4th Annual Report

CARE

Coordinated Accelerator Research in Europe

Integrating Activity

implemented as

Integrated Infrastructure Initiative

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A. ACTIVITY REPORT

1. PROGRESS REPORT

1.1 Summary of the activities and major achievements

The CARE project includes three networking activities ELAN, BENE, HHH, and four joint research activities SRF, PHIN, HIPPI and NED. The third year of the project has permitted the following major achievements.

1.1.1 Networking Activities

CARE Management Activity

- Edition of the third CARE annual report (April 2007)
- Mid-term review passed successfully (April 2007)
- Organisation of the CARE general meeting CARE07 (CERN, Geneva, November 2007)

N1 Electron Linear Accelerator Network (ELAN)

- Submission and approval of the FP7 "ILC Hi-Grade" CNI-PP project
- Support for the second international ILC school in Erice, Italy (October 2007)
- Support for the first CLIC Workshop at CERN (October 2007)

N2 Beams in Europe for Neutrinos Experiment (BENE)

- Submission and approval of FP7 "EuroNeutrino" and "Laguna" Design Studies
- Support for the Neutrino Factory workshop "NuFact07" in Okayama (August 2007)
- Support for the Next generation Nucleon decay and Neutrino detectors workshop "NNN07" in Hamamatsu (October 2007)

N3 High Energy High Intensity Hadron Beams (HHH)

- A third route for the LHC interaction region upgrade was identified, based on crab cavities plus a new triplet allowing for $\beta^*<0.25$ m. Beam parameters for this and the two alternative IR upgrade scenarios were consolidated. In parallel a detailed upgrade plan for the LHC injector complex was established.
- Tests of crystal multi-reflection in the SPS North Area with a 400-GeV proton beam demonstrated more than 90% extraction efficiency, with a considerable deflection angle, which suggests, as next step, to perform tests in circular accelerators, such as the CERN-SPS or the FNAL-Tevatron.
- Several novel technologies for the systematic suppression of beam-beam effects in the LHC proper and of electron-cloud effects in the LHC injectors were proposed and are presently being prototyped or tested, including beam-beam compensators, crab cavities, and special vacuum chambers.

1.1.2 Joint Research Activities

JRA1 Superconducting Radio Frequency (SRF)

- Progress has been made in fabrication of the first 9-cell hydroformed cavity and also a 9-cell cavity from large grain material. Based on these results it can be expected to fabricate high gradient and high Q (low RF loss) cavities at reduced material and processing costs (WP3.2)

- Excellent results on electro polishing followed by alcohol rinsing have been reported, following experience of intensive EP studies of Niobium cavities at the labs and also by industrial studies (WP5).
- The successful test of the beam position monitor (BPM) will allow this BPM will be used in FLASH and also in the XFEL accelerator (WP11.1)

JRA2 Charge Production in Photo-Injectors (PHIN)

- Production of photocathodes Cs_2Te with a Quantum Efficiency (QE) of 7 % has been measured at CERN on a photocathode produced in the preparation chamber with a DC gun and a life time test up to 1000 hours (WP2).
- Development of compact single shot electron spectrometers at LOA in order to control the electron distribution energy (WP2).
- Principle of phase-coding for CTF3 demonstrated at INFN-Milano (WP3).
- Construction of the photocathode preparation system and first beam produced in ELBE (WP4).

JRA3 High Intensity Pulsed Proton Injector (HIPPI)

- CCDTL Pre-prototype and Prototype successfully tested at CERN with full RF power (WP2).
- High-power test stand for superconducting cavities at CEA-Saclay completed (WP3).
- Beam experiments at GSI linac completed, showing good agreement with simulated parameters (WP5).

JRA4 Next European Dipole (NED)

- Thermal studies completed with, as key result, a first indication that the new innovative insulation types can have an order of magnitude better heat removal that the classical types employed up to now (WP2).

1.2 MANAGEMENT ACTIVITY

- The 2007 instalment received from the EC has been distributed to the CARE contrators.
- The CARE Web site http://care.lal.in2p3.fr/ has been regularly updated (CNRS-Orsay).
- The official table of the CARE deliverables has been regularly updated on the CARE Web site at http://care.lal.in2p3.fr/Deliverables .
- The CARE Publication Database has been maintained and updated (CEA).
- The following table lists all the management meetings as well as the general annual meeting CARE 07 organised by the management team.
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Date	Title/subject of meeting	Location	Number of attendees	Website address
17-18 April 2007	CARE Steering Committee and Dissemination Board	CERN	15	http://care.lal.in2p3.fr/CAREmeetings/Management/Steering/Schedule/
12 September 2007	CARE Steering Committee and Dissemination Board	CERN	15	http://care.lal.in2p3.fr/CAREmeetings/Management/Steering/Schedule/
29-31 October 2007	General meeting CARE'07	CERN	108	http://www.lnf.infn.it/conference/care06/index.htm
31 October 2007	CARE Steering Committee and Dissemination Board	CERN	15	http://care.lal.in2p3.fr/CAREmeetings/Management/Steering/Schedule/
30 October 2007	CARE Governing Board	CERN	24	http://care.lal.in2p3.fr/CAREmeetings/Management/Governing/Schedule/

1.3 NETWORKING ACTIVITIES (other than Management)

1.3.1 N1: Electron Linear Accelerator Network (ELAN)

ELAN is the CARE network for Electron Linear Accelerators. It comprises 11 countries plus CERN. The list of participants and their implication in the ELAN Work Packages (**C**: Coordination, X: Participation) is given in the table below. The overall management is done by CNRS-Orsay and CERN.

Number	Participant	LTECNC	LTECSC	BDYN	INSTR	ANAD
1	**CEA**		X	X	X	
3	**CNRS**	X	X	X	X	X
	CNRS-Orsay		X	X		
	CNRS-CPHT					X
	CNRS-LULI					X
	CNRS-LAPP	X			X	
	CNRS-LOA	X			X	X
	CNRS-LPGP					X
	CNRS-LPCO	X				
5	**DESY**		X	X	X	
7	**FZJ**				X	
8	**FZR**		X		X	
10	**INFN**	X	X		X	
	INFN-LNF	X			X	
	INFN-LNL		X			
	INFN-Mi		X			
	INFN-Na		X			
	INFN-Ro2		X			
11	**TEU**				X	
12	**TUL**		X			
13	**IPJ**		X			
14	**WUT-ISE**		X			
16	**CSIC**		X	X		
	CIEMAT		X			
	LEII		X			
17	**CERN**	X		X	X	
19	**PSI**				X	
20	**CCLRC/STFC**	X	X	X	X	X
21	**ICL**			X	X	X
22	**UMA**			X	X	

There are also associates:

Participant number	Organisation (name, city, country)	Short name	Associated to
1	Center for the Advancement of Natural Discoveries using Light Emission, Yerevan , Armenia	CANDLE	CERN
2	Technion – Israel Institute of Technology, Tel-Aviv, Israel	Technion-IIT	CERN
3	Stanford Linear Accelerator Center, Stanford, USA	SLAC	CERN
4	Krakow University of Technology, (Institute of Applied Mechanics), Krakow, Poland	CUT	CERN

N1.1 Meetings

- 10 workshops + 1 Accelerator school were supported by ELAN (~same as in 2006) as shown below
- This effort resulted in 26 ELAN Documents (17 in 2006)
- The ELAN web page contains all relevant informations about workshops and documents: http://esgard.lal.in2p3.fr/Project/Activities/Current/Networking/N2/ELAN/

N1.2 Publications

See http://esgard.lal.in2p3.fr/Project/Activities/Current/Networking/N2/ELAN/Documents/

N1.3 Web sites

See http://esgard.lal.in2p3.fr/Project/Activities/Current/Networking/N2/ELAN/

N1.4 Activities of ELAN in 2007

The main purpose of ELAN has been to favour the various R&D and European initiatives towards high energy electron linacs. This goal was achieved primarily:
- By supporting several workshops in Europe and throughout the world
- By taking part to the various panels preparing the European strategy (ESGARD and the working groups for the calls of FP7)

There are 3 main relevant topics addressed within ELAN:
- The supra-conducting RF electron linac with the ILC project
- The normal-conducting RF two beam linac with the R&D on CLIC
- Laser and beam plasma acceleration with EUROLEAP (NEST initiative)

During the present years these 3 activities have been rapidly evolving.

ILC has released during last summer a Reference Design Report on the Machine and the Detectors including costing:
http://www.linearcollider.org/cms/?pid=1000437
External reviews have concluded that designs and costs were realistic. The RDR documents were signed by 1800 physicists and engineers belonging to 320 institutions. European participants were 25 % on the machine and 57 % on detectors.
Note finally that UE, through the CNI preparatory phase project **ILC-Hi-Grade**, is providing a precious help for an effective participation to the new phase of ILC with contributions to the most critical technical developments and the coordination of efforts of the main European players: CERN, DESY, France, Italy, and UK

The R&D on CLIC is actively progressing through the CTF3 facility at CERN which is aimed at proving the feasibility of 2 beam acceleration. This work has been summarized at the recent

CARE workshop held at CERN during the ELAN parallel session by JP Delahaye and with a highlight talk was given by A. Grudiev in the plenary session. With better understanding of gradient/frequency scaling laws (the need for low aperture cavities in conflict with high frequency), CLIC parameters were recently revised:

- The frequency was reduced from 30 GHZ to 12 GHZ (allows relaxed alignment tolerances, testing with conventional sources at SLAC and KeK)
- The goal for the gradient was reduced from 150 to 100 MV/m with problems similar to ILC (preparation of surfaces, conditioning) for reliability

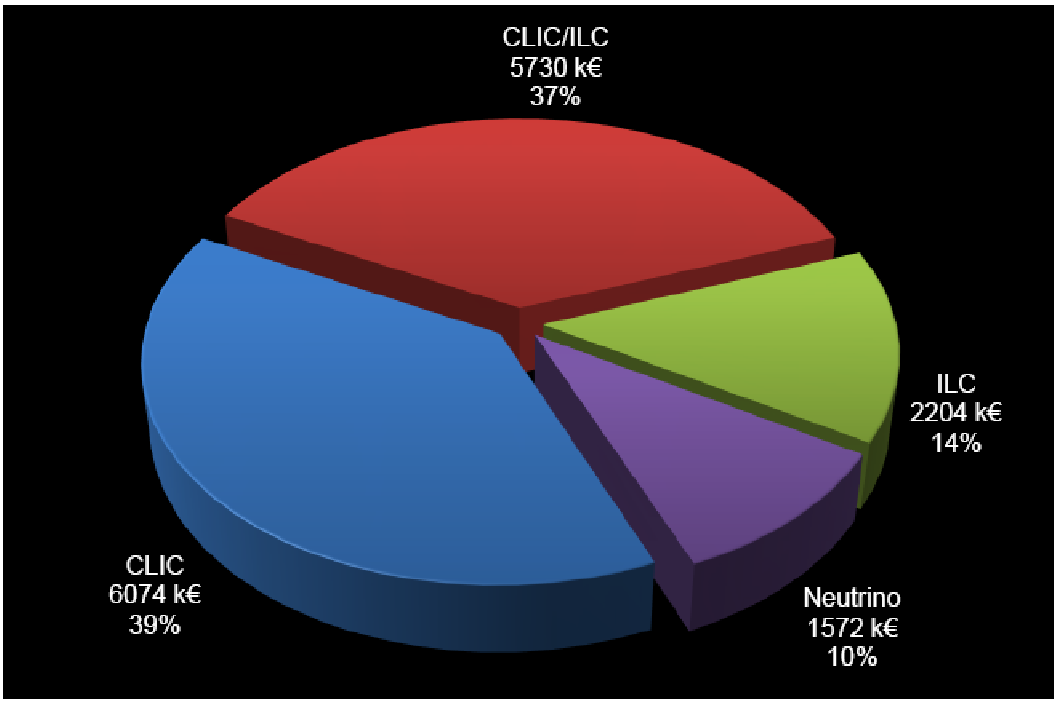
The objective is to produce a Concept Design Report by 2010.

Last year there was a breakthrough on the laser/plasma technique with an accelerated beam at 1 GeV (see V. Malka talk in the CARE07 plenary). This year there was a successful attempt on beam/plasma at SLAC: a ~1m plasma wakefield accelerator was achieved (see Blumenfeld et al. Nature 445 (2007) p. 741) using a 40 GeV electron beam which induced plasma gradients reaching up to 50 GV/m.
This community is also entering in a Preparatory Phase to launch a large European project: The Extreme Light Infrastructure called ELI.

ESGARD has split in 3 groups the relevant LoI (Letters of Intents) received for Integrated Activities (IA). ELAN is involved in the organization of 2 of them:

- IA on SCRF coordinated by O. Napoly relevant for ILC
- IA on new techniques of acceleration which include CLIC and ILC coordinated by E. Jensen

Our main purpose has been to connect ELAN activities within this framework.



ELAN is keen in encouraging ILC-CLIC synergies. These two techniques share several common items: Alignment issues (participation to ATF2 at KeK), instrumentation, generation of positrons, beam dynamics…One can note that within the IA proposal on Novel Acceleration Systems (warm technologies), the above diagram shows that the overlap is fairly large.

ELAN is also encouraging connections between accelerator experts and the laser/plasma community. It was recently agreed to accommodate some of the demands into EuCARD, the new IA, in spite of severe financial limitations.

Do we still need ELAN?

It is fair to say that while the 3 activities are progressing very fast, one notes a clear decrease of direct participation to ELAN specific tasks since the groups tend to focus for their reporting and deliverables to their specific collaborations (GDE and EUROTEV for the LC, EUROLEAP for Plasma acceleration). This trend was clearly not foreseen when we initially planned ELAN. It would seem inappropriate to impose artificially an extra layer creating duplication of effort while the available manpower is very limited.

The present trend does not mean that ELAN resources are not well spent. They still allow an active participation to workshops which helps to increase the European competitiveness in these international efforts. We are also quite active in the preparation of FP7. Next year there is a planned reduction by a factor 2 of the funding of ELAN. The present conclusion seems therefore to be that ELAN should go on.

Conclusions

The field of high energy electron linacs is very active and progresses well. ELAN has helped in connecting the various actors. ELAN suffers, paradoxically, from its success and gets short-circuited in many of its initial goals. ELAN financial resources are however needed to promote European participation to workshops.
We think we should go on in 2008 with ½ budget as initially planned.

N1.5 Significant Achievements

- Completion of the ILC European contract ILC Hi-Grade
- Support of 11 workshops on innovative linac technologies
- Helping the synergy between ILC and CLIC
- Helping the synergy between linac R&D and laser-plasma acceleration R&D
- Preparatory work for Integrated Activities within FP7
- Release of 26 documents in the ELAN web-base which describe in detail some of the contributions achieved under ELAN

N1.6 List of major meetings organized under ELAN during the reporting period

2007		
9th ACFA ILC Physics and Detector Workshop & ILC GDE Meeting	04 - 07 February	IHEP, Beijing
ECL2 Electron Cloud Clearing	28 February to 02 March	CERN
TTC TESLA Technology Collaboration Meeting	23 - 26 April	FERMILAB, Batavia, Illinois - USA
POSIPOL 2007 Workshop	23 - 25 May	Orsay, France
LCWS2007 and ILC2007 Linear Collider Workshop	30 May - 03 June	DESY, Germany
CLIC structure workshop	18 - 19 June	CERN
LPAW07 Laser and Plasma Workshop Accelerators Workshop	09 - 13 July	Azores
IBS'07 Intra Beam Scattering Mini Workshop	28 - 29 August	Daresbury, UK
2007 LC Second International Accelerator School for Linear Colliders	01 - 10 October	Erice, Italy
CLIC Workshop	16 - 18 October	CERN
CARE07	29 - 31 October	CERN

1.3.2 N2: Beams in Europe for Neutrino Experiments (BENE)

BENE is the CARE network for Beams for European Neutrino Experiments. It comprises 13 nodes. The table of the participants and their implication in the BENE Work Packages is given below.

Participant number	Participant	PHYSICS	DRIVER	TARGET	COLLECTOR	NOVEL NEUTRINO BEAMS
1	**CEA**	X	**C**	X	X	**C**
2	**UCLN**	X				X
3	**CNRS**	X			X	X
	CNRS-Orsay	X			X	X
	CNRS-LPNHE	X			X	
	CNRS-CENBG	X				
	CNRS-IPNL	X			X	
	CNRS-LPSC					**Cb**
	CNRS-IReS	X			**C**	
4	**GSI**					X
7	**FZJ**		X	X		
8	**TUM**	X				X
10	**INFN**	**C**	X	X	X	X
	INFN-LNF	X				X
	INFN-Ba	X				X
	INFN-Ge					X
	INFN-GS	X				
	INFN-LNL	X	X			X
	INFN-Mi	X				X
	INFN-Na	X				X
	INFN-Pa	**C**				X
	INFN-Pi	X				
	INFN-Tr	X				X
	INFN-Ro3	X				X
	INFN-To	X				
16	**CSIC**	X				
	UBa	X				
	IFIC	X				
	UAM	**C**				
17	**CERN**	X	X	X	X	**Cc**
18	**UNI-GE**	X		X	X	X
19	**PSI**			X		
20	**CCLRC/STFC**	X	X	**C**	X	X
	RAL	X	X	**C**	X	X
21	**ICL**	X		X		**Ca**

The overall management is done by INFN-Na. During the period our new Deputy Coordinator (S. Pascoli, from Univ. of Durham, associated to ICL) has been improving our dissemination

BENE's mandate is that to promote clear awareness, in our particle physics peer community, a) the physics interest of superior accelerator neutrino beams (Superbeams, Betabeams, Neutrino Factories) b) the promising on-going developments of accelerator technology that will make them possible c) the opportunities that exist to plan, fund and realize, on a realistic time scale, a much enhanced European accelerator neutrino complex tools. Less new WP coordinators have been consolidating hold of the PHYSICS (A. Donini, co-coordinator), DRIVER (M. Zito), TARGET (C. Densham) and COLLECTOR (M. Dracos) WPs.

2007 marked the approval of the EuroNu DS proposal, after 2006 had been a key year for the BENE Network. Its strategy, including its attention to international collaborations in a truly global context, was recognized valid by CERN Council in its Strategy Document issued in July 2006 in Lisbon. A more powerful accelerator neutrino complex is regarded since as an emerging facility of EU interest, in the context of the ESFRI road map.

This was confirmed, following the first FP7 call of spring 2007, when we could finally submit our EuroNu DS, by the highest rank achieved by our proposal and its admission to negotiation for the largest EC contribution of its call. The EC negotiations are still in progress, we should be able to start the DS in the first part of 2008

Lead by STFC, this Design Study will review all three currently accepted methods of realizing this facility (the so-called neutrino Super-Beams, Beta Beams and Neutrino Factories). In the Neutrino Factory sector, it will be also our contribution to an International Design Study with America and Asia. It includes a detailed study of the key technical challenges of the accelerator facilities. It will use the available information baseline detector option best suited to measure physical quantities governing neutrino oscillation parameters to make a comparison of the physics reach of these facilities. The construction of such a facility in Europe would reassert Europe's position as the leading region for high energy particle physics.

BENE looks now forward to deploy the strongest possible effort to contribute to the establishment of another coordinated European participation to a structured European and International R&D program. Our main task remains that of assembling a large and solid collaboration of laboratory and university teams supported by all the European agencies willing to contribute increasing funds and human resources to our sector. This EU collaboration would participate to a global effort, clustering around a small but freshly re-motivated CERN task force .

Another FP7 Design Study Proposal, LAGUNA, originated from the astro-particle physics community, focusing on underground laboratory facilities of great interest also for accelerator neutrinos, **has also been admitted to negotiation**.

In the second part of the year, BENE has **switched** the focus of its attention **to the** preparation of proposals for the first FP7 **IA call**.
The IA Proposal in preparation in the particle accelerator sector has become known as **EuCARD** and **includes** Work Packages of great interest ALSO for neutrino beams.

1) A NA, **NEU20012** aiming at structuring of the accelerator neutrino community tighter than BENE will be able to. The name NEU20012 is meant to convey clearly the message that indeed Neutrino users in EUrope will meet the 2012 date recommended by Council.
2) **MICE-TA,** a Trans-national Access centred around the muon facility in advanced construction at the ISIS synchrotron at the Rutherford Laboratory in the UK
3) several **JRA's** either of -direct interest and involvement of the neutrino beams community, like the one including Fixed Field Alternating Gradient **FFAG** accelerators of protons and/or neutrino parents or the one including Superconducting Proton Linacs **SPL** that can possibly reach the high power level desirable for neutrino

facilities.
-interest for possible synergy with the upgrade of the EU proton collider LHC, like the one including R&D on high field magnets **HFM** (usable in accelerators and storage rings of neutrino parents) or the one including R&D on the behaviour in high power radiation environment of materials considered for LHC collimators **COLMAT** (but also for high power targets producing neutrino parents and high power collection devices collecting them)
-interest for possible synergy with the R&D towards more powerful electron linear colliders, like the one including R&D on normal conducting radiofrequency (applicable to muon ionization cooling) **NRF** or on superconducting radiofrequency **SRF** (applicable in several sectors of both conventional and novel neutrino beams.

A long intense phase of preparation of this proposal, that has had to involve several senior members of BENE, is approaching its deadline of 29 Feb.

BENE is giving its contribution also to another IA Proposal in preparation in the particle detector sector. That has become known as **DEVDET** (development of detectors) and includes Work Packages on neutrino detectors of great interest for neutrino beams.

The activities of BENE interest in the FP7 IA proposals try to move further on the path of the set by the on going program of R&D and design work. We hope that the entire set of EuCARD and DEVDET initiatives of interest for neutrino beams will be approved and strongly supported by European agencies in the years 2009-2012.

The year 2012 was set by Council as the milestone for the next major undertaking in this field. Studies of the scientific case for future neutrino facilities and the R&D into associated technologies are required to be in a position to define the optimal neutrino program based on the information available in around **2012. The BENE effort on FP7 proposals works now in that prospective.** A possible, desirable, model is the establishment by CERN Council of an oversight body for neutrino physics whom NEU2012 could submit in 2012 its proposal an of optimal programme of accelerator neutrino experiments.

2012 is likely to have been indicated as it is the year when solid physics results should have arrived from LHC, giving general direction to particle physics, and the T2K and Double-CHOOZ experiments, giving great guidance to identify the optimal step in the exploration path of neutrino transitions. Meanwhile financial resources will be liberated by the end of the payments for LHC and its detectors. Major decisions will be mature, for ILC, for accelerator neutrino and for other sectors. The deadline must be met.

In addition to this strong focus on FP7 proposals, during 2007 the BENE Network has

1) **Monitored the physics results of the accelerator neutrino experiments in progress and their implications for the directions of the field.** The main result of the year was the null result[1] of the MiniBoone experiment on the Fermilab Booster neutrino line. The long standing LSND claimed evidence for a neutrino transitions over a distance much shorter than those of both “solar” and “atmospheric” transitions was, in the end, dismissed. The possibility of a fourth sterile neutrino was thus pushed to much higher energy. **The 3*3 mixing matrix scenario emerges stronger**: if so, its

[1] A.A. Aguilar-Arevalo et al., "A Search for Electron Neutrino Appearance at the $\Delta m^2 \sim 1$ eV^2 Scale", arXiv:0704.1500 [hep-ex], Phys. Rev. Lett. 98, 231801 (2007).

one and only one CP violating phase is now certainly a decisive physical quantity to measure.

2) **Followed closely progress of the CNGS**. First, the successful repairs in view of the main run of 2007 that resulted in a few days of high intensity running in September. Reaching full nominal intensity was prevented by new problems in the ventilation control electronics that forced an early 2007 shutdown and are now being tackled so that finally the run of 2008 can be a productive physics run. I view of the rapid progress of the **OPERA** detector, BENE follows that with great concern
3) **Taken interest in the studies of the ultimate performance of the CNGS.** These have been stimulated in 2007 by the ICARUS group[2] (envisaging a new much larger Li-Ar detector module and a new shallow underground detector hall not far from the present LNGS site where an incremental multi **ModuLAr** detector could take shape)**.** While BENE looks forward to more ambitious future facilities, it is well aware that these can only be rooted in the expertise that has produced the CNGS and its predecessors, the WANF and the PS neutrino beams. It does therefore follow closely exploration of the upgrade paths to maximal CNGS performance under study by the CERN/AB CNGS team and recommends a more complete and conclusive study of the accelerator and physics performance.
4) **Followed closely the progress of the EU Team in the T2K experiment in Japan.** This is a large team of about 150 physicists that is contributing major components of the T2K near (280m) detector, including the refurbished European NOMAD (former UA1) big magnet. T2K has recently become a CERN recognized as experiment (RE13), with establishment of a regular MoU[3]. The community supporting future neutrino facilities in Europe includes this team, as Well as the smaller EU team working **in MINOS at Fermilab.** In addition to detectors, Europe is preparing to contribute to T2K the result of a small dedicated experiment, known as NA61 or SHINE, on a secondary CERN SPS 40 GeV proton beam, measuring hadro-production of neutrino parents in the proton energy region of interest for T2K. Now approved NA61 is preparing to collect its data. Contribution to the T2K beam line is being provided by the RAL and Saclay Accelerator Divisions.
5) **Followed closely the progress of the Betabeam DS** that is taking place within the Eurisol DS. This concerns only the original betabeam concept reusing the present SPS and using low Q value He and Ne ion decays, respectively for antineutrino and neutrino, meant to travel distances of the CERN-Frejus size. Major progress in the efficiency of extraction and reacceleration of ions as well as stacking and radiation containment in the storage ring has been achieved.
The use of different higher Q value ion decays, different production schemes, ion acceleration to higher Lorentz gamma factors (and consequently higher energy neutrinos travelling longer paths) and more will be tackled by the EuroNu DS. Different production schemes are particularly important, as a shortage in the production of Ne ions seems to affect the original ISOL scheme.
6) **followed the progress of R&D projects** in progress, **in Europe**, where much scientific, technical and organizational work has been done by BENE members in the collaborations
a) **HARP** data analysis, providing finally more solid, experimental, production data of neutrino parents both in the forward and central production region

[2] LOI for a new very massive modular Li-Ar Imaging Chamber to detect low energy off axis neutrinos from the CNGS beam (22/12/2006) and Proccedings of the second CryoDet Workshop, Gran Sasso, June 2007

[3] Memorandum of Understanding CERN/T2K, 24-Nov-2006

b) **HIPPI** design work of LINAC4, possibly the first backbone of a high intensity particle physics facility in Europe.
c) **MICE** progress towards running the muon ionization cooling test facility being built at RAL.
d) **MERIT** test installation of a target and solenoidal collection system exposed to a (single) CERN PS proton bunch comparable to the one foreseen at future higher power facilities.
e) The non scaling FFAG demonstration electron model machine, **EMMA**, in preparation at Daresbury
as well as outside Europe where also some work has been contributed by BENE members
f) upgrade studies to a **NuMi+** facility, **Project X** studies for a new proton driver, the design of a new **FNAL-DUSEL conventional** neutrino beam line, the studies of the Neutrino Factory and Muon Collider Collaboration **NFMCC**, the **MUCOOL** project, developing and testing in the Fermilab Muon Test Area **MTA** components of a muon ionization cooling channel, in the US
g) The Japanese progress in the construction of the **T2K facility** and the planning a Japanese muon facility **PRISM** that may evolve into a neutrino factory (**NuFactJ**).

7) **Contributed to all the few most important international events of the year: -WIN07 Workshop on Weak Interactions and Neutrino** January, India-the **Durham** Workshop in February -the late winter **Rencontres de Moriond** and **Rencontres de la Thuile** -the **Venice Neutrino Telescopes Workshop** in March-the **HEP Conference** in Manchester in July -the **Lepton Photon Conference** in July-the **CARE07** and **BENE07 Workshops** at CERN in November and more, re-proposing updates on BENE basic strategy to aim at a Conceptual Design Report of a new ν-complex by 2012 or so, the main results of the Intern. Scoping Study on Neutrino Factory & Superbeam and progress of the Betabeam Design Study, advocating that a timely R&D program should not be procrastinated and recommending participation & commitment to the BENE FP7 projects and proposals and to its International Design Studies.
8) **Contributed to its two main traditional yearly appointments.** A large BENE delegation was present to both meetings-**NuFact07**, in August, in Okayama. As stated earlier in BENE reports, the NuFact Workshop is the yearly international forum of a world-wide collaboration of several regional communities and has gained importance over the year, providing every year the most advanced review of the potential of both conventional and novel neutrino facilities. The BENE community has been presenting the work of one year giving almost 1/2 of the talks given in all parallel and plenary sessions of the workshop. http://fphy.hep.okayama-u.ac.jp/nufact07/ -**NNN07**, in October, in Hamamatsu. Very similarly, the NNN Workshop is also a yearly international forum of a world-wide collaboration of several regional communities, reviewing the physics case and the technical of Next very large mass underground Neutrino and Nucleon decay detectors and structuring the international collaboration towards their realization. The concept of a large Megaton water detector has emerged independently in the 3 regions, under the name of Hyper-Kamiokande in Japan, of UNO in the USA, MEMPHYS in the Western Alps in Europe, where the Li-Argon option is also well alive (ModuLAr). The three designs have much in common, the collaborations have significant overlap and work in very close cooperation, with the aim of realizing commonly one such detector in the region that will offer the best and earliest opportunity. The BENE community has been presenting a significant fraction of the talks given at the workshop. http://www-rccn.icrr.u-tokyo.ac.jp/NNN07/ .

9) **Been continuing its contributions to** the task forces set up by CERN set up to look into its options for proton accelerator of the future **(PAF)** and into the physics opportunities of those future proton accelerators (**POFPA**), with the decisive task of **designing the best possible proton complex** capable of best serving LHC and its upgrades, an ambitious neutrino program, some frontier aspects of kaon, muon and other fixed target physics, the nuclear physics of radioactive ion beams and possibly more. In addition, A. Blondel and P. Dornan have been our voices in the CERN **SPC**.
10) **Contributed to the completion of the transition from ISS to IDS and to the start of the NF-IDS**. Launched at the BENE organized edition NuFact05 in Frascati and formally concluded in August 2006 at NuFact06, the International Scoping Study on Neutrino Factory and Superbeam http://www.hep.ph.ic.ac.uk/iss/ had in reality to use almost entirely the year 2007 to complete its reports, now available on its Web Site. An overall study report is accompanied by the three reports of the three Physics, Accelerators, and Detectors Working Groups. A detailed account of the results achieved was already provided in the BENE Yearly Report 2006. The start of a four or so years long NF-IDS, International Design Study, http://www.hep.ph.ic.ac.uk/ids/ focusing exclusively on the Neutrino Factory, was prepared during 2007. A transition meeting took place at CERN in March 2007 http://www.hep.ph.ic.ac.uk/ids/communication/cern-2007-03-29/index.html, an ad-hoc steering group presented its plans to NuFact07 in August. NuFact07 endorsed the **basic strategy to aim at a Design Report of a new ν-complex** by 2012 or so. A steering committee was set up and a first meeting of the NFS-IDS took place http://www.hep.ph.ic.ac.uk/ids/communication/RAL-2008-01-16/index.html in January 2008 at RAL. The study is going, now, and will work and meet together with the Neutrino Factory package of the EuroNu FP7 DS. Its work structure has Accelerator Design, Detector Design and Performance Evaluation task forces.
11) **Been preparing** a less lucky FP7 **proposal for** a **Marie Curie Initial Training Network** centred on the themes of BENE. The potential of the activities of BENE interest for an ITN was acknowledged by the referees and we were advised to resubmit the proposal after more careful preparation. We will do so at next call. Admittedly, we did not foresee enough time for its preparation.
12) **Been hosting** for **the** first time in Europe an FFAG (**Fixed Field Alternated Gradient) Workshop** April 12-17 at LPSC in Grenoble. http://lpsc.in2p3.fr/congres/FFAG07/ We observe today a revival of this concept, that is as old as the principle of strong focusing, when pulsed field prevailed in the fifties for high energy applications. The use of fixed fields, not ramping, that implies growing orbits and so large acceptance and limited acceleration factor, per FFAG, is returning of interest today, pioneered in Japan by Mori, Machida et al. and then in the US. It can accelerate very rapidly, as necessary for unstable neutrino parents, and with very high currents, thus promising applications as a proton driver too. Over a wide range, low energies for cancer therapy applications and medium energies for particle physics applications. Part of a FP7 JRA being proposed in EuCARD concerns FFAGs.
13) **Been fostering the establishment of a detector R&D effort,** mandatory for the achievement of its goals. The themes and collaborations of the neutrino related activities being proposed in the DEVDET IA have been identified at NNN07 and **at Golden07**, First International **Workshop on the Golden Channel at a Neutrino Factory**. http://evalu29.ific.uv.es/golden07//Welcome.html. The baseline detector for this electron to muon neutrino golden transition is currently considered to be a Magnetised Iron Neutrino Detector (MIND) of the MINOS type. Alternative is a Totally Active Scintillation Detector (TASD) of the NOvA type. A complementary

approach is the one of Magnetized Emulsion Cloud Chambers (MECC) extending the functionality of OPERA like ECCs.

14) **Contributed to the organization of the 3rd International High-Power Targetry Workshop** organized in September 10 – 14, 2007 Bad Zurzach, Switzerland by the Paul Scherrer Institut, Villigen PSI. http://asq.web.psi.ch/hptrgts/index.html The High-Power Targetry Workshop brings together interested scientists and engineers from the international community. In particular scientist from the major high-energy laboratories in the US, Japan and Europe are addressed. Subject matter of the workshop focuses on problems and solutions for targetry utilizing MW class future accelerators. Both high average power and high peak power issues are explored. For the third workshop, the organizing committee had decided to focus on future activities which will lead toward successful implementation of targets for proposed new multi-MW class proton drivers.
15) **Been following** with great attention **a renewed push in the USA on a Muon Collider and Neutrino Factory option for Fermilab** and the establishment and first results of a Muon Collider Task Force (MCTF) at Fermilab, in addition and in close collaboraton with the long established US NFMC Collaboration. Among the most promising aspects there is the renewed discussion of a high power 8 GeV proton linac (the X Project) capable of driving Main Injector neutrino lines and possibly a Neutrino Factory, before a Muon Collider.
The UK Neutrino Factory (UKNF) Collaboration has organized in Abingdon, Oct 21-24, a very stimulating Topical Workshop on the physics and R&D programs of Neutrino Factory & Muon Collider, to exchange experience with this effort. http://indico.cern.ch/conferenceDisplay.py?confId=16035
16) **Organized during** the annual **CARE07** http://care07.web.cern.ch/CARE07/ meeting **its yearly BENE07 Workshop** http://bene.web.cern.ch/bene/BENE07Agenda.pdf. Its presentations http://care07.web.cern.ch/CARE07/Presentations/ reviewed extensively the achievements of the year in Europe and elsewhere listed above. The orientation of our IA proposals was discussed and endorsed by the community.
17) **Been starting preparation of the NuFact08 and NNN08 Workshops, both in Europe**. The first returns after the canonical three years and will be organized in Valencia in late June http://ific.uv.es/nufact08/. NNN08 International Workshop on Next Nucleon decay and Neutrino detectors will take place in Paris 10-13 September 2008. http://nnn08.in2p3.fr/2008 thus promises to be an intense year for European initiative in our sector.

N2.1 Meetings

The major events organized or co-organized by BENE in 2007 were:

1) **WIN07** the **21 International Workshop on Weak Interaction and Neutrinos**, Jan 15-20 in **Kolkata, India** the main neutrino event worldwide in the odd years, was organized with significant BENE contributions, including an ISS/IDS session http://www.saha.ac.in/anp/win07.sinp/win07/index.htm

2) **Open meeting of the BENE SG, Feb 21 2007, CERN, Geneva, Switzerland,** http://bene.web.cern.ch/bene/070221Open%20Meeting%20of%20the%20BENE%20Steering%20Group.doc , organized to review the work in progress in the preparation of the FP7 Design Study proposals, EuroNu and also Laguna

3) **Plenary ISS/IDS meeting, March 29-31 2007, CERN, Geneva, Switzerland** http://www.hep.ph.ic.ac.uk/ids/communication/cern-2007-03-29/ that defined the ways of the transition from scoping to design study.

4) **FFAG07, Apr 12-17 2007,** LPSC **Grenoble, France** in Grenoble. http://lpsc.in2p3.fr/congres/FFAG07/

5) **Golden07**, First International **Workshop on the Golden Channel at a Neutrino Factory**. http://evalu29.ific.uv.es/golden07//Welcome.html, Jun 27-30 2007, Valencia, Spain, focusing on magnetic detectors for the so called "golden transition channel" at the Neutrino Factory

6) **NuFact07 Summer school, 6th International School on Neutrino Factories, Superbeams and Betabeams,** Jul 27 – Aug 04 2007, KEK Tsukuba, Japan, coupled yearly to the NuFact07 Workshop, with the aim of the school is to provide young particle physicists with an introduction to both particle and accelerator physics aspects of conventional and novel neutrino beams. We had many EU lecturers as usual, a few EU students attended, most being of course Asians, this year http://fphy.hep.okayama-u.ac.jp/nufact07/summer_school

7) **The NuFact07 International Workshop**, the 9th International Workshop on Neutrino Factories, Suprbeams & Betabeams, 6-11 August, Okayama, Japan as detailed in several places in this report.

8) **The 3rd International High-Power Targetry Workshop** organized in September 10 – 14, 2007 Bad Zurzach, Switzerland by the Paul Scherrer Institut, Villigen PSI. http://asq.web.psi.ch/hptrgts/index.html

9) The **NNN07 Workshop on Next Nucleon decay & Neutrino** http://www-rccn.icrr.u-tokyo.ac.jp/NNN07/, 2-5 October, Hamamatsu, Japan, 6th edition of this international Workshop, as detailed in several places in this report. .

10) A regular (short) week of meetings of BENE related work packages, study groups and R&D projects (BENE07) took place during CARE07 at CERN. We had parallel meetings of several WPs. Then a plenary session of all accelerator WP together, where the themes of each of them (DRIVER, TARGET, COLLECTOR, MUFRONT, MUEND and BETABEAM) and those specific of the R&D experiments in progress will each covered Plans for the IA proposal were discussed and the agenda of BENE in 2008 was finalized.

At the WP level, it felt wise to limit dedicated meetings, in addition to the BENE meetings, the many plenary and parallel meetings of the IDS and ISS and the proliferating multiple international appointments.

The PHYSICS WP met in the occasion of the plenary and parallel meetings of the ISS/IDS Physics and Detector Group g, of the meetings preparing the proposal of the Physics and Detector WP of the EuroNu DS proposal, in the WG1 of NuFact07 and at the BENE07 Workshop.

The Accelerator WPs, DRIVER, TARGET; COLLECTOR, NOVEL NEUTRINO BEAMS met in the occasion of the plenary and parallel meetings of the ISS/IDS Accelerator Group, of the meetings preparing the proposal of the Superbeam, Neutrino Factory and Betabeam WPs of the EuroNu DS proposal, in the WG3 of NuFact07 and at the BENE07 Workshop.

Phone-meeting are the common practice to prepare the major events.

MuEND organized FFAG07, chaired by F. Méot.

In addition, BENE has been present to all major neutrino events in the year. In 2007 we will mention only two most important and representative events, the **European Physical Society High Energy Physics Conference** in Manchester, 19-25 July http://www.hep.man.ac.uk/HEP2007/ and the XXIII International Symposium on **Lepton** and **Photon** Interactions at High Energy. Aug 13-18, Daegu, Korea, http://chep.knu.ac.kr/lp07/htm/s11_01_01.htm, both attended by a small BENE delegation with speakers in some sessions and/or panel discussions.

BENE has also made reports at regular ECFA meetings in the year. It also keeps regular contact with the Chairs of the CERN scientific committees (SPSC, SPC) and the CERN Directorate.

N2.2 Publications

An overview of BENE documents and publications can be found in:
http://bene.web.cern.ch/bene/publications/
From there one can link to the documents created by each work package. They are structured in the same way as it is proposed for the general CARE publication policy, i.e. CARE-Note/Report/Conf/Pub/Document.
Regular update of the database of publications by the work package convenors and the BENE deputy coordinator has been hindered by the lack of a deputy coordinator. It has now been resuming as documented by the preliminary list of not yet properly filed publications assembled in the Appendix

N2.3 Web Sites

The BENE Main Web Page has been improved and refurbished at http://bene.web.cern.ch/bene/.

It displays the general plan of BENE activities for about 1 year ahead. Basic informations are kept up to date. BENE federates several pre-existing working groups and relies on their several pre-existing Web sites
http://muonstoragerings.web.cern.ch/muonstoragerings/Welcome.html
http://nfwg.home.cern.ch/nfwg/nufactwg/nufactwg.html
http://beta-beam.web.cern.ch/beta-beam/

The process of re-organization into a unitary site, in tune with the BENE federative process, continues. In each BENE WP Web page, the fraction of the material relevant to the scope of WP is being reorganized in a coherent set of links.

The Mailing List of members, bene@cern.ch, has been further extended. In addition there exist mailing lists of each work packages. (hep-mgt-betabeam@cern.ch, hep-mgt-bene-collector@cern.ch, hep-mgt-bene-drivers@cern.ch, hep-mgt-bene-muend@cern.ch, hep-mgt-bene-mufront@cern.ch, hep-mgt-bene-physics@cern.ch, hep-mgt-bene-target@cern.ch).
Other lists of more loosely connected colleagues are also maintained.

N2.4 Activities of BENE in 2006

Perhaps the best summary of the technical achievements stimulated this year by BENE is the list of presentations, in part supported by BENE funds, made by EU speakers at the two main yearly events of interest for BENE: NuFact07 and NNN07.

Those at NuFac07 include neutrino phenomenology (T. Schwetz), the optimization of a Neutrino Factory (W. Winter), the transition from ISS (the International Scoping Study) to the NF-IDS the Neutrino Factory Int. Design Study (K. Long), the achievements of the ISS Physics Group (P. Hernandez) Accelerator Group (C. Prior) and Detector Group (A. Cervera) , the status of hadro-production measurements and precise neutrino flux calculations (J. Panman), calculations of neutrino interactions from MeV to GeV (J. Nieves), the technical challenges of the Eurisol Betabeam (S. Hancock), future options for betabeams focusing on

production issues (M. Lindroos), the status of MICE (R. Sandstrom), target R&D for high power proton beam applications (A. Fabich), the general conclusion of the Workshop (A. Blondel), tracking and interaction studies in the betabeam ring (A. Fabich), the options for the Eurisol betabeam within the CERN upgrade plans (A. Fabich), the EuroNu Design Study (M. Lindroos), the T2K and NuFact targets and windows (C. Densham), the MERIT experiment (A. Fabich), the muon Dogbone Cooler (C. Roger), non-scaling FFAGs (S. Machida), muon rings for cooling and acceleration (J. Pasternak), the RACCAM FFAG R&D (F. Meot), the status of HARP (G. Catanesi), the status of NA61-SHINE (N. Abgrall) , the role of near detectors at neutrino factories (A. Laing), performance and prototypes of magnetized iron neutrino detectors (A. Cervera and F. Terranova), low energy neutrino factories (M. Ellis), quark lepton complementarity (W; Winter), sterile neutrinos after the MiniBoone result (T. Schwetz), CPV from non unitary leptonic mixing (J. Lopez-Pavon), particle production at MICE target (P. Soler), recent K2K results (C. Mariani), first muon lifetime results from FAST (C. Casella) .
Those at the smaller NNN07 event include summary from OPERA (M. Spinetti), present understanding of neutrino oscillations (J. Valle), future prospects on neutrino oscillation phenomenology (P. Huber), report of European design study EUROnu (M. Dracos), report of LAGUNA (L. Mosca), report of MEMPHYS (N. Vassilopoulos), report of GLACIER (A. Rubbia) PMm2 readout electronics (J. E. Campagne).

BENE's further acceleration of initiative in 2007 is driven by the work of its Steering Committee that has created the necessary networking tools for this and organized the main meetings and the other events. Regular phone-conferences are the main tool of coordination in the interval between meetings. Closed or Open meeting of the SG in person occur then at each of the major events that BENE supports.

The BENE SG was the core of the editorial board of the FP7 proposals

N2.5 Overall Progress of Work Packages

The following text and five tables highlight the progress of work done by each work package by listing the lowest level subtasks of the BENE detailed implementation plan. No major deviations are reported, with one notable exception in the driver sector (see below, as already remarked last year).

All WP s have had regular phone-meetings over the year.

WP1 (PHYSICS) During 2007 the report about future neutrino beams and in particular neutrino factories performed in conjunction with the ISS study group (A.Bandyopadhyay et al. [ISS Physics Working Group],``Physics at a future Neutrino Factory and super-beam facility, arXiv:0710.4947 [hep-ph]) has been completed.
This report performs a complete comparison of SuperBeam, Beta Beam and Neutrino Factory performances as far as the discovery potential of θ_{13} is concerned.
Leptonic CP violation and neutrino mass hierarchy. It represents also an important effort in individuating the most sensitive areas of improvement for such facilities.
The problematic of systematic errors in SuperBeam experiments, potentially the most important limiting factor of these facilities, have been studied by P.Huber, M.Mezzetto and T.Schwetz (``On the impact of systematical uncertainties for the CP violation measurement in superbeam experiments", arXiv:0711.2950 [hep-ph]) where the impact of close detectors, their needed performances and the impact of external experimental informations like direct measurements of neutrino cross sections and hadro-production have been quantified
On the Beta Beam side, the exploitation of the potential of a Beta Beam based on Boron and Lithium ions has been fully assessed by P.Coloma, A.Donini, E.Fernandez-Martinez and J.

Lopez-Pavon ("θ_{13}, δ and the neutrino mass hierarchy at a γ=350 double baseline Li/B beta-Beam", arXiv:0712.0796 [hep-ph]), while in A.Donini et al.,``Neutrino hierarchy from CP-blind observables with high density magnetized detectors", Eur. Phys. J. C 53 (2008) 599, arXiv:hep-ph/0703209) the physics reach of an iron magnetized detector detecting atmospheric neutrinos and Beta beam neutrinos has been quantified.
An innovative setup to make available low energy neutrinos from a standard Beta Beam has been proposed by R.Lazauskas, A.B.Balantekin, J.H.De Jesus and C.Volpe, (``Low-energy neutrinos at off-axis from a standard beta-beam", Phys. Rev.D 76 (2007) 053006, arXiv:hep-ph/0703063).
The Globes open source package, now worldwide used in simulation of sensitivities of future neutrino beam experiments had a major new release, as described in P.Huber, J.Kopp, M.Lindner, M.Rolinec and W.Winter, ``New features in the simulation of neutrino oscillation experiments with GLoBES 3.0", Comput. Phys. Commun. 177 (2007) 432, arXiv:hep ph/0701187].

WP2 (DRIVER) has continued its comparative study of M-Watt proton driver designs. An important element in this comparison is the recently published report CERN-AB-2007-014 that describes a low power version of SPL, compares it to a RCS solution and consider the potential for future projects. The report concludes that: "An RCS-based injector is the logical choice if cost is the only concern. However, if the ease of operation for LHC and the potential for other users (including future ones which could be served by an upgrade) are of more importance, then an SPL-based injector makes full sense." Of special interest for the neutrino community is this observation: "There is also a significant difference between the proton flux that can be delivered by the low energy accelerators (up to 50 GeV) to the other users, once the needs of the high energy machine are satisfied. In most cases, there are approximately 2.5 times more protons available at 50 and 4 GeV when using the SPL."
Clearly the BENE network should continue to closely follow these promising developments and provide input to optimise the physics potential of proton at CERN.

An important new contribution toward a proton driver for neutrino physics is the publication of the report by the International Scoping Study of a Future Neutrino Factory and Superbeam Facility"Accelerator design concept for future neutrino facilities" (RAL-TR-2007-23) which summarizes the findings of the Accelerator Working Group. This report embodies the ideas and discussions at the various ISS meetings in which representatives of the BENE network actively contributed. Here we will mention in particular the conclusion that the desired range for the proton energy is 10 +- 5 GeV reflects the consensus reached in the broad international community on the requirements for the proton driver of a Neutrino Factory,
Finally, a good part of the activities in this WP has been devoted to the preparation of the FP7 proposal of the EuroNu design study. In this context, new energies from RAL and Saclay have been attracted to the BENE framework. Thanks to the active role of the BENE framework a strong european collaboration was formed and an important fraction of EuroNu resources will tackle most difficult aspects of the SuperBeam project. Clearly this design study will provide an excellent focussing point for the studies related to the proton driver.
Concerning FP7, in the context of the EuCARD IA , several JRA (COLMAT and SRF) are of particular importance to the proton driver plans and these studies and their implications should be closely monitored .

WP3 (TARGET) registered this year the successful achievement of the MERIT experiment, a major milestone in the high power neutrino target programme. This US led experiment took place at CERN over October-November 2007 with the involvement of BENE network staff. A 20 m/s mercury jet was injected into a solenoid with a magnetic field ranging up to 15 T, with the simultaneous interaction with a proton beam pulse of up to 30×10^{12} protons of 24 GeV in a 2.5 µs beam spill. In addition a number of experiments were carried out to study the effect of a lower intensity two bunch pulse structure with bunch separations in the range 2 - 700 µs. The initial observations from these experiments were very positive, with indications that the magnetic field suppressed the proton beam induced mercury jet filamentation. Analysis of the experimental data is ongoing.

In addition, there have been a number of parallel contributions in the study of solid targets at RAL. (1) The T2K target and beam window systems design and development have been completed, and the 1st beam window and target manufactured ready for installation in 2008. (2) The study of shock waves generated in thin tungsten wires using a pulsed power supply has demonstrated that the material can withstand the conditions of shock and fatigue that would be generated in a solid tungsten neutrino factory target, with samples experiencing over 10^7 cycles at 2000K. (3) A new study into flowing powder targets has also been initiated, with early experiments generating a tungsten powder jet with material density of 25-30 % flowing at up to 15 m/s.

Finally, there have been a number of highly productive workshops and meetings on the subject of high power targets, principally (1) a joint BENE/EURISOL high power targets meeting held at CERN and (2) the 3rd High Power Targetry Workshop hosted by PSI. Presentations by BENE contributors have been made at the usual forums, e.g. Nufact07 and at the regular T2K collaboration meetings. There have also been numerous private meetings involving BENE members held at various locations e.g. ORNL in Tennessee and IPUL in Latvia.

WP4 (COLLECTOR) The WP has concentrated its efforts on the definition of a horn-type collector which is a critical element for a 4 MW Super-Beam. All components of this collector are under study with the main aim to increase as much as possible the reliability of the system. New ideas are now under investigation in order to better afford the 4 MW primary proton beam as for instance the split in 4 of the primary beam and send it on 4 target/horn systems. This would be possible due to the small horn size needed for this application and to the short (20-50 m) length of the corresponding decay tunnel. This could also allow to use a solid target instead of a liquid one more difficult to handle.
In this study, the horn pulsing system is very important. Several options have been investigated with the help of private companies.
In order to well study the power dissipation in the horn, the presence of the target inside the horn has to be taken into account. Studies have been started on this subject and will continue in the framework of the EuroNu FP7 DS project. In EuroNu, studies will also be done about all mechanical aspects and possibilities of replacing remotely the whole system in case of failure.

The main achievements of the 3 components of **WP5** (NOVEL NEUTRINO BEAMS)

WP5a (MUFRONT) has been active this year in the following sectors
1) preparation of the FP7 design study proposal submitted in May
2) further progress in the design and specification of the Neutrino Factory muon front-end was made during the ISS, outlining a baseline ionisation cooling channel in which lithium-hydride absorbers are interspersed with RF cavities in a solenoidal transport lattice.
3) the final effort to bring into operation the proof-of-principle of the ionisation cooling technique that will be provided by the international Muon Ionisation Cooling Experiment (MICE) which is being prepared at the Rutherford Appleton Laboratory. Over the reporting

period, significant progress has been made in the preparation of infrastructure required in the MICE Hall. In spite of some delay originating from some unexpected technical difficulties and from the recent revisions of the particle physics budget in the UK, this crucial demonstration experiment is progressing steadily and it will be taking data in 2008.
Difficulties with the pion-production target are being recently successfully overcome in the ISIS proton beam. Construction of beam-line components and refurbishment of the magnets required for the beam line (from RAL and PSI) is nearing completion. The first elements of the particle identification system (time-of-flight counters, a Cherenkov detector, and a calorimeter) are being installed. The spectrometer solenoids as well as the scintillating-fibre trackers for the experiment are also close to final installation.
4) the continuing *w*ork on the study of novel cooling- and phase-rotation schemes based on helicoidal cooling channels, non-scaling FFAGs and more.
5) preparation of some sections of the FP7 IA proposal EuCARD, submitted then on Feb 29,2008. This includes the transnational access program for MICE and studies relevant for the front end of a neutrino factory in the two JRAs proposed for normal conducting and superconducting RF.
WP5a physicists have given presentations on MICE and the other activities at a number of international meetings and workshops including the International Neutrino Factory, beta-beam, and super-beam Workshop (NuFact07), which took place in Okayama, Japan, in August.
Special attention is being devoted to the renewed efforts developing in this sector in the US in general and at Fermilab in particular. The very stimulating Topical Workshop on the physics and R&D programs of Neutrino Factory & Muon Collider organized by the UK Neutrino Factory (UKNF) Collaboration in Abingdon, Oct 21-24 provided a rewarding exchange experience in this sector.

WP5b (MUEND) has been promoting

- design studies concerning the pumplet lattice muon accelerator and its application as proton driver, and electron model of a pumplet lattice proton driver

- design studies concerning the muon FFAG accelerators : beam dynamics, effects of defects, design optimizations. Milestones : ISS-NuFact Design Report, to be published in 2008. The first PhD thesis on the topic [BibLemuet] has been presented in April 2007 at Paris-XI Orsay University. WP5b. The “harmonic number jump” method, a possible way of combining scaling FFAGs and high frequency RF, is subject of a thesis at KURR-Institute, Kyoto University, in collaboration with LPSC, Grenoble.

- design studies concerning the muon storage rings : machine design, beam dynamics, effects of defects, design optimizations, spin transport. Milestones : ISS-NuFact Design Report, to be published in 2008. The first PhD thesis on the topic has been presented in April 2007 at Paris-XI Orsay University. WP5b.

- participation in EMMA construction, started at Daresbury in April 2007. EMMA involves scientists from CARE/BENE, BNL, FERMILAB, RAL, Daresbury Lab., KEK, KURRI, LPSC-Grenoble. EMMA has yielded many thesis subjects, is fostering formation of young students to FFAG theory and technology. Regular phone meetings (about every 2-3 weeks), design review meetings at Daresbury (Feb. and Dec. 2007). Harware design and fabrication now well advanced, quadrupoles to be ordered by end 2007. Detailed status of the project available at http://hepunx.rl.ac.uk/uknf/wp1/emodel/ . EMMA will organize the 2008's FFAG workshop, in the Daresbury Lab. region.

- participation in RACCAM design study, all details available at http://lpsc.in2p3.fr/service_accelerateurs/raccam.htm . RACCAM has organized and hosted the FFAG 2007 workshop in Grenoble. In Nov. 2007 RACCAM has launched the fabrication of the first 200 MeV-proton class prototype of a spiral scaling FFAG magnet, proper to use in proton driver or muon lattice, as well as in medical and industrial applications. RACCAM has organized a Miniworkshop at the Lacassagne anti-cancer Hospital, Nice, Dec. 2007, “Medical application of FFAG accelerators”, all details on http://lpsc.in2p3.fr/service_accelerateurs/raccam.htm (meetings).

These studies are performed in collaboration with the ISS accelerator working group. They have been subject to contributions to FFAG-2007 (Grenoble), FFAG07 (Kyoto Univ.), PAC 07, NuFact 07, the EU Cyclotron Conference (Catania), ICFA Beam Dynamics News Letter 43, and in the many BENE, EMMA and RACCAM meetings (available via web links).

In addition, the proposal of an FP7 : EUROFFAG JRA, first drafted by WP5b in 2006 in view of CARE-Next IA, has finally become the “FFAG” task (Rob Edgecock Coordinator) within “Assessment of Novel Accelerator Concepts” (ANAC) JRA in EuCARD FP7 IA. Fundings will be dedicated to EMMA upgrade.

Within RACCAM, WP5b is preparing now an application to the Agence Nationale de la Recherche, France for 2008's funds for further R&D in the domain of spiral scaling FFAG lattice (the LICORNE project). A new team is being constituted in that aim : LPSC (Grenoble, Coordinator Lab.), AIMA-Developpement (Nice, Lacassagne Hospital), IBA (Louvain-la-Neuve, Belgium), ETOILE (Lyon, Carbon Synchrotron Installation for hadrontherapy), SIGMAPHI (Vannes, magnet Industrial).

WP5c (BETABEAM) The beta-beam BENE WP serves as a link between the beta-beam activities (the betabeam WP within the FP6 design EURISOL DS, the preparation of the proposal of a WP in the FP7 EuroNu design study and more) and the neutrino physics community. The Eurisol design study is making good progress and the BENE community has been updated on a regular basis through the BENE meetings on this progress. As there is no work package on oscillation physics with electron (anti-)neutrino beams within the design study and that the BENE meetings are also the only forum for these two communities to meet. In 2007 the beta-beam was discussed at the BENE07 and other meetings and presented at NUFACT 07. A course with tutorials was given for beta-beams at the NUFACT School at KEK in Japan.
With the approval of the EuroNu DS, betabeam design work will continue, addressing novel issues as high gamma and/or high Q-value beta-beams and new scenarios for production and bunching of isotopes.
An informal meeting to assess Louvain’s last measurements of production rate of ions was held in Louvain-la-Neuve, 27 July, 2007
A possible green-field study for DESY-Hamburg for a high-gamma beta-beam facility was discussed at a special http://bene.web.cern.ch/bene/071031BetabeamAachenBulletin.pdf meeting in Aachen Oct 31-Nov 1 and it was agreed to advance on first feasibility studies for such a facility in the coming year.
BENE has been made aware of an extensive study undertaken at CERN and TRIUMF of collimation and magnet protection issues for the beta-beam. The work included i) an adaptation of the ACCSIM tracking code to enable parallel tracking of mother and daughter nuclei within the full dipole aperture, ii) development of an interface between ACCSIM and the particle-matter interaction code FLUKA, iii) a tracking campaign of beta-beam isotopes using the modified ACCSIM code and iv) FLUKA studies for particle losses in the magnets and the magnet protection elements.
BENE was also exposed to a study of cross sections using recently updated Nuclear Physics cross section codes from GSI done at CERN, with the objective of identifying new production channels for beta-beam isotopes.

The web site for the beta-beam at http://cern.ch/beta-beam is documenting the progress within the design tudy and gives reference to new published work.

Work Package 1: PHYSICS.

	Title	Original begin date (Annex 1)	Original end date (Annex1)	Estimated Status	Revised end date
WP1	**PHYSICS**				
1.1	Improvement of the WP Web Site	Jan. 2007	Mar 2007	95%	Continuously improving
1.2	WP Spring Meeting	Mar 2007	Mar 2007	100 %	held jointly with ISS
1.3	Close in on physics analysis, motivate EuroNu DS	May 2007	May 2007	100%	
1.4	Topical Workshop at WP Summer Meeting	Aug 2007	Aug 2007	100 %	joint with NuFact07
1.5	WP Fall Meeting	Oct 2007	Oct 2007	100 %	
1.6	Physics sections of EuroNu Proposal	May 2007	May 2007	100%	

Work Package 2: DRIVER

	Title	Original begin date (Annex 1)	Original end date (Annex1)	Estimated Status	Revised end date
WP2	**DRIVER**				
2.1	Improvement of the WP Web Site	Jan 2007	Mar. 2007	95%	Continuously improving
2.2	Finalize criteria of SPL vs RCS comparison	Jan 2006	Mar. 2006	40% Taking longer!!	> 2008, arger picture emerging, CERN Council oversees
2.3	Identify R&D beyond HIPPI, motivate EuroNu	May 2007	May. 2007	100 %	
2.4	WP Spring Meeting	Mar 2007	Mar 2007	100 %	held jointly with ISS
2.5	Topical Workshop at WP Summer Meeting	Aug 2007	Aug 2007	100 %	joint with NuFact07
2.6	WP Fall Meeting	Oct 2007	Oct 2007	100 %	
2.7	Driver sections of EuroNu Proposal	May 2007	May 2007	100%	

Work Package 3: TARGET

	Title	Original begin date (Annex 1)	Original end date (Annex1)	Estimated Status	Revised end date
WP3	**TARGET**				
3.1	Improvement of the WP Web Site	Jan 2007	Mar. 2007	95%	Continuously improving
3.2	Close in on hi power target choice, motivate EuroNu & R&D post MERIT	May 2007	May 2007	100%	
3.3	WP Spring Meeting	Mar 2007	Mar 2007	100 %	held jointly with ISS
3.4	International Target Workshop	Sep 2007	Sep 2007	100 %	
3.5	WP Fall Meeting	Oct 2007	Oct 2007	100 %	
3.6	Target sections of EuroNu Proposal	May 2007	May 2007	100%	

Work Package 4: COLLECTOR

	Title	Original begin date (Annex 1)	Original end date (Annex1)	Estimated Status	Revised end date
WP4	**COLLECTOR**				
4.1	Improvement of the WP Web Site	Jan 2007	Mar. 2007	95%	Continuously improving
4.2	Close in on collector choice, motivate EuroNu & further R&D	May 2007	May 2007	100%	
4.3	WP Spring Meeting	Mar 2007	Mar 2007	100 %	held jointly with ISS
4.4	International Topical workshop	Aug 2007	Aug 2007	100 %	joint with TARGET
4.5	WP Fall Meeting	Sep 2007	Sep 2007	100 %	joint

4.6	Collector sections of EuroNu Proposal	May 2007	May 2007	100%	

Work Package 5: NOVEL NEUTRINO BEAMS

	Title	Original begin date (Annex 1)	Original end date (Annex1)	Estimated Status	Revised end date
WP5	**NOVEL NEUTRINO BEAMS**				
5.1	Improvement of the WP Web Site for the three areas of interest of the WP	Jan 2007	Mar. 2007	95%	Continuously improving
5.2	Assemble NuFact and Betabeam guidelines for EuroNu	May 2007	May 2007	100%	
5.3	WP Spring Meeting	Mar 2007	Mar 2007	100 %	held jointly with ISS
5.4	Topical Workshop at WP Summer Meeting	Aug 2007	Aug 2007	100 %	joint with NuFact07
5.5	WP Fall Meeting	Oct 2007	Oct 2007	100 %	
5.6	WP multiple sections of EuroNu Proposal	May 2007	May 2007	100%	

N2.6 Significant Achievements

- Submission and approval of FP7 EuroNeutrino and Laguna Design Studies
- Transition from International Scoping to Design Studies
- Timely progress on the preparation of FP7 IA Proposals

N2.7 List of all deliverables during the reporting period

Deliverable/ Milestone No	Deliverable/Milestone Name	Workpackage /Task No	Lead Contractor(s)	Planned (in months)	Achieved (in months)
D	**Proposal of EuroNu Design Study s**	All WPs	CCLRC/STFC INFN-Na,	41	41
D	**Draft of FP/ IA Proposal, to be delivered by month 50**	All WPs	INFNNa CERN	48	48

N2.8 List of major meetings organized under BENE during the reporting period

Date	Title/subject	Location	Number of participants	Web Site Address
Jan 15-20	21st International WIN Workshop	Kolkata	110	http://www.saha.ac.in/anp/win07.sinp/win07/index.htm
Feb 21	Open meeting of the BENE Steering Group	CERN	25	http://bene.web.cern.ch/bene/070221Open%20Meeting%20of%20the%20BENE%20Steering%20Group.doc
Mar 29-31	Plenary ISS/IDS meeting	CERN	45	http://www.hep.ph.ic.ac.uk/ids/communication/cern-2007-03-29/
Apr 12-17	FFAG07	Grenoble	40	http://lpsc.in2p3.fr/congres/FFAG07/
Jun 27-30	Golden07	Valencia	50	http://evalu29.ific.uv.es/golden07//Welcome.html
6-11 Aug	NuFact07 International Workshop	Okayama	160	http://fphy.hep.okayama-u.ac.jp/nufact07/
Sep 10 – 14	3rd International High-Power Targetry Workshop	Bad Zurzach	55	http://asq.web.psi.ch/hptrgts/index.html
2-5 Oct	NNN07 Workshop on Next Nucleon decay & Neutrino	Hamamatsu	84	http://www-rccn.icrr.u-tokyo.ac.jp/NNN07/
Nov 14-17	BENE07	CERN	40	http://bene.web.cern.ch/bene/BENE07Agenda.pdf. http://care07.web.cern.ch/CARE07/Presentations/

1.3.3 N3: High-Energy High-Intensity Hadron Beams (HHH)

HHH is the Care network for High Energy High Intensity Hadron Beams. It comprises 8 countries plus CERN. The list of participants and their implication in the HHH Work Packages (C: Coordination, X: participation) is given in the table below. The overall management is done by CERN.

Number	Participant	WP1 AMT	WP2 ABI	WP3 APD
1	**CEA**	X		
4	**GSI**	X	X	X
6	**DESY**		**C**	X
10	**INFN**	X		X
	INFN-Ge	X		
	INFN-LNF			X
	INFN-Mi	X		
	INFN-Na			X
	INFN-Sal			X
11	**TEU**	X		
15	**WUT**	X		
16	**CSIC**			X
	CIEMAT	X		
	LEII			X
17	**CERN**	**C**	**C**	**C**
19	**PSI**		X	
20	**CCLRC/STFC**	X		

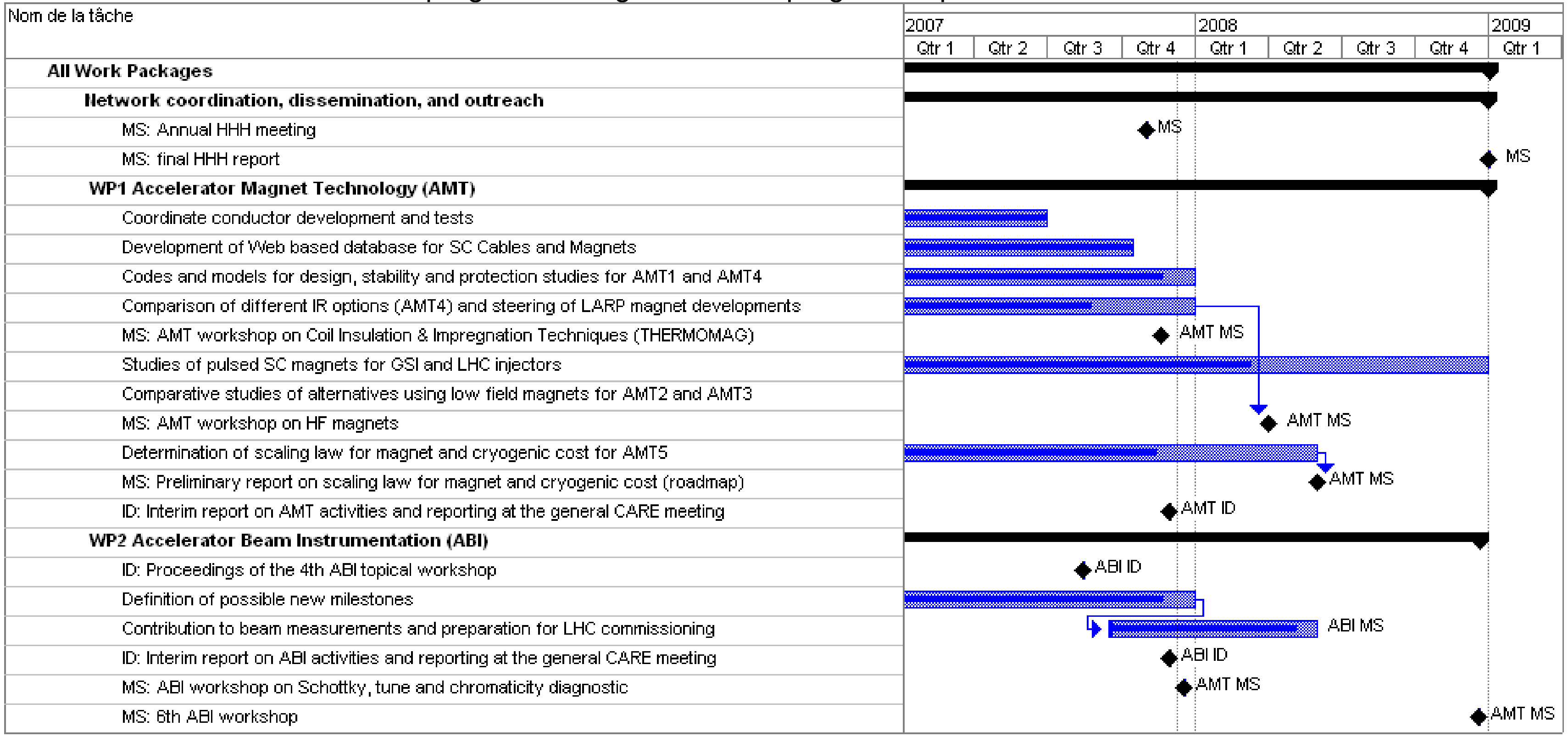
In 2007 the networking activity of CARE-HHH continued to focus on the high-luminosity upgrade of the LHC at CERN, the upgrade of the LHC injector complex, and the FAIR project at GSI.

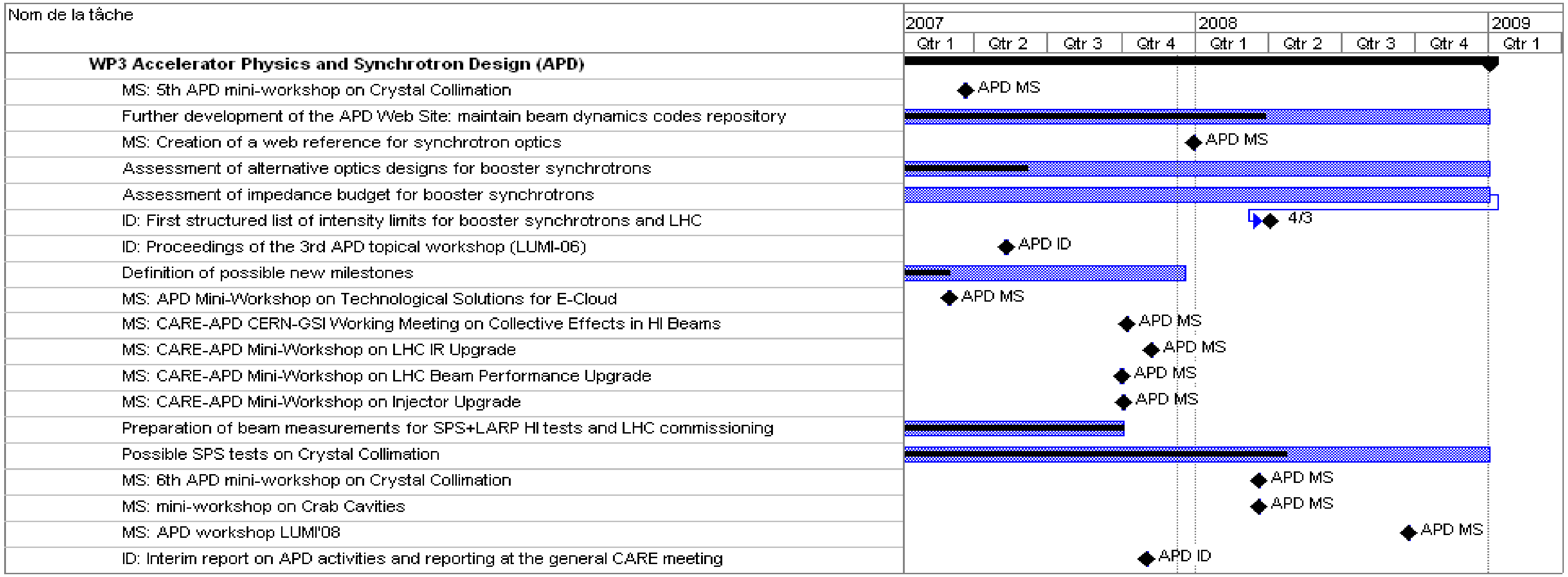
N3.1 Overall Progress of the Activity

Triggered by the results of the HHH studies obtained since 2004, in 2007 several new working groups were launched inside CERN, dedicated to the design of a PS successor “PS2”, to the enhancement of the SPS, and to the upgrade of the LHC interaction regions, respectively. In parallel, the development of magnet prototypes for the LHC interaction region upgrade was approved as a new infrastructure initiative (CNI) within the European Union’s 7th framework programme. In terms of budget and resources, these greatly expanded studies go far beyond HHH.

In 2007, two main upgrade paths for the LHC, identified at the CARE-HHH-APD LUMI’06 workshop, were confirmed and further elaborated, namely the early separation (ES) scheme, and the large-Piwinski angle (LPA) scheme. The average luminosity reach of either scheme as a function of the IP beta function was computed, demonstrating that the ES option in its original form requires more focusing to be competitive. Various options for luminosity leveling in both approaches were explored. Small-angle crab cavities for the LHC upgrade have received renewed interest, either as a component of the early-separation scheme or as a standalone alternative.

Gantt table of the HHH Network progress through 2007 and progress expected in the next 12 months




Nom de la tâche
2007
2008
2009
Qtr 1
Qtr 2
Qtr 3
Qtr 4
Qtr 1
Qtr 2
Qtr 3
Qtr 4
Qtr 1
WP3 Accelerator Physics and Synchrotron Design (APD)
MS: 5th APD mini-workshop on Crystal Collimation
APD MS
Further development of the APD Web Site: maintain beam dynamics codes repository
MS: Creation of a web reference for synchrotron optics
APD MS
Assessment of alternative optics designs for booster synchrotrons
Assessment of impedance budget for booster synchrotrons
ID: First structured list of intensity limits for booster synchrotrons and LHC
4/3
ID: Proceedings of the 3rd APD topical workshop (LUMI-06)
APD ID
Definition of possible new milestones
MS: APD Mini-Workshop on Technological Solutions for E-Cloud
APD MS
MS: CARE-APD CERN-GSI Working Meeting on Collective Effects in HI Beams
APD MS
MS: CARE-APD Mini-Workshop on LHC IR Upgrade
APD MS
MS: CARE-APD Mini-Workshop on LHC Beam Performance Upgrade
APD MS
MS: CARE-APD Mini-Workshop on Injector Upgrade
APD MS
Preparation of beam measurements for SPS+LARP HI tests and LHC commissioning
Possible SPS tests on Crystal Collimation
MS: 6th APD mini-workshop on Crystal Collimation
APD MS
MS: mini-workshop on Crab Cavities
APD MS
MS: APD workshop LUMI'08
APD MS
ID: Interim report on APD activities and reporting at the general CARE meeting
APD ID

Networking aspects: Major HHH workshops in 2007 (BEAM'07, IR'07, THERMOMAG) were organized to complement the greatly expanded CERN studies on the LHC and LHC injector upgrade by reinforcing contacts with, and providing input and help from, the European partner institutes and the international community, in particular US-LARP. A dedicated HHH mini-workshop on electron-cloud countermeasures, "ECL2", gave birth to three new electron-cloud suppression schemes and led to the launch of a concrete and active improvement programme for the SPS.
Two specific HHH working groups created in 2005 continued to be active in 2007. The first, addressing issues such as accelerator physics and machine-detector interface aspects related to the upgrade of the LHC Interaction Regions, took a closer look at magnetic elements integrated into the detectors. The second was investigating an appropriate R&D programme for AC superconducting magnets in view of the upgrade of the LHC injector complex and of FAIR at GSI and it developed preliminary super-ferric magnet designs, as a starting point for future optimization.
A networking support to crystal channeling, reflection and collimation began at the end of 2005 and continued all along 2006 and 2007, providing a forum of discussion to which many associated institutes in Russia and US, such as IHEP, PNPI, JINR and FNAL, could contribute. Several mini-workshops on crystal collimation were organized within this activity. Support was provided for the completion of a master thesis. In 2007 HHH also supported participation in beam experiments with crystals at the SPS and the FNAL Tevatron, as well as long-range beam-beam studies with wires at RHIC and the SPS.
Studies on energy deposition from collision debris in the magnets, in collaboration with INFN Milano and US-LARP, and incoherent electron cloud effects, together with GSI, were other key R&D items for HHH in 2007, as was the CERN-GSI collaboration on collective beam phenomena in high-intensity beams.

Events: A total of 7 HHH workshops were organized in 2007, two in the frame of WP1 (AMT), one by WP2 (ABI), and four in the frame of WP3 (APD). The interest in HHH events was enormous and participation unexpectedly large. It included not only representatives from several European HHH partner laboratories, but also from Japan, and in particular a strong presence from the US-LARP, and a significant delegation from industrial companies. In addition, a CARE-HHH bilateral GSI-CERN meeting and a Memorial Symposium for Francesco Ruggiero were organized in the frame of WP3 (APD), integrated into one of the APD workshops.

Dissemination and outreach: The intensity of the dissemination effort of HHH information was maintained at a high level similar to 2006. Numerous invited talks were delivered, mostly by the HHH coordinators, which illustrated the HHH activity for various CERN and INFN committees, to the LHC experiments, at universities, as well as at workshops and conferences organized by other institutions. 22 new publications were issued from January through October 2007, most of which are already stored in the CARE database. The HHH web site was continually updated.

Exchanges and educational aspects: One Italian accelerator specialist was hosted by CERN for a total period of about one month with the support of HHH in the frame of WP1 (AMT) to work on energy deposition. The travel of three doctoral students active on HHH issues to BNL and/or FNAL was supported by HHH to participate in beam-beam experiments at RHIC and to collect information for the s.c. database, respectively. One junior scientist from GSI, Germany, was hosted and supported for HHH studies, in the frame of WP3 (APD). Three EU summer students and nine EU doctoral students were active at CERN on issues related to WP1 and 3 (AMT and APD), namely IR upgrade, web databases, beam-beam compensation, new injector synchrotrons, and crystal experiments. The first US-LARP Toohig fellow is being hosted at CERN for a period of one year. Two Russian scientists and two Italian fellows were also hosted at CERN to contribute to the estimation of the ion-crystal interaction. An Italian master student received a partial support for the completion of his master thesis on crystal collimation.

Overall CARE-HHH Network activities in 2006 in chronological sequence:

- **21 November 2006 (dissemination):** Joint PAF/POFPA meeting, about 30 participants. F.Zimmermann and W. Scandale presented Accelerators Options for the LHC Luminosity Upgrade: Status after LUMI06.

- **28 November 2006 (dissemination):** INFN CSN1 Meeting, Frascati. W. Scandale described the H8-RD22 Experiment to test Crystal Collimation for the LHC.

- **30 November -1 December (ABI):** 4th CARE-HHH-ABI Workshop on *Simulation of BPM Front-End Electronics and Special Mechanical Designs*, Lüneburg, Germany; 6 CERN participants (total of 27 including 5 from industry). Workshop topics were BPM sensors, electronics, and cold BPMs.

- **January – October 2007 (AMT):** “OSOM” activity; conceptual design of 2-T pulsed superferric magnets as a follow-up of ECOMAG workshop; also comparison of s.c. and n.c. options for the fast cycling “PS2”.

- **5 January 2007 (dissemination):** Accelerator Seminar of KEK, Tsukuba, Japan; 25 experts. F. Zimmermann presented the LHC Status, Commissioning and Upgrade.

- **11 January 2007 (dissemination):** 1st LHCb Collaboration Upgrade Workshop, Edinburgh, UK; about 150 particle physicists. F. Zimmermann gave an invited talk on LHC Upgrade Plan and Ideas - Scenarios and Constraints from the Machine Side

- **18 January 2007 (dissemination):** Joint AB & LHC Project Seminar; about 100 accelerator physicists. W. Scandale and F. Zimmermann discussed the Baseline Scenarios for the LHC Luminosity Upgrade - Summary of the CARE-HHH LHC-LUMI-06 workshop

- **30 January 2007 (dissemination):** CERN Magnet Seminar; J.-P. Koutchouk described A Strongly Focused High-Luminosity Insertion for the LHC Upgrade in front of about 50 specialists.

- **29 January – 2 February (AMT):** HHH doctoral student E. Laface visited FNAL & BNL for 1 week to coordinate work on s.c. database.

- **13 February 2007 (dissemination):** At a joint PAF/POFPA meeting, with about 30 participants, Two Scenarios for the LHC Luminosity Upgrade were presented by F. Zimmermann and W. Scandale

- **22-26 February 2007 (AMT):** CERN scientist M. La China visited FNAL for three days to present the thermal performance of improved s.c. cables. .

- **1-2 March 2007 (APD):** Joint CARE-HHH, CARE-ELAN and EUROTeV Mini-Workshop on *E-Cloud Cloud Clearing* (ECL2), CERN, Geneva; 35 participants from 16 institutions including 3 from German industry. Discussions and presentations on CERN NEG coating facility, motivation, technological solutions, simulations, beam measurements, and impedance for the PS2, the SPS upgrade, the LHC upgrade, CLIC & the ILC. Novel solutions proposed at ECL2 include enamel based quasi-continuous clearing electrodes, slotted vacuum chambers, and electret inserts.

- **15 March 2007 (dissemination):** At an LHC Seminar, with audience of about 50 experts W. Scandale presented the H8-RD22 Experiment to Test Crystal Collimation for the LHC.

- **19 March 2007 (dissemination):** at a common ATLAS & CMS Electronics Workshop at CERN, with about 230 participants, W. Scandale and F. Zimmermann reviewed the Upgrade Scenarios,

- **21 March 2007 (dissemination):** First SPS Upgrade Meeting, CERN, about 15 participants. F. Zimmermann surveyed Possible Solutions for the Electron Cloud Problem.

- **22-23 March 2007 (APD):** CARE-HHH mini-Workshop on *Crystal Channeling for Large Colliders: Machine and Physics Applications* (CC-2007), CERN, 45 participants, co-sponsored by INTAS. Discussions included a review of experimental results, crystal production, application to LHC collimation system, assessment of new crystals through experiments at SPS and Tevatron, use of crystals for diffractive physics. 2007 SPS experimental goals: For 2007, seven weeks of SPS runs were allocated to the collaboration. The following goals were defined: test of multi-strip crystals; checking the effect on ions; verifying their fragmentation and electromagnetic dissociation inside the crystal, testing the effectiveness of crystal collimation for ILC

- **26-30 March, 2-5 May and 4-7 September 2007 (AMT):** Visits to CERN by F. Broggi in the frame of a HHH collaboration on simulating heat deposition in future IR magnets.

- **30 March 2007 (dissemination):** About 50 specialists listened while E. Todesco, J.-P. Koutchouk, L. Rossi described the Parametric Studies for a Phase-One LHC Upgrade Based on Nb-Ti at a CERN Magnet Seminar.

- **30 March 2007 (APD):** Crab Waist Meeting, Frascati, about 20 accelerator physicists and particle physicists, including two CERN participants. Discussions on using crab waists at an LHC upgrade collaboration and partners.

- **10 April 2007 (dissemination):** At a special PAF meeting with 7 participants, the Two Scenarios for the LHC Luminosity Upgrade, were discussed by W. Scandale and F. Zimmermann

- **13 April 2007 (coordination):** For the Mid-Term Review in Brussels the HHH-Network Mid-Term Review: 2004-2006/07 Achievements and Status, was prepared by W. Scandale and F. Zimmermann, and presented by R. Aleksan.

- **17 April 2007 (coordination)**: aT the CARE Steering and Dissemination Board Meeting, LPNHE, Paris, News from HHH (1st Quarterly Status Report 2007), were reported by F. Zimmermann

- **18-20 April 2007 (coordination):** US-LARP collaboration meeting, FNAL, USA, 77 participants, including 7 from CERN. Discussion on current challenges and difficulties, new task proposals, technical and financial planning for FY08 and FY09, potential U.S. contributions to a "full upgrade" of the IRs in about 2015, LARP R&D strategy. HHH presentations included "LHC Upgrade R&D at CERN" by L. Rossi, and "The CERN view on Accelerator Physics R&D" by O. Bruning

- **30 April 2007 (dissemination):** At an ALICE Seminar, CERN, about 30 particle physicists followed a presentation on the H8-RD22 Experiment: Progress on Ion Beam Focusing with Bent Crystals by W. Scandale

- **20-26 May 2007 (dissemination):** At the Hadron Collider Physics Symposium 2007 (HCP2007), Isola d'Elba, Italy, with about 150 particle physicists, W. Scandale presented Scenarios for sLHC and vLHC (slides).

- **1 June 2007 (dissemination):** During an SPS Chamber Upgrade Meeting, CERN, the Scenarios for the LHC Upgrade and Consequences for the SPS were reviewed by F. Zimmermann and W. Scandale.

- **11-22 June 2007 (APD):** HHH students U. Dorda and G. Sterbini visited BNL for two weeks to participate in wire beam-beam experiments at RHIC.

- **25-29 June 2007 (dissemination):** Contribution of 9 talks and papers to PAC'07, Albuquerque, USA, including an invited overview presentation by F. Zimmermann on "LHC Upgrade Scenarios" and a contributed oral presentation by W. Scandale on "Observation of Proton Reflection on Bent Silicon Crystals at the CERN SPS".

- **27 June 2007 (dissemination):** At the IoP Half-day Meeting on *Super-LHC*, Liverpool 27 June 2007, J.-P. Koutchouk discussed the LHC Accelerator Upgrade.

- **2-4 July 2007 (APD):** US-LARP and HHH Mini-Workshop on *Beam-Beam Compensation*, SLAC, USA, 35 participants, including 6 from CERN. The following HHH presentations were given among others:
  - Beam-Beam Effects for LHC and LHC Upgrade Scenarios, F. Zimmermann
  - Open Issues from the SPS Long-Range Experiments, F. Zimmermann
  - Head-On Compensation in LHC, W. Scandale and F. Zimmermann
  - Beam-Beam Aspect of a Possible Early-Separation Scheme, J.-P. Koutchouk
  - Technological Issues of Wire Compensators, U. Dorda

- **5 July 2007 (dissemination):** In an Accelerator Seminar at SLAC, about 30 participants closely followed W. Scandale's Observation of Proton Reflection on Bent Silicon Crystals at the CERN SPS.

- **24 July 2007 (dissemination):** Meeting on Machine-Experiment Interface Issues for the LHC Luminosity Upgrade, CERN. The LHC Machine Upgrade Parameters were described by F. Zimmermann andW. Scandale.

- **12 September 2007 (coordination)**: At the CARE Steering and Dissemination Board Meeting, CERN, Switzerland, the News from HHH (2nd Quarterly Status Report 2007), were transmitted by W. Scandale and F. Zimmermann.

- **16-18 September 2007 (dissemination):** The 3rd National Accelerator Congress (UPHUK3), Bodrum, Turkey, had about 70 participants including two from CERN, and with presentations on R&D for Future Accelerators byF. Zimmermannm and Physics at the Next Colliders by A. de Roeck.

- **25-29 September (APD):** G. Franchetti from GSI visited CERN in the frame of the HHH collaboration on incoherent electron-cloud effects in the LHC and its injectors, and greatly deepened the understanding of beam-electron interaction in a dipole magnetic field.

- **October 2007 (APD):** CARE-HHH-APD Workshop on *LHC Injectors Upgrade and LHC Beam Parameters Upgrade including Francesco Ruggiero Memorial Symposium and CERN-GSI Meeting* (BEAM'07)**,** CERN, Geneva, Switzerland, with 88 participants including 46 from CERN. The workshop focused on PS2, SPS enhancements plus GSI upgrades, and beam parameters upgrade scenarios; e.g. bunch spacing, operation with large Piwinski angle, luminosity performance, respectively.

- **29-31 October 2007 (dissemination):** Annual CARE Meeting CARE'07, CERN, about 110 accelerator experts. HHH highlight presentations on Active Techniques to Mitigate the Electron-Cloud Effects in Proton Machines , and Improved Thermal Removal from the Nb-Ti SC Cable were delivered by F. Zimmermann and D. Tommasini, respectively.

- **30 October 2007 (coordination):** CARE Governing Board Meeting, CERN, about 20 participants.
  CERN-HHH presentation:
  Preliminary 2008 Work Program and Budget, W. Scandale, F. Zimmermann

- **7-9 November 2007 (APD):** CARE-HHH-APD Workshop on *Interaction Regions for the LHC Upgrade* (IR'07), INFN Frascati, Italy, 39 registered participants, about half of which from CERN. Discussions on new low-beta quadrupoles, detector-integrated dipoles and quadrupoles, crab cavities, wire compensation, design of the new DAFNE IR.

- **19-20 November 2007 (AMT):** CARE-HHH-AMT Workshop on *Heat Generation & Transfer in Superconducting Magnets* (THERMOMAG), Paris, 2 days, about 30 presentations with 1/3 of the speakers from CERN. Discussions on minimizing and evacuating the heat in the next generation of superconducting magnets for high intensity particle accelerators. The workshop will identify the state of the art in (1) cooling techniques (fluids and regimes), (2) heat transfer mechanisms, (3) modeling of heat transfer from coils to cooling system, (4) heat transfer experiments; it will also identify a common set of thermal design criteria.

- **11-13 December 2007 (ABI):** CARE-HHH-ABI annual workshop on *Schottky, Tune and Chromaticity Diagnostic (with real time feedback)*. Chamonix, France. Topics: pertinent detailed technology issues; specifications for upcoming new hadron facilities; concrete work packages for the coming year in order to meet objectives.

N3.2 Overall progress of Work Packages

Status of the lowest Sub tasks level in the WP which are supposed to have started according to the MS project breakdown.

WBS #	Title	Due date (from 2006)	Status	Revised delivery date
General				
	MS: annual HHH meeting	T4-2007	100 %	T4-2007
	ID: Annual Report 2006	T4-2007	70%	T4-2007
WP1-AMT				
	Coordinate conductor development & tests	T2-2007	100%	T2-2007
	MS: AMT workshop on coil insulation and impregnation techniques (THERMOMAG)	T4-2008	50 %	T4-2007
	Web based database for SC Cables and Magnets	T2-2007	100%	T4-2007
	Codes and models for design, stability and protection studies in AMT1 and AMT4	T4-2007	100%	T4-2007
	Comparison of different IR options and steeting of LARP magnet development	T2-2007	100%	T4-2007
	Studies of pulsed SC magnets for GSI and LHC injectors	T4-2008	75%	T4-2008
	Comparative studies of alternatives using low field magnets for AMT2 and AMT3	T1-2007	100%	T1-2007
	Determination of scaling law for magnets and cryogenic cost for AMT5	T1-2008	78%	T2-2008
	MS: Preliminary report on scaling law for magnet and cryogenic cost (roadmap) – AMT5	T1-2008	0 %	T2-2008
	D: Development of web based database for sc cable and magnets	T4-2008	100%	T3-2007
	ID: Interim report on AMT activities and reporting at the general CARE meeting	T4-2007	90%	T4-2007
	MS: AMT workshop on high-field magnets	T4-2007	0%	T2-2008
WP2-ABI				

	ID: proceedings of the 4th ABI topical workshop	T1-2007	100 %	T3-2007
	Definition of possible new milestones	-	100%	T4-2007
	Contribution to beam measurements and preparation for LHC commissioning	-	90%	T2-2008
	ID: Interim report on ABI activities and reporting at the general CARE meeting	T4-2007	100%	T4-2007
	MS: 5th ABI workshop on Schottky, tune and chromaticity diagnostic	T4-2007	0%	T4-2007
WP3-APD				
	Further development of the APD Web Site: maintain beam dynamics codes repository	-	75%	T4-2008
	MS: 5th APD Mini-Workshop on Crystal Collimation	T2-2007	100%	T1-2007
	ID: Proceedings of the 3rd APD topical workshop (LUMI-06)	T1-2007	100%	T2-2007
	MS: Creation of a web reference for synchrotron optics	T4-2007	50 %	T4-2007
	Assessment of alternative optics designs for booster synchrotrons	T4-2007	50%	T4-2008
	Assessment of impedance budget for booster synchrotrons	T2-2008	30%	T4-2008
	ID: First structured list of intensity limits for booster synchrotrons and LHC	T2-2008	100 %	T3-2007
	Definition of possible new milestones	-	100%	T4-2007
	MS: APD mini-Workshop on Technological Solutions for Electron cloud	T1-2007	100%	T1-2007
	MS: HHH-APD CERN-GSI Working Meeting on Collective Effects in High-Intensity Beams (in BEAM07)	T2-2007	100%	T4-2007
	MS: HHH-APD Mini-Workshop on LHC IR	T4-2007	100%	T4-2007

	Upgrade (IR07)			
	MS: HHH-APD Mini-Workshop on LHC Beam Performance Upgrade	T4-2007	100%	T4-2007
	MS: HHH-APD Mini-Workshop on Injector Upgrade	T4-2007	100%	T4-2007
	Preparation of beam measurements for SPS+LARP HI tests and LHC commissioning	T2-2007	100%	T4-2007
	SPS tests on Crystal Collimation	-	70%	T4-2008
	ID: Interim report on APD activities and reporting at the general CARE meeting	T4-2007	100%	T4-2007

N3.3 List of all milestones and deliverables (D) during the reporting period

Status with respect to the interim reports and deliverables to be done in 2007 according to the MS project breakdown in Mile-Stones (MS), Intermediate Deliverables (ID), and main Deliverables (D).

WBS #	Title	Due date (from 2006)	Status	Revised delivery date
General				
	MS: annual HHH meeting	T4-2007	100 %	T4-2007
	ID: Annual Report 2006	T4-2007	70%	T4-2007
WP1-AMT				
	MS: AMT workshop on coil insulation and impregnation techniques (THERMOMAG)	T4-2008	50 %	T4-2007
	MS: Preliminary report on scaling law for magnet and cryogenic cost (roadmap) – AMT5	T1-2008	0 %	T2-2008
	D: Development of web based database for sc cable and magnets	T4-2008	100%	T3-2007
	ID: Interim report on AMT activities and reporting at the general CARE meeting	T4-2007	90%	T4-2007
	MS: AMT workshop on high-field magnets	T4-2007	0%	T2-2008
WP2-ABI				
	ID: proceedings of the 4th ABI topical workshop	T1-2007	100 %	T3-2007
	ID: Interim report on ABI activities and reporting at the general CARE meeting	T4-2007	90%	T4-2007
	MS: 5th ABI workshop on Schottky, tune and chromaticity diagnostic	T4-2007	0%	T4-2007
WP3-APD				
	MS: 5th APD Mini-Workshop on Crystal Collimation	T2-2007	100%	T1-2007
	ID: Proceedings of the 3rd APD topical workshop (LUMI-06)	T1-2007	100%	T2-2007

	MS: Creation of a web reference for synchrotron optics	T4-2007	50 %	T4-2007
	ID: First structured list of intensity limits for booster synchrotrons and LHC	T2-2008	100 %	T3-2007
	MS: APD mini-Workshop on Technological Solutions for Electron cloud	T1-2007	100%	T1-2007
	MS: HHH-APD CERN-GSI Working Meeting on Collective Effects in High-Intensity Beams (in BEAM07)	T2-2007	100%	T4-2007
	MS: HHH-APD Mini-Workshop on LHC IR Upgrade (IR07)	T4-2007	100%	T4-2007
	MS: HHH-APD Mini-Workshop on LHC Beam Performance Upgrade	T4-2007	100%	T4-2007
	MS: HHH-APD Mini-Workshop on Injector Upgrade	T4-2007	100%	T4-2007
	ID: Interim report on APD activities and reporting at the general CARE meeting	T4-2007	90%	T4-2007

N3.4 Significant Achievements

• A third route for the LHC luminosity upgrade was identified, based on crab cavities plus a new triplet allowing for $\beta^*<0.25$ m. Compared with the two upgrade schemes developed in 2006 this new scheme has the advantage to neither involve early-separation dipoles inside the detectors, nor the unproven operation in a regime of large-Piwinski angle. Instead it relies on crab cavities, which poses other challenges. The optimum average luminosity as a function of β^* was computed for all scenarios. A staging of the luminosity upgrade into two phases was decided.
• Plans and studies for supporting upgrades of the CERN accelerator complex continued to evolve in parallel to the LHC IR upgrade. A general consensus was reached that the LHC injector complex should be strengthened by using a linac+SPL complex to inject into a PS2 ring at twice the energy of the present CERN-PS. Superconducting pulsed magnets were considered as a promising economical option for building the lattice of the PS2 ring, and an intense effort of magnet optimization was launched. At the same time the main intensity limitations of the SPS were investigated and methods to improve these limitations were proposed. The loss of longitudinal Landau damping, one fundamental intensity limitation, was investigated including numerical applications to the present PS and SPS, and the existing stability theory extended to the case of long flat bunches required by one of the LHC upgrade scenarios.
• Discussions between the LHC accelerator experts and the LHC experiments addressed several critical issues, such as the feasibility of integrating slim magnetic elements inside the detectors and the pertinent constraints and the way to handle the increased multiplicity due to the higher luminosity. Simulations of energy deposition in the IR magnets of the upgraded LHC continued to be performed.
• In 2007, the tests of crystal reflection and channeling continued in the SPS North Area with a 400-GeV proton beam demonstrating the feasibility of multistage crystal reflection with more than 90% extraction efficiency, which confirms a completely new perspective for the upgrade of the LHC collimator system. A different use of crystals as "diluters" for damage prevention was also demonstrated. These achievements gave rise to a newly proposed and approved programme of testing crystal collimation in the SPS ring itself.
• Work on beam-beam compensation techniques advanced well throughout 2007. Experiments on long-range "wire" compensators were performed both at RHIC and in the SPS. The results indicate a strong effect of chromaticity. Measurements conducted at different beam energies allowed the verification of theoretical scaling laws and a more reliable extrapolation to LHC. An ac "RF" wire for optimum compensation of PACMAN bunches was proposed and prototyped. An installation of wire compensators in the LHC as soon as needed was endorsed by the HHH network. In parallel, beam-beam compensation with intense low-energy electron lenses is being pursued together with US-LARP. A multi-laboratory US-Japan-EU collaboration on LHC s.c. crab cavities was initiated, and HHH participated in the preparation of a US DOE SBIR proposal for the construction of an 800-MHz LHC crab-cavity prototype.
• Great progress can also be reported from the electron-cloud frontier, where, in collaboration with European enamel industry and with linear-collider activities, several novel technologies for systematically combating the electron cloud in the future PS2 and the enhanced SPS were proposed, most of which will be tested with beam in 2008. The novel measures include slotted vacuum chambers, enamel-based electrodes, electret inserts, and various types of coatings. Benchmarking of electron-cloud simulation programmes also proceeded in an international collaboration, and the results raised confidence in the predictions. In collaborating with GSI, more realistic models for the incoherent electron-cloud effects arising in a dipole magnet were developed. A large experimental effort at the SPS proved that the electron-cloud driven

instability threshold decreases with higher beam energy, which is a concern for the SPS in the PS2 era. In the PS the beneficial effect of local clearing electrodes was demonstrated, simultaneously revealing a highly complex parameter space.

• A sustained intense effort for the dissemination of information included several invited presentations at major conferences, e.g., PAC2009, or workshops, e.g. upgrade events organized by the individual LHC experiments, as well as university seminars. Seven HHH workshops plus a CERN-GSI bilateral meeting were organized in 2007, some of which together with US-LARP. Knowledge and technology transfer between the major HHH European labs (CERN, GSI and DESY) was much stimulated, including numerous additional European, American or Asian institutes and universities.

• The final version of the HHH web based database for SC Cables and Magnets has been made available, and its initial access rates signal an enthusiastic reception by the community. The structured list of intensity limitations for the LHC accelerator complex was completed. The Accelerator Physics Code Repository was updated and maintained.

• Knowledge on hadron beam instrumentation was transferred between the participating institutes, including improved lifetime calculation algorithms, and Schottky diagnostics experience for bunched and unbunched beams. The LHC machine protection system was validated as a whole, while integral protection components like “fast magnet current change monitors” were also contributed and the LHC beam-loss monitor system was tested at HERA with remote control from CERN. Spin-off in the US further included the LHC @ FNAL control room project, and the “LAFS” (LHC application Fermilab software) initiative, which is developing essential add-ons to the LHC control system, e.g., RBAC = Role Based ACcess.

1.4 JOINT RESEARCH ACTIVITIES

1.4.1 JRA1: Superconducting Radio Frequency (SRF)

The list of participants and their implication in the SRF Work Packages (C: Coordination, X: Participation) is given in the table below. The overall management is done by DESY and CNRS-Orsay.

Number	Participant	WP1 M&C	WP2 ISCF	WP3 SCP	WP4 TFCP	WP5 SP	WP6 MA	WP7 COUP	WP8 TUN	WP9 LLRF	WP10 CIT	WP11 BD	Person-months
1	**CEA**					X			X		**C**	X	58,03
3	**CNRS**	**C**						**C**	X		X		76,77
	CNRS-IPNO								X				
	CNRS-LAL	**C**						**C**	X		X		
6	**DESY**	**C**	X	**C**		**C**	X			**C**			218(48)
10	**INFN**		**C**	X	X	X	**C**		X			**C**	74(40)
	INFN-LNF											**C**	24(15)
	INFN-LNL		X	X		X	**C**						24(12)
	INFN-Mi		**C**						X				24(12)
	INFN-Ro2				X								2(1)
12	**TUL**								**C**	X			72(27)
13	**IPJ**		X		**C**								73(11,1)
14	**WUT-ISE**									X			16
19	**PSI**									X			

JRA1.1 Work Package 1: Management and Communication

The aim of the JRA on Superconducting RF Technology is to improve the quality and performance of the superconducting test accelerator TTF (Tesla Test Facility), a unique test facility to explore the operating conditions of a high gradient superconducting accelerator, at DESY.
The ultimate objectives of this research activity are

- to increase the accelerating gradient from 25 to 35 MV/m and
- to increase the quality factor from 5×10^9 to 2×10^{10},
- to improve the reliability, operating performance and availability of the superconducting accelerating system,
- to achieve a cost reduction of the SRF cavities and their associated components.

Great progress has been made by the group of W. Singer (WP3.2) in fabrication of the first 9-cell hydroformed cavity and also a 9-cell cavity from large grain material. Based on these results it can be expected to fabricate high gradient and high Q (low RF loss) cavities at reduced material and processing costs. Excellent results on electro polishing followed by alcohol rinsing have been reported in a highlight talk at the CARE07 annual meeting at CERN. The progress of this work follows the experience of intensive EP studies of Niobium cavities at the labs and also by industrial studies. A further highlight in2007 was the very successful test of the beam position monitor of WP11. This BPM will be used in FLASH and also in the XFEL accelerator.

Some tasks which are due at the end of 2007 will continue in 2008. Among these tasks are those with high risk, such as dry ice cleaning and thin film

JRA1.1.1 Use and Dissemination of knowledge

Communication is an important aspect of the JRA-SRF, both between participating institutes as well as with external institutes who share our interest in high gradient, low loss superconducting cavities. Contributions from JRA-SRF members were given to several conferences and meetings, the major ones being as follows:

- The XXth IEEE-SPIE WILGA Joint Symposium on Photonics, Web Engineering, Electronics for High Energy Physics Experiments, (Wilga, PL)
- The IEEE-EUROCON 2007, Int. Conference on Computer as a Tool, (Warsaw,PL)
- The Particle Accelerator Conference 2007 (Albuquerque, USA)
- The MIXDES 2007, Int. Conference on Mixed Design of Integrated Circuits and Systems (Ciechocinek, PL)
- The Asia Particle Accelerator Conference 2007 (Indore, India)
- The TESLA Technology Collaboration Meeting (FNAL-Chicago, USA)
- The Int. Workshop on SRF 2007 (Beijing, China)
- Several GDE/ILC meetings

Papers and talks were also presented at TESLA Technology Collaboration meetings in this reporting year as well as at the annual CARE meeting held at CERN in November
The impressive progress made in WP5 (Electro Polishing) and WP10 (Beam Position Monitors) has been presented as highlight talks at the CARE 07 annual meeting. The presentations can be found on the meeting WEB site.

JRA1.1.2 Meetings

Annual SRF Meeting

In addition to the above conferences and several telephone meetings, the SRF JRA community held their dedicated annual meeting in Warsaw, September 17-19,2007 and during the annual CARE07 meeting at CERN, October 29-31, 2007. The meeting in Warsaw included an entire review of all work-packages and tasks therein. It was the opportunity for the external scientific advisory committee to review the program of work. Their findings can be found later within this report. What was clear from the Warsaw meeting is that, despite some delay in certain milestones / deliverables, the project has made enormous progress in the last twelve months. The technical summaries to be found in later sections bears witness to this.

The strong connection between the R&D activities in JRA-SRF, the European X-FEL, and the TTC (TESLA technology Collaboration) community continues. It is obvious that many of the results of the work from SRF will have a major impact on these project and collaboration.

JRA1.2 Work Package 2: Improved Standard Cavity Fabrication

JRA1.2.1 Reliability analysis

JRA1.2.2 Improved component design

The cavity geometry and the design of many components as flanges, HOM, etc. can be kept as present. The proposed changes are related to the end group:

- less expensive Nb,
- cheaper and simplified machining and welding.

We propose to change significantly the connection between the high RRR / low RRR (Nb Reactor Grade, RG) ring, and the NbTi cone. In the existing solution a Nb RG ring is welded to the high RRR Nb ring. Also a stiffening ring is welded from the Nb RG part to the cavity wall. The NbTi cone is welded to the Nb RG part. Our proposal is to change the high RRR part shape and to weld directly the NbTi cone to the high RRR Nb ring. No more low RRR (Nb RG) part and stiffening for the first and last half cell are foreseen. Preliminary calculation done at Milano indicates that these stiffening parts have negligible effect on the cavity. Fig. JRA1.2.1 shows the proposed solution compared with the existing one.

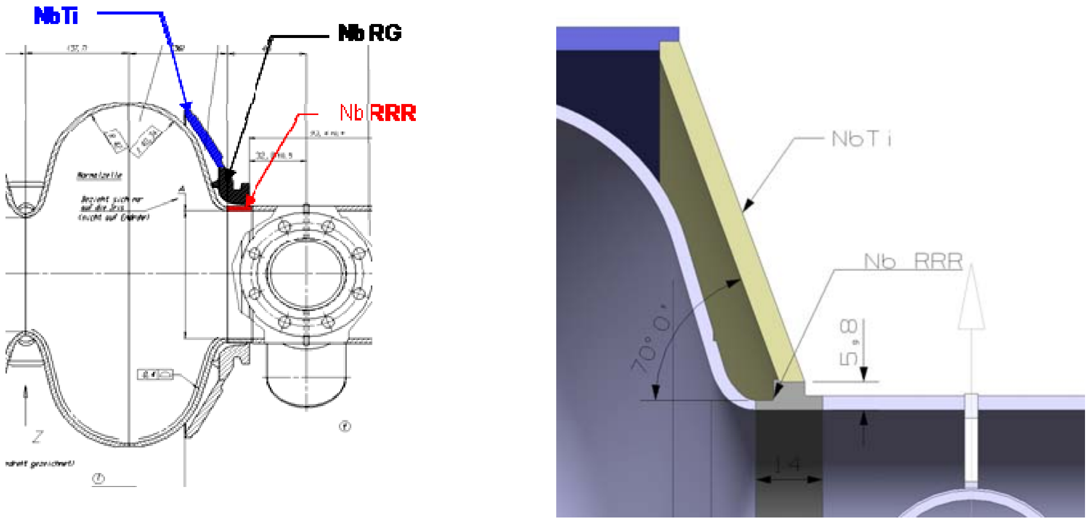


Figure JRA1.2.1: Existing and proposed solution

All the other parts of the end group are kept unchanged. Proper machining on the Nb high RRR part will help the welding and the alignment of the NbTi cones. In case of need of a reference surface for the cavity alignment, this can be tack welded on the NbTi cone.

The assembly procedure for the final welds (adjustment of the he tank length) can be optimized for an easier and cheaper procedure by means of proper surface machining as in fig. JRA1.2.2.

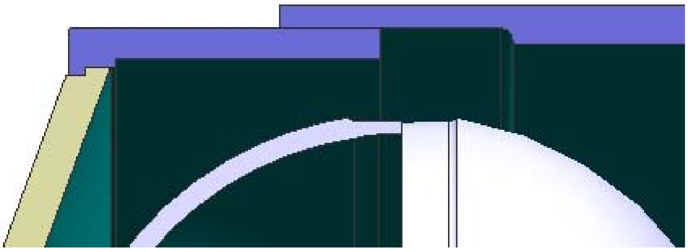
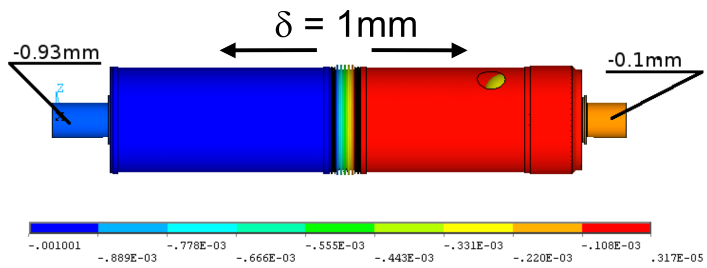


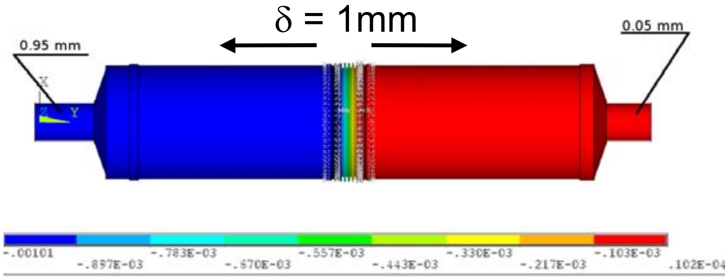
Figure JRA1.2.2: Detail of the Ti He Tank adjustment ring welded to the NbTi cone.

No bellow is foreseen at the He tank extremities: we propose to use the coaxial tuner which has bellow in the center. As a consequence, all the machining for the Saclay tuner can be totally avoided. Using the blade tuner, the magnetic shielding can be located either between the He tank and the Coax tuner or inside the tank.

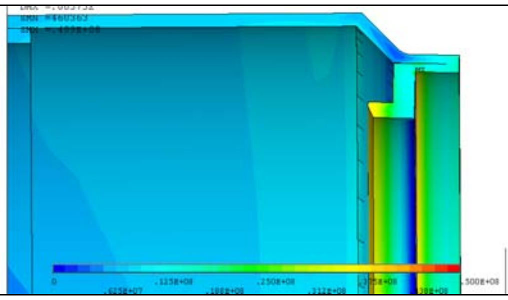
A preliminary evaluation of strength and stiffness has been done both on the present geometry and on the proposed one. The differences are reported in the next figures.



Present solution: the 83% of the coaxial tuner elongation is transferred to the cavity.



Proposed solution: the 90% of the coaxial tuner elongation is transferred to the cavity.



Present solution, max stress for an internal pressure p = 2bar@RT: σ_{max} = 47 MPa

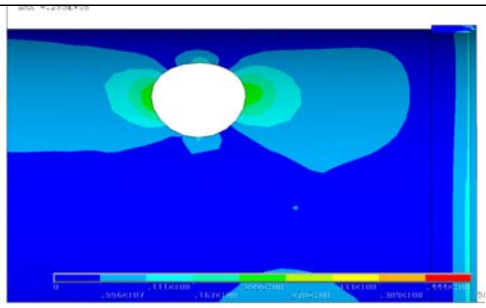
	Proposed solution, max stress for an internal pressure p = 2bar@RT: σ_{max} = 28 MPa

Figure.JRA1.2.3: Comparision between new and old LHe tank design

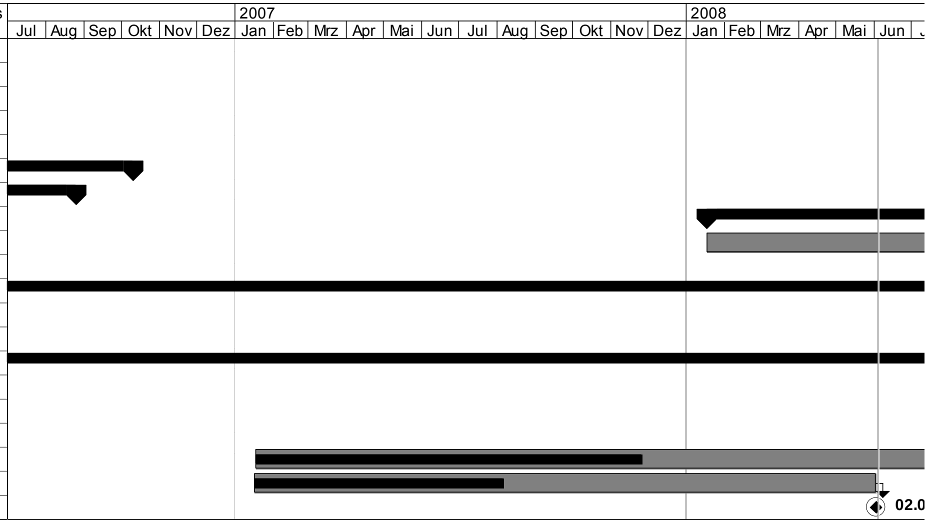
Concerning the electron beam welding, we are collecting information about EB welding machines in companies and laboratories. We asked companies and labs to send details concerning the available EBW machines (model, power), the vacuum chamber (dimensions, volume), the working plane (linear and rotary motions), the electron beam (accelerating voltage, beam current), vacuum system (type of pumps, vacuum cycle time, diagnostics, venting gas), and any useful comments. In some case data were available only on the WEB.
The collected information is summarized in Tab. 1.

	E.B. Machine				max comp. dim.			working plane		Motion	beam			vacuum				Welding info and comments	
laboratory / firm	machine	model	power	chamber volume	diam	length	weight	linear motion	rotary motion	Oil Free / in vacuum motors and gears	rotary motion	V (kV)	I (mA)	Pumps	Diagnostics (Residual gas analysis)	Vacuum cycle time	Gas used for venting	welding seam depth	comments
ACCEL			30 kW	10 m^3	1200mm	3500mm	up to 4Mp									10^{-5} mbar			data available only on the WEB: http://www.accel.de/_struktur/manufacturing_technologies.htm
ACCEL			7.5 kW	1.4 m^3	300mm 500mm	5000mm 1350mm	up to 250kp									10^{-5} mbar			
CERCA AREVA	TECHMETA	CT4	15 kW	8 m^3	1500 mm	4500 mm	1000 Kg	x = 1500 mm y = 500 mm	>360°	yes	no	60	250	Cryogenic	yes	10^{-5} mbar in 15' 10^{-6} mbar in 5h	Pure Argon		direct information from the company
	SCIACKY	Internal	6 kW									30	200						
ZANON	PTR	EBW 8001/30-150 CNC	15 kW	8 m^3	1200 mm	1500 mm	2000 kg	CNC control X=1100mm Y=550 mm	CNC control	yes	dynamic and static	150	200	mechanical + diffusion pump	no	15' for $8x10^{-4}$ 120' for $4x10^{-5}$	Air	min.0.4 mm max.120 mm	direct information from the company
DESY	Steigerwald	150 keV	15 kW	7.4 m^3	1400 x 1600	3300		1400 mm	yes	yes	5°	150	100	Cryogenic	yes	30'	Nitrogen		
Jlab	Sciaky	VX4		6.4 m^3				6 axis of motion (x,y,z, rotation, tilt of rotation,gun tilt)				60	700	Cryogenic	no	12'	Nitrogen		
FZJ	ZAT	K40-G150KM	15 kW	4 m^3				960 x 590 mm				170		Oil free					

Tab. 1: Electron beam welding parameters information from companies and labs

JRA1.2.2 Overall Progress of Work Package 2

N°	Task Name	Status	Deliverables
2	**WP 2 IMPROVED STANDARD CAVITY FABRICATION**	**85%**	
2.1	**Reliability Analysis**	**100%**	
2.2	**Improved component design**	**93%**	
2.2.1	**Documentation retrieving**	**100%**	
2.2.2	**Review of criticality in welding procedures**	**100%**	
2.2.3	**Finalize new component design**	**100%**	
2.2.4	**Finalize new cavity design**	**100%**	
2.2.5	**Fabrication of new cavity**	**0%**	
2.2.5.1	Fabrication	0%	
2.2.5.2	New cavity finished	0%	**Prototype**
2.3	**EB welding**	**69%**	
2.3.1	**Design tooling**	**100%**	
2.3.2	**Tools production**	**100%**	
2.3.3	**Welding**	**55%**	
2.3.3.1	Commissioning welding machine	100%	
2.3.3.2	Test welding	100%	
2.3.3.3	**Start production welding of components**	100%	
2.3.3.4	Single cell welding	50%	
2.3.3.5	Multicell welding	40%	
2.3.3.6	**Welding of prototypes of components finished**	50%	**Prototype**



JRA1.3 Work Package 3: Seamless Cavity Production

JRA1.3.1: Seamless cavities by spinning

The spinning lathe has been successfully set up for the multi-cells fabrication. A new procedure for getting the thickness uniform all over the cavity wall has been developed. The new method combines spinning operation with the upsetting technique. In other words, the uniform thickness is obtained by increasing the pressure between late tailstock and headstock meanwhile spinning. More simply, by shrinking the cavity across the cavity length, meanwhile the roller presses the Niobium along the equator radius in order to get more Nb material to the iris. This method permits a good wall thickness uniformity along the eight irises and the nine neighboured equators, as sketched in the following picture.

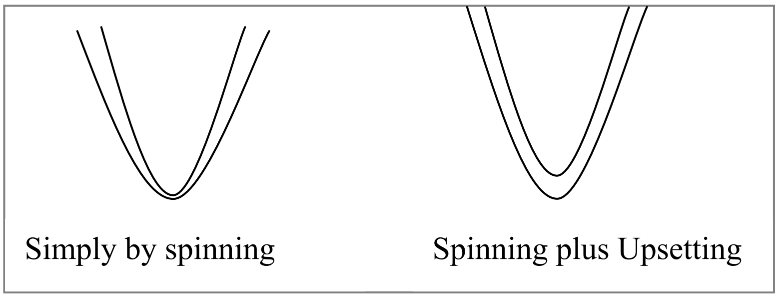


Figure JRA1.3.1: Constant wall thickness is established by a combination of spinning and upsetting technique

However a problem appears in the two end-halfcells close to the cut-off tubes, just the one where this method is not applicable. There is indeed a narrow circle where the wall thickness is thinner and this is just in the halfcell-tube conjunction. This problem was experienced when tumbling a multicell cavity, as shown in the following picture. The thinner wall between halfcell and tube was immediately consumed by the abrasive action of silicon carbide media so that the beam pipe was “cut” from the cavity body.

Figure JRA1.3.2: Destroyed cavity after tumbling because of a too small wall thickness at the iris region

The thickness uniformity experimentally found in this region is sketched in the next figure.

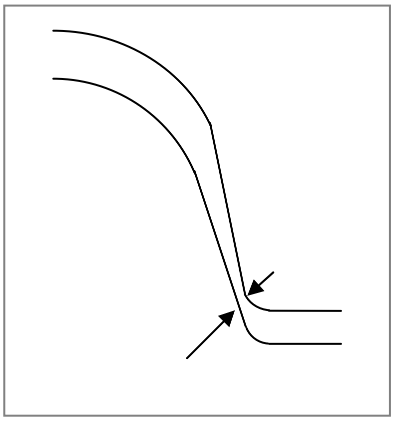


Figure JRA1.3.3: Measured wall thickness after fabrication of a Nb cavity by spinning

In order to try to solve this problem, we are currently building a further collapsible die to add to the collapsible mandrel. The added mandrel part has the shaper of a frustum and it is follows the scheme sketched below.

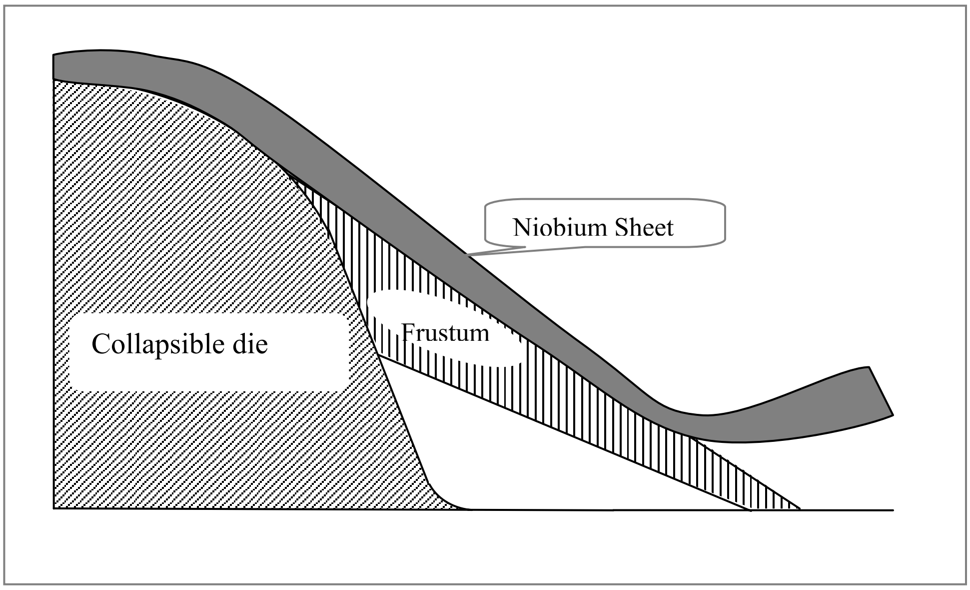


Figure JRA1.3.4: Prinzipal layout of the modified tool in order to avoid the thinning of the Nb wall near to the iris location

The optimization of this new tool is in progress. After this a new series of cavity production by spinning will be started.

JRA1.3.2: Seamless cavity production by hydroforming

Several three 3-cell units have been fabricated by hydroforming from seamless tubes (ID 150mm, wall thickness 3 mm). After necking the hydroforming was performed in two stages in order to achieve the correct shape, uniform wall thickness of the complete cavity and to suppress possible instabilities in the tube expansion process.

Completing of a worldwide first 1.3 GHz nine cell seamless resonator (without equator welds) is done at the company ZANON.
Completion included following steps (see Fig. JRA1.3.5):

- Fabrication of the long and short end groups connected with three cell units
- Machining, preparation and welding of three units together in a 9 cell cavity (two iris welds done from outside)
- Machining, preparation and weld on of the stiffening rings

The completion was successfully done and the seamless resonator has been delivered to DESY (Fig. JRA1.3.6).
The cavity is currently in the preparation for the vertical RF test at DESY.

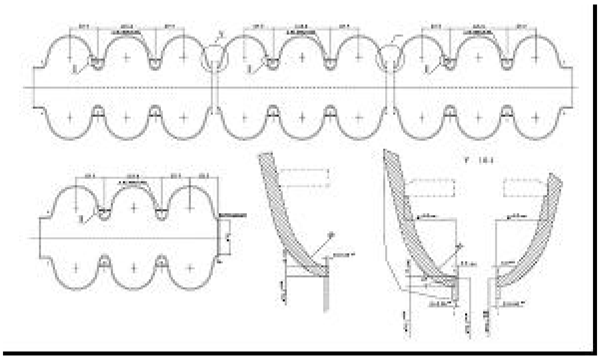


Figure JRA1.3.5: Completion of the hydroformed cavity

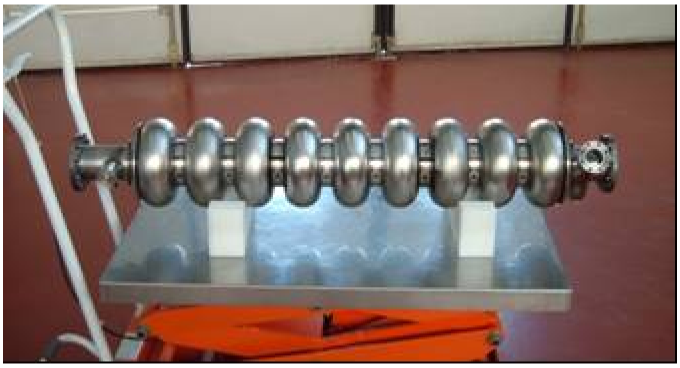


Figure JRA1.3.6: Picture of the hydroformed cavity Z14

Thermal Conductivity of Large Grain/Single Crystal Niobium

Bulk niobium cavities made from large grain or single crystal niobium may benefit from the thermal conductivity enhancement at around 1.8K due to reduction of the scattering of phonons on grain boundaries. The total heat conductivity of the superconducting metal is obtained by adding the electron term and the phonon term.

$$\lambda_s(T) = R(y)[\frac{\rho_{295K}}{L_0 \cdot RRR \cdot T} + aT^2]^{-1} + [\frac{1}{D\exp(y)T^2} + \frac{1}{BlT^3}]^{-1} \quad [1]$$

T-Temperature, RRR-residual resistivity ratio, l-phonon mean free path.

Taking into account the basic data for niobium these parameters are easily calculated:

$y = \alpha \bullet T_c / T$, α=1.76, L=2.45×10^{-8} WK^{-2}, a = 2.3 × 10^{-5}mW^{-1}K^{-1},

1/D=300 mK^{-3}W^{-1}, B=7.0 ×10^{3}Wm^{-2}K^{-4} , G - grain size.

The fitting for high purity niobium coefficients are given in work [1].

Large grain or single crystal Nb material has less grain boundaries as compared to polycrystalline material. Therefore it is expected that the contribution of phonon scattering on grain boundaries will be significantly reduced for these materials. Calculation of thermal conductivity using the formula for λs(T) and as the phonon mean free path the sample width of ca. 3 mm (instead of grain size for material normally ca. 50µm) can be seen in Fig. JRA1.3.7-8. Phonon peak is clearly pronounced.
The thermal conductivity of a series of fine grain (polycrystalline), large grain and single crystal niobium samples were measured at low temperatures. The experimental results (Fig. JRA1.3.7-3.8) are emphasis pronounced phonon peaks on large grain and single crystal heat treated at 800°C niobium samples produced by W.C. Heraeus (Figure JRA1.3.7), while no ‘phonon peak’ on fine grain samples independently on RRR value are observed. The dependence of the phonon peak on crystallographic orientation was not dedicated. Thermal conductivity in the range 4-10 K is consistent with theoretical model.

No “phonon peak” was observed on a large grain niobium sample from Ningxia. Additional crystallographic structure investigation has shown that NINXIA large grains consist of many small powders like crystals.

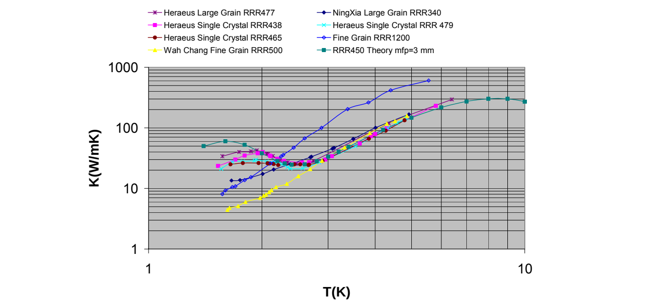


Figure JRA1.3.7: Thermal conductivity of fine grain, large grain, single crystal niobium and calculation of thermal conductivity(for RRR450, mfp3mm) (mfp: phonon mean free path)

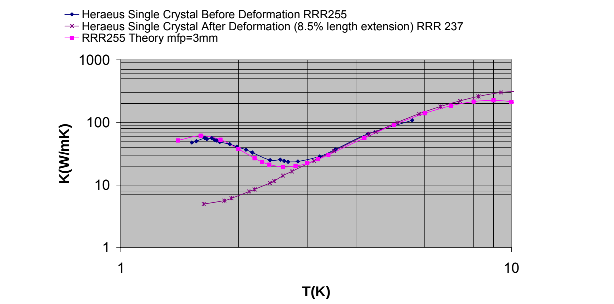


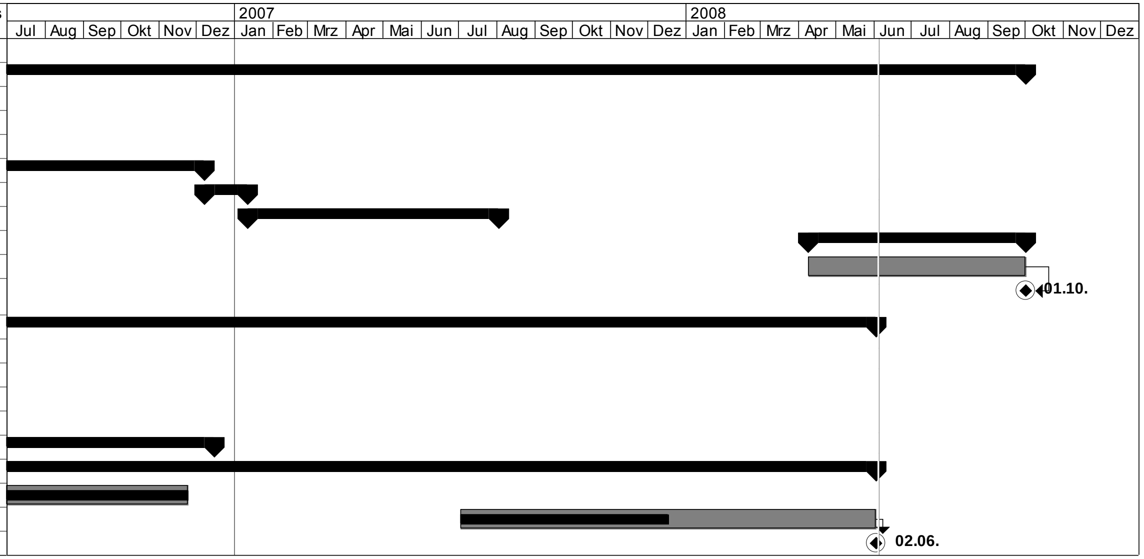
Figure JRA1.3.8. Plastic deformation influence on thermal conductivity of single crystal niobium

Further investigation has shown that the phonon peak may be destroyed by stress inside the sample due to plastic deformation. Already at a small plastic deformation of 8.5% the phonon peak totally disappeares (Figure JRA1.3.8). It implies that the final cavity made with large/single crystal niobium might not benefit from the thermal conductivity enhancement due to the plastic deformation during cavity fabrication (deep drawing of half cells). In this context final annealing at ca. 800 °C might be helpful not only for outgassing of the hydrogen but also for the stress relaxation.
Further investigation of magnetic, mechanical properties, crystal orientation and structure of large grain and single crystal niobium with the aim to make the fabrication procedure more efficient are in progress.

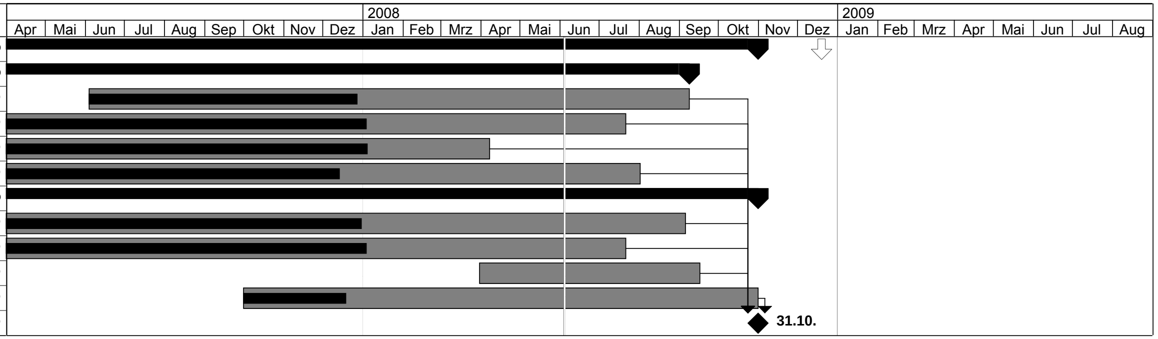
[1] Koechlin, F., Bonin, B., Parametrisation of the Niobium Thermal Conductivity in the Superconducting State, Supercond. Sci. Technol. 9 (1996) 453-460.

JRA1.3.3 Overall Progress of Work Package 3

N°	Task Name	Status	Deliverables
3	**WP3 SEAMLESS CAVITY PRODUCTION**	**95%**	
3.1	**Seamless by spinning**	**93%**	
3.1.1	**Design spinning machine**	**100%**	
3.1.2	**Fabrication of spinning machine**	**100%**	
3.1.3	**Evaluation of spinning parameters**	**100%**	
3.1.4	**Spinning of 1-celll cavities**	**100%**	
3.1.5	**Extension of spinning apparatus to multicells**	**100%**	
3.1.6	**Spinning of multi-cell cavities cavities**	**100%**	
3.1.7	**Series production of multi-cell cavities**	**0%**	
3.1.7.1	Spinning	0%	
3.1.7.2	**Multi-cell cavities finished**	0%	**Report, Prototype**
3.2	**Seamless by hydro forming**	**97%**	
3.2.1	**Design hydro forming machine**	**100%**	
3.2.2	**Construction of hydro forming machine**	**100%**	
3.2.3	**Construction of tube necking machine**	**100%**	
3.2.4	**Development of seamless tubes for 9-cell cavities**	**100%**	
3.2.5	**Development of tube necking**	**100%**	
3.2.6	**Hydro forming of seamless cavities**	**80%**	
3.2.6.1	Computer simulation of the hydro forming	100%	
3.2.6.2	Hydro forming of bulk Nb 9-cell cavities	50%	
3.2.6.3	**Hydro formed 9-cell cavities ready**	50%	**Prototype**



Nr.	Task Name	Status
1	**3.3 Development of large grain LG and single crystal SC Cavities**	**54%**
2	**3.3.1 Material properties of LG/SC**	**62%**
3	Thermal and magnetic properties	45%
4	Mechanical properties	65%
5	Microstructure analysis	80%
6	Surface investigation and processing	60%
7	**3.3.2 Fabrication and testing of single cell cavities**	**45%**
8	Analysis and optimization of the deep drawn shape accuracy	55%
9	Cavity from large grain material	65%
10	Cavity from single crystal material	0%
11	RF tests and analysis	20%
12	3.3.3 Summary report large grain / single crystal material / cavity	0%



JRA1.4 Work Package 4: Thin Film Cavity Production

JRA1.4.1 Linear arc cathode coating

In 2007 the WP4.1 activities were concentrated on the final preparation of the UHV linear arc facility. An improved model of the cylindrical Venetian-type filter with cooling flanges at the both ends has been ordered at an external manufacturer. Due to very critical requirements in regard to the quality of the applied materials (OFHC) the manufacturing met some difficulties and the new filter should be finished after summer holidays. Another filter, designed as a cylindrical set of cooled copper tubes distributed symmetrically, is also under manufacturing and it should be obtained this autumn. The UHV linear-arc facility was equipped with a laminar flow chamber, as shown in Fig.JRA1.4.1.

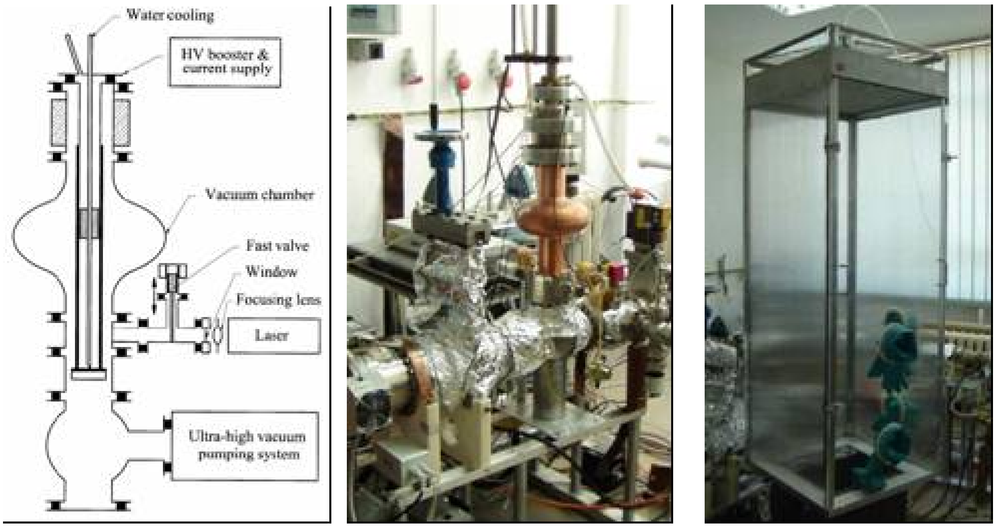


Figure JRA1.4.1: Scheme and view of UHV cylindrical-arc facility constructed at IPJ and a removable laminar flow chamber.

Before a delivery the first original 1.3-MHz copper cavity the WP4.1 activities were concentrated on analyses of various samples deposited within the UHV linear-arc facility. An example is shown in Fig. JRA1.4.2.

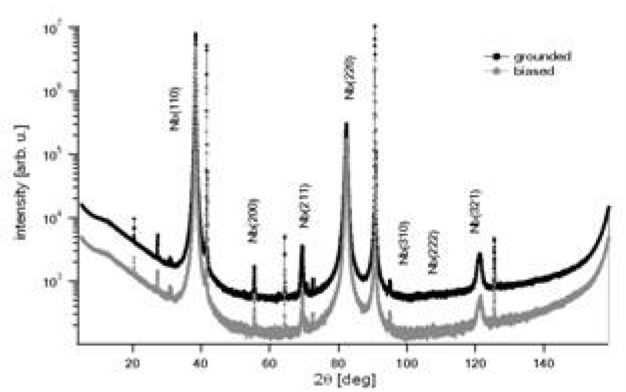


Figure JRA1.4.2: X-ray diffraction patterns from Nb layers deposited upon the biased- and grounded-substrates.

The X-ray diffraction lines from a sapphire substrate and the deposited Nb-film were identified. The lines from the substrate appeared to be stronger and narrower than those from the Nb layer. Estimates of the Nb lattice constant have given values very close to that observed for the bulk Nb crystal.

Simultaneously with the described tests we carried various tests of the samples deposited during previous operational runs. Since the film oxidation may be an important reason for the deterioration of the superconductive properties, the oxidation of $Nb/Al_2O_3(0001)$ samples has been studied in order to identify various niobium oxides formed during the thermal annealing (up to 600 ºC) in the atmosphere characterized by the partial pressure of oxygen equal to 10^{-4} mbar. Grazing-incidence scans and $\theta - 2\theta$ diffraction patterns have been measured with the Cu $K_{\alpha1,2}$ radiation for the films before and after their oxidation, as shown in Fig. JRA1.4.3.

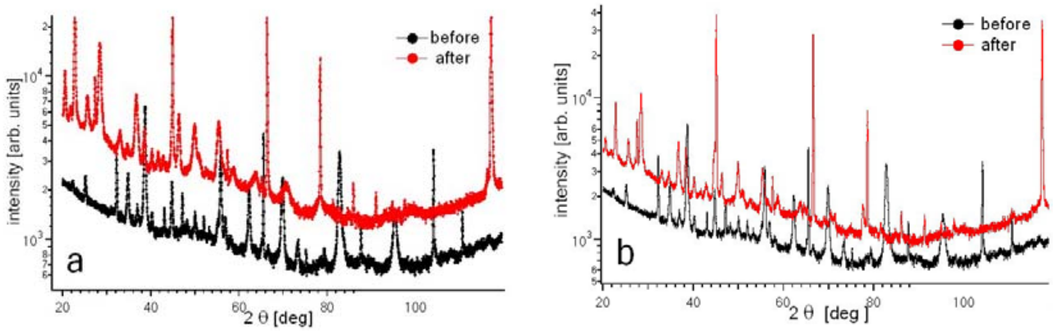


Figure JRA1.4.3: X-ray diffraction patterns of the Nb/Al_2O_3 (0001) film before and after the oxidation: **a** – grazing incidence detector scan, **b** – θ–2θ pattern.

The obtained results show that the deposited Nb layer can be converted into a new crystalline phase. A detailed analysis of this phase has to be continued because it might be of importance for future deposition processes.

X-ray diffraction measurements were also performed for the Nb/Al_2O_3 samples, using a W2 beam-line at the DORIS storage-ring in DESY. The enhanced 110 reflection at 38.45 ° indicated that the preferable orientation of the 110-plane is parallel to the sample surface. In the θ–2θ pattern such a reflection showed two (sharp and broadened) components, while only a sharp one was observed in the grazing incidence pattern. The broaden component can be interpreted as a result of a thin (a few nanometers) epitaxial-layer formed on the sapphire substrate directly.

The first original copper cavity was delivered from CEA-Saclay in April 2007, but it was broken during its transport to Poland. After the inspection of that cavity by Dr B. Visentin and Miss M. Bruchon during their visit at IPJ on May 10-11, 2007, it was sent back to CEA-Saclay. The second cavity (with an improved external supports) was delivered from CEA-Saclay in June 2007, and its internal walls were coated with the Nb-layer, as shown in Fig.JRA1.4.4.

Figure JRA1.4.4: End-on picture of the second cavity from CEA-Saclay, taken after its coating at IPJ.

The coated cavity was sent back to CEA-Saclay in order to perform high-pressure rinsing and RF tests. Unfortunately, it appeared that adhesion of the deposited Nb-layer was too low to withstand the high-pressure rinsing and further deposition tests have to be performed. In order to improve the adhesion during next deposition processes, it has been decided to apply an appropriate biasing of the original cavity by means of an auxiliary anode and/or to perform preliminary ion cleaning. A new auxiliary anode has just been designed and installed within the UHV linear-arc facility for electrical tests and depositions upon some samples are to be performed in June 2007. The next deposition of the original 1.3-MHz copper cavity will be performed when it is delivered from the CEA-Saclay.

The WP4.1 team has received the information from the CEA-Saclay that our Nb/Cu sample, which was deposited within the UHV linear-arc facility at IPJ, had undergone the HPWR procedure and the Nb layer was not destroyed. It is very positive information as regards future experiments.

JRA1.4.2 Planar-Arc Cathode Coating Status of activities

In 2007 the WP4.2 team activity was mainly devoted to the upgrade of the UHV unfiltered planar arc facility dedicated to single cell deposition tests, aimed at improving the system flexibility, the ion current delivery and the configuration reproducibility. In order to make the film thickness more uniform particularly in the equator region, an external slanted rotating coil was added to bend the plasma column and rotate it around the cavity axis. A schematic drawing and a view of the modified UHV planar-arc facility are shown in Fig. JRA1.4.5.

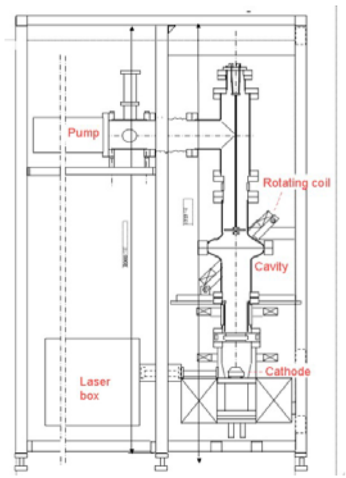


Figure JRA1.4.5: Layout of the modified UHV planar-arc system and a picture taken during assembly.

With the upgraded system equipped with a SS dummy cavity carrying a number of ion collectors, it was verified that the deposition rate upon the upper half-cell surface, facing the planar cathode, exceeds that on the bottom half-cell by an order of magnitude, confirming that the cavity must be coated from both sides. The design of such a system, equipped with two cathodes and including micro-droplet filtering, is in progress.

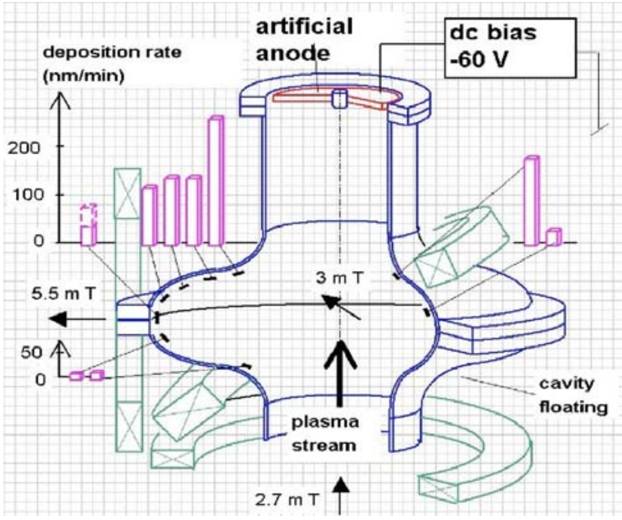
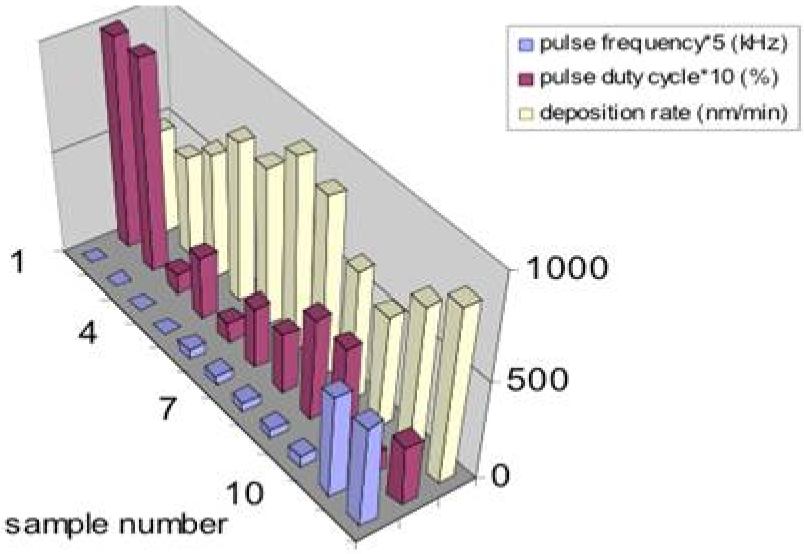


Figure JRA1.4.6: Sketch of the SS dummy cavity showing the set of magnetic coils controlling the plasma beam position, the ion collectors arrangement and the measured deposition rates at their locations.

In the meantime, the magnetic field distribution will be further studied in order to further improve the deposition rate in the equator region.

The influence of pulsed bias on the deposition rate was studied by coating, under a number of different conditions, an array of 11 sapphire samples fastened to the dummy cavity inner surface. Measured deposition rates are shown in Fig. JRA1.4.7.



Sample number	Bias freq.y (KHz)	Duty cycle (%)
1	DC	100
2	DC	100
3	1	10
4	1	30
5	10	10
6	10	30
7	10	30
8	10	50
9	10	50
10	100	10
11	100	30

Figure JRA1.4.7: Deposition rates measured at bias voltage of -60 V and different bias pulsing frequencies and duty cycles.

The effects on the film characteristics of pulsed as compared to continuous negative biasing was also investigated for various bias voltages, repetition frequencies and pulse duty factors. Tests on samples have shown that bias pulsing improves the morphological and structural properties of the deposited Nb films. The measured RRR of the best sample was 80. Larger grain sizes (up to microns) and less defects are obtained under the best conditions so far, namely 10 kHz and 30%-50% duty cycle, as shown in Fig. JRA1.4.8.

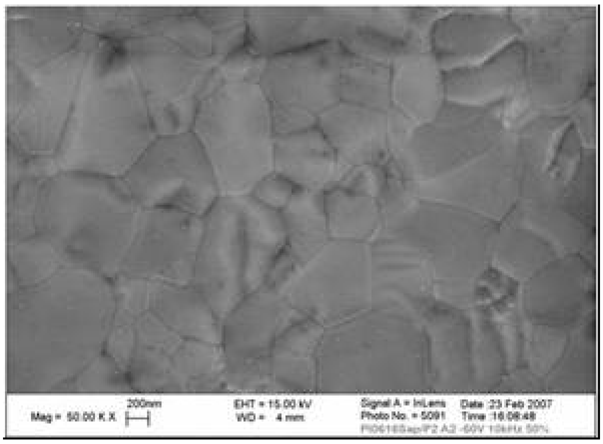


Figure JRA1.4.8: FEG-SEM picture of a 1.4-μm-thick Nb film, deposited on sapphire, with -60 V bias, pulsed at 10 KHz and 50% duty cycle.

During sample depositions an infrared camera has been used to investigate temperature distribution over the whole system and in particular that of the sample substrate. Thermographic pictures, taken through an observation window, showed that the sample holder temperatures ranged from ~25 °C to ~150 °C. The sample substrate temperature is therefore expected to come close to the 150°C upper value. Temperature distribution on the cavity walls and on the plasma duct also gave information on the plasma flow: a typical observation is shown in Fig. JRA1.4.9.

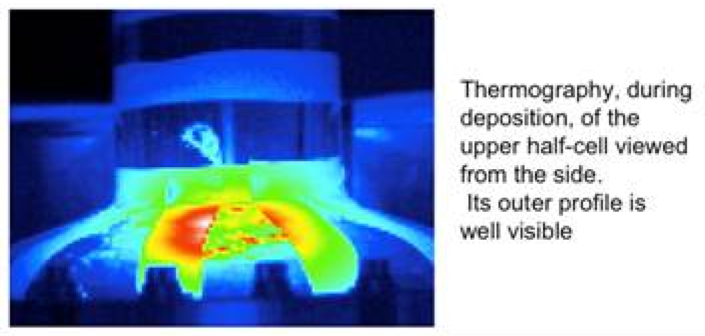


Figure JRA1.4.9: Color coded temperatures of the upper dummy half cell during deposition tests.

The first 1.3-MHz copper single cell, prepared for coating and delivered by CEA-Saclay at the end of June 2007, was successfully coated, in the unfiltered system described above, on July 11 and is being sent back to CEA-Saclay for final cleaning and RF measurements. The inner coated surface is shown in Fig. JRA1.4.10.

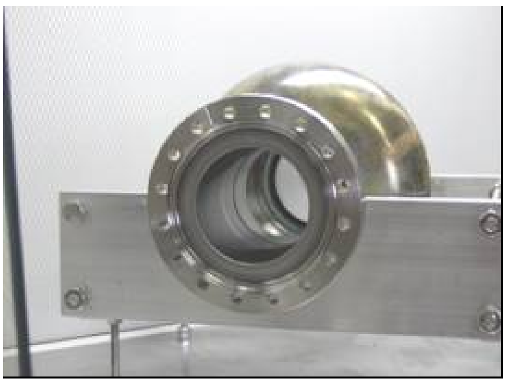


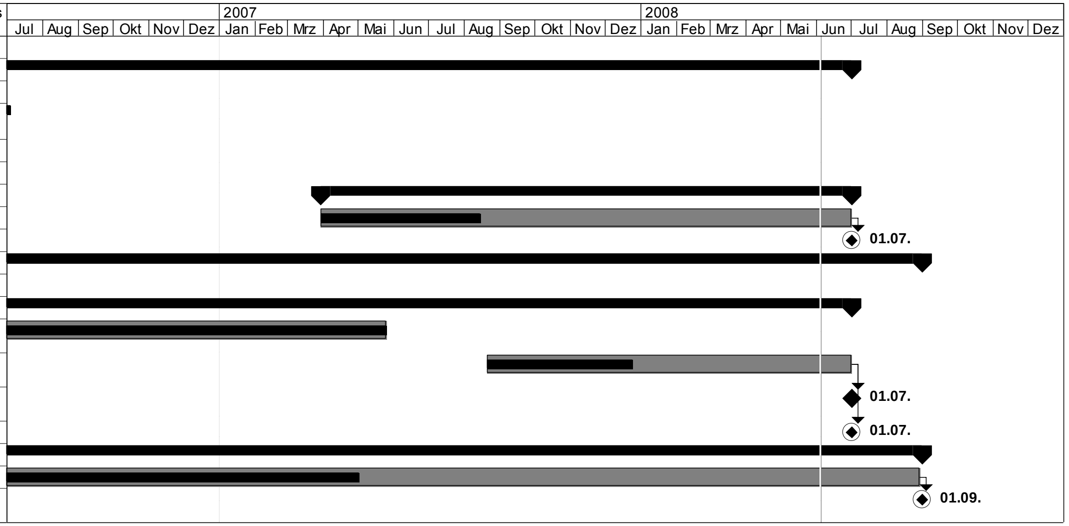
Figure JRA1.4.10: The first single cell copper cavity, UHV planar arc coated in Tor Vergata lab.

The milestone “Report on quality of high-T_c material coating“ has not been reached due to the fact that priority was given to the preparation of the UHV planar-arc facility for single cell deposition. It is estimated that the mentioned milestone will not be reached before the end of 2007.

Results of the studies described above have already been reported in several publications and papers presented (or to be presented) at international scientific conferences this year (see the list in this Report).

JRA1.4.3 Overall Progress of Work Package 4

N°	Task Name	Status	Deliverables
4	**WP4 THIN FILM CAVITY PRODUCTION**	**77%**	
4.1	**Linear-arc cathode coating**	**81%**	
4.1.1	**Installation & commissioning of coating apparatus**	**100%**	
4.1.2	**Coating of single cells without micro droplet filtering**	**100%**	
4.1.3	**Droplet filter ready**	100%	
4.1.4	**Coating of single cell with micro droplet filtering**	**100%**	
4.1.5	**Design and commissioning multi-cell coating**	**30%**	
4.1.5.1	Design and commissioning	30%	
4.1.5.2	**First Multicell coating**	30%	**Prototype**
4.2	**Planar-arc cathode coating**	**75%**	
4.2.1	**Modification of a planar-arc & trigger system**	**100%**	
4.2.2	**Routine Operation of planar arc system**	**82%**	
4.2.2.1	Characterization of samples coated at different conditions	100%	
4.2.2.2	Quantitative investigation of the micro droplet problem	40%	
4.2.2.3	**Summary report on quality of planar arc coating**	0%	
4.2.2.4		0%	**Prototype**
4.2.3	**Studies of other HTC superconducting coating**	**50%**	
4.2.3.1	Study of superconducting properties	50%	
4.2.3.2	**Report on quality of superconducting properties**	0%	**Report**



JRA1.5 Work Package 5: Surface Preparation

JRA1.5.1 Electropolishing (EP) on single cells

After some modifications the EP system for single cell at Saclay is operating and in use. Fig. JRA1.5.1 shows the installation in operation.

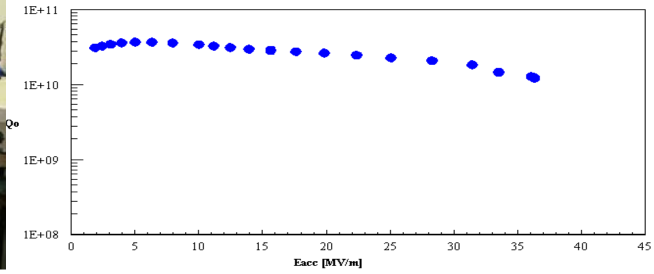


Figure JRA1.5.1: Single cell electropolishing (EP) installation at Saclay.

Figure JRA1.5.2: Test result of the first treated cavity at Saclay

In order to calibrate the new EP facility a test cavity was electro-polished according to the EP parameter set under use at the DESY 9-cell EP installation. The performance of this cavity is shown in figure JRA1.5.2. An accelerating gradient of 36 MH/m at a quality factor of $1x10^{10}$ was measured, which is very close to the original treatment and measurement at DESY.
During 2007 a variety of EP mixtures were applied to several single test cavities. Originally these mixtures were developed during a small sample test program in 2006. The cryogenic measurement of the 1-cell cavities could also be done at Saclay because the move and re-installation of the cryogenic plant was finished in 2007. A summary report of the investigation of EP parameter optimisation will be finished early 2008.

JRA1.5.2 Electropolishing (EP) on multi-cells

The design of new and optimized electrodes has been started. Calculations of the existing electrode are in an acceptable agreement with the parameters found on the DESY EP apparatus even if influences like acid flow speed and temperature variations are not included in the calculation. Various electrode designs are under calculation. One promising design is shown in Fig. JRA1.5.3. The main difficulty is to assure a high EP rate at the equator area in comparison to the iris location which is much nearer to the central cathode. Therefore additional radial rods are attached to the horizontal center electrode. The current distribution with and without these rods are calculated and shown in figures JRA1.5.4.

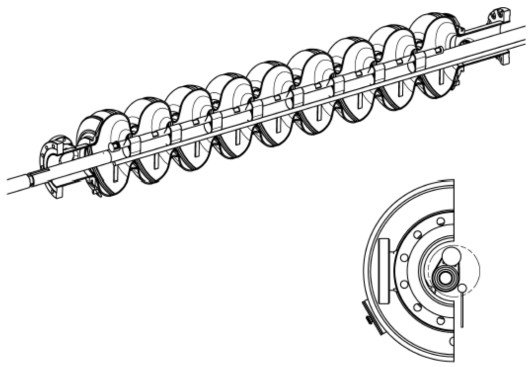


Figure JRA1.5.3: Optimised electrode shape

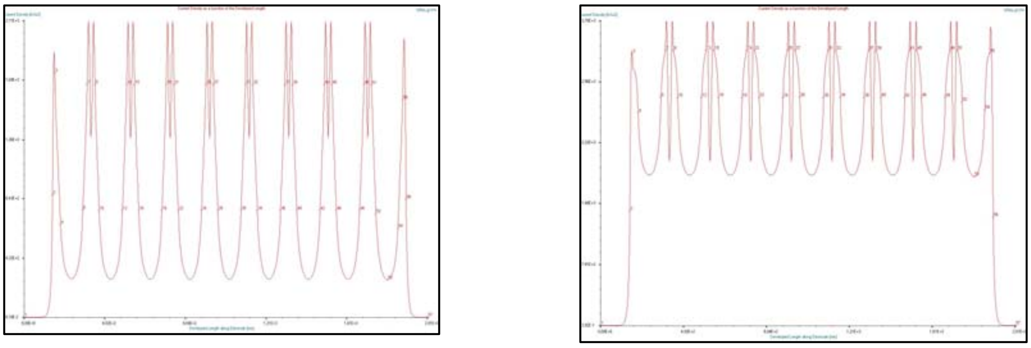


Figure JRA1.5.4: Calculated current distribution without (left) and with (right) radial rods in order to increase the current density at the equator region

The transfer of EP technology to industry has been started. Contracts to industry were placed for the installation of 9-cell EP facilities (ACCEL, HENKEL). These installations follow the experience of the prototype operation at DESY. The first operation is expected for early 2008.

JRA1.5.3 Automated EP

At INFN laboratory an automated EP system was developed and tested with single cell Nb resonators (see CARE-Report-07-010-SRF). A collaborative effort of INFN Legnaro and DESY has been started to adopt the necessary electronics and software to the DESY 9-cell EP facility. It is expected to turn the DESY EP facility into automated operation early 2008.

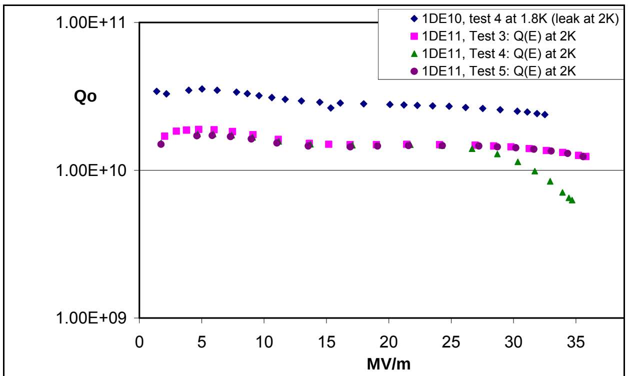


Figure JRA1.5.5: Q(E)-performance of the latest 4 DIC cleaned cavity tests

JRA1.5.4 Dry-ice cleaning

A set-up for the horizontal cleaning of single- to three- cell cavities is in successful operation. The present parameter set of DIC gives reproducible gradients of 35 MV/m in single-cell cavities with no or low field emission loading (see Fig. JRA1.5.5)

There are examples where dry ice cleaning (with the modified cleaning parameters) exceed the cavity performance gained after high pressure water cleaning (see fig. JRA1.5.6).

In order to provide low dark currents in the gun cavity of the photo injector of FLASH and for the future European XFEL, a dedicated dry ice cleaning set-up (Figure JRA1.5.7) was constructed, commissioned and recently started up. Compared to the previously applied cleaning using HPR, the risk of an objectionable oxidation of the sensitive rf surface is minimized. Remarkable is the new nozzle system with a 110° degree rotatable nozzle (Figure JRA1.5.8). This design is necessary in order to assure a complete and effective cleaning of the rf gun geometry, i.e. the surface close to the cathode and the first cell of reduced length. In order to avoid any particulate recontamination created by the motion of the nozzle, the nozzle system is exhausted.

The first gun cavity has been cleaned recently, and the cavity test is under preparation.

Figure JRA1.5.7: Vertical cleaning set-up for copper rf gun cavities

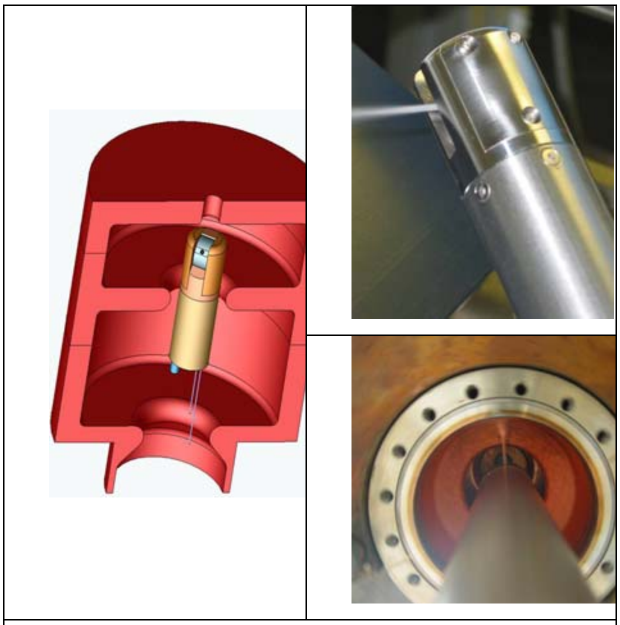
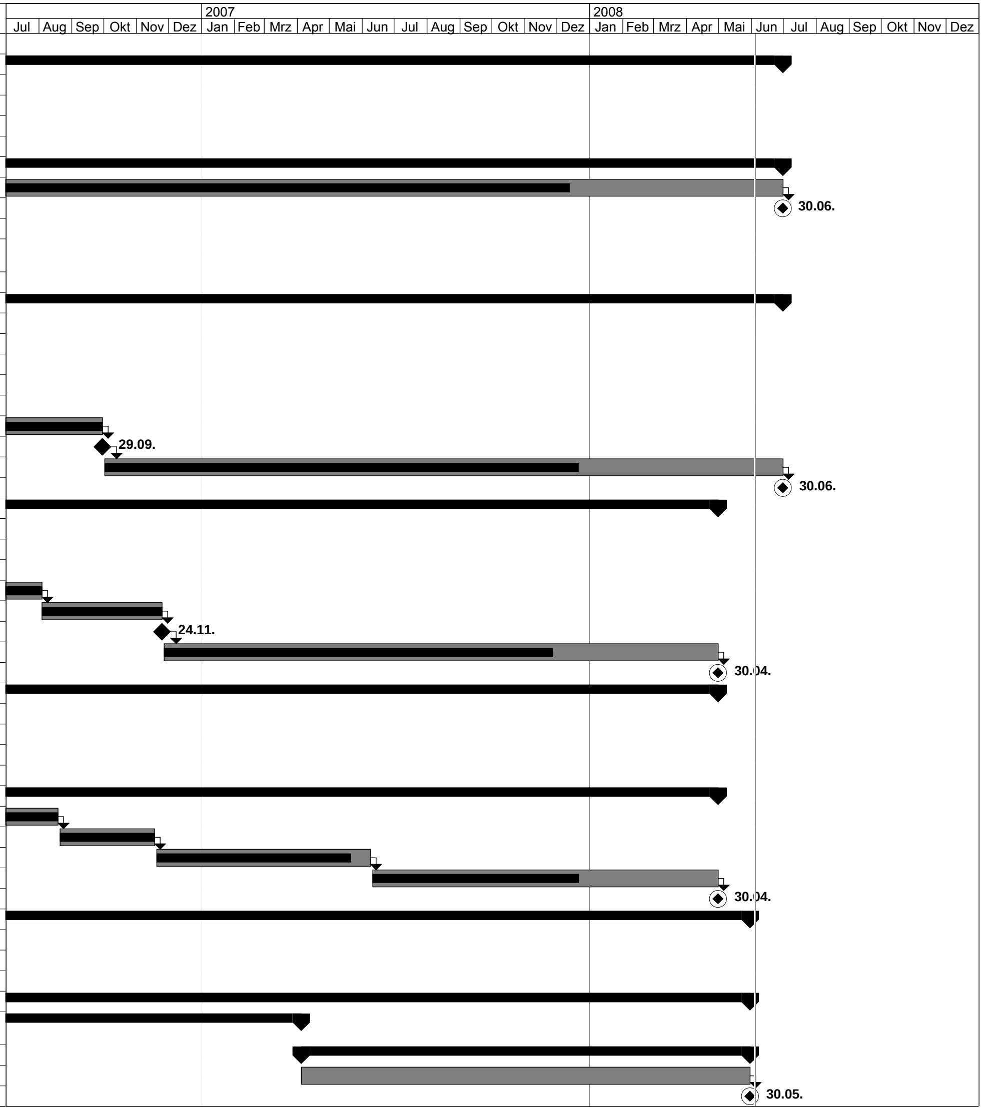


Figure JRA1.5.8: 3D-model of gun cavity with rotatable nozzle (left); rotatable nozzle (upper right); bottom-up view of the cleaning of the gun cavity (lower right)

JRA1.5.4 Overall Progress of Work Package 5

N°	Task Name	Status	Deliverables
5	**WP5 SURFACE PREPARATION**	**73%**	
5.1	**EP on single cells**	**91%**	
5.1.1	**EP on samples**	**100%**	
5.1.2	**Single cell cavities**	**100%**	
5.1.3	**Build EP chemistry for single cells**	**100%**	
5.1.4	**Operation of single cell EP**	**100%**	
5.1.5	**Continuous operation, search for best parameters**	**80%**	
5.1.5.1	Parametrising EP procedure	80%	
5.1.5.2	**EP parameters fixed**	80%	**Report**
5.2	**EP on multi-cells**	**91%**	
5.2.1	**Transfer of parameters from 1 cell to multi cell equipment**	**100%**	
5.2.2	**Laser roughness**	**100%**	
5.2.3	**Oxipolishing as final chemical cleaning**	**85%**	
5.2.3.1	Laboratory studies	100%	
5.2.3.2	Design of OP system	100%	
5.2.3.3	Setup one-cell system	100%	
5.2.3.4	**Proof-of-Principle experiment Oxipolishing**	100%	
5.2.3.5	Design OP for nine-cells	100%	
5.2.3.6	Build OP for 9-cells	100%	
5.2.3.7	**OP for 9-cells ready**	100%	
5.2.3.8	Study op with 9-cell cavities	70%	
5.2.3.9	Evaluate experiments	0%	**Report**
5.2.4	**Transfer Electropolishing technology to industry**	**87%**	
5.2.4.1	Qualify industry with one-cells	100%	
5.2.4.2	Industrial design study on setup for multi-cells	100%	
5.2.4.3	**Report on industrial design**	100%	
5.2.4.4	Fabricate EP multi-cell industrial prototype	100%	
5.2.4.5	Commission EP multi-cell industrial prototype	100%	
5.2.4.6	**EP multi-cell industrial prototype ready**	100%	
5.2.4.7	Operate EP multi-cell industrial prototype	70%	
5.2.4.8	**Final report on industrial EP**	50%	**Report**
5.3	**Automated EP (AEP)**	**92%**	
5.3.1	**Prototype EP installation**	**100%**	
5.3.2	**EP computer control**	**100%**	
5.3.3	**Operation of AEP prototype**	**100%**	
5.3.4	**Alternative electrolytes**	**100%**	
5.3.5	**Define best AEP**	**78%**	
5.3.5.1	Compare standard/new electrolyte method	100%	
5.3.5.2	Modify AEP installation for best electrolyte	100%	
5.3.5.3	Operate modified AEP	90%	
5.3.5.4	Design report on best AEP	60%	
5.3.5.5	**Conclude on best electrolyte**	50%	**Report**
5.4	**Dry ice cleaning**	**19%**	
5.4.1	**Installation of full system for 1-3 cell cavities**	**100%**	
5.4.2	**Optimization of cleaning parameters**	**100%**	
5.4.3	**VT 9-cell cleaning apparatus**	**0%**	
5.4.4	**VT Cleaning of 9-cell cavities**	**0%**	
5.4.5	**Design & construction of H 9-cell cleaning apparatus**	**0%**	
5.4.6	**Cleaning of horizontal nine-cell cavity**	**0%**	
5.4.6.1	Continuous cleaning	0%	
5.4.6.2	**Evaluation of experimental results**	0%	**Report**



JRA1.6 Work Package 6: Material Analysis

JRA1.6.1 Development of SQUID based equipment for detection of defects in Nb

Task 6.1 SQUID scanning results

Further improvement of the SQUID scanner has been further improved and a special software tool has been developed which allows minimizing the noise signals caused by vibration etc. Excitation frequency was significantly increased up to 80 kHz.
21 niobium sheets of the Fa. Tokyo Denkai has been scanned with WSK SQUID scanner. In addition another 20 sheets from Plansee company have been scanned, too. SQUID scanning results have been compared with Eddy Current scanning results get for the same sheets earlier. The sensitivity of the SQUID apparatus is at lest on the same level as of the EDDY current apparatus. Two examples of the comparison can be seen in the figures JRA1.6.1-6.4.

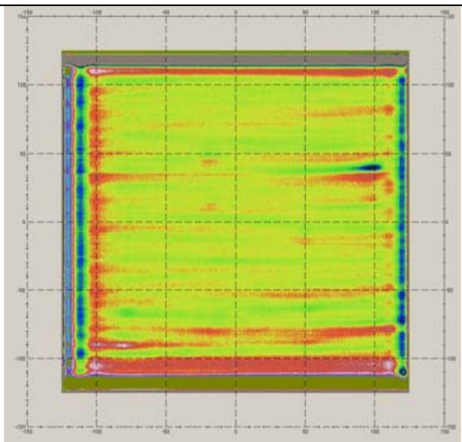


Figure JRA1.6.1: SQUID image of the NC-1355-335 Nb-sheet

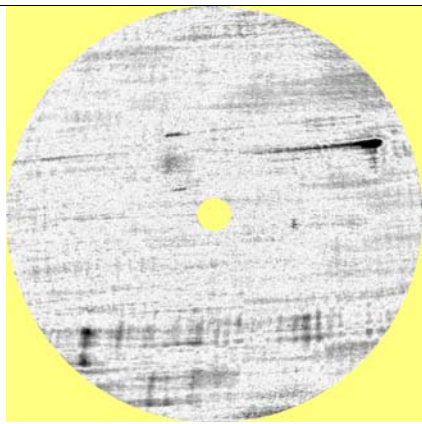


Figure JRA1.6.2: Eddy Current image of the NC-1355-335 Nb-sheet

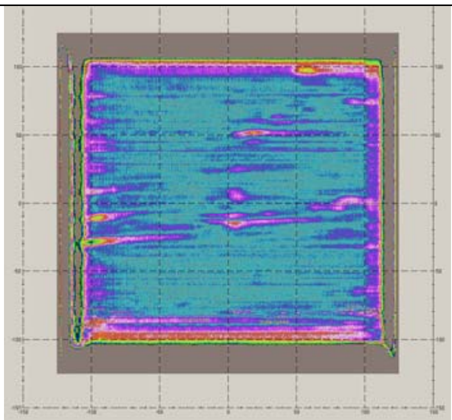


Figure JRA1.6.3: SQUID image of the NC-1357-400 Nb-sheet

Figure JRA1.6.4: Eddy Current image of the NC-1357-400 Nb-sheet

It can be seen that for the sheet NC-1357-400 the SQUID sensor makes existing flaws even more visible than by the eddy current methode
Another evidence of the high sensitivity of SQUID apparatus have been obtained at WSK on the irridium welding seam. Shrinkage voids smaller as 50 µm have ben detected by SQUID and have been clearly proven by metallograpfic investigation (see Fig. JRA1.6.5)

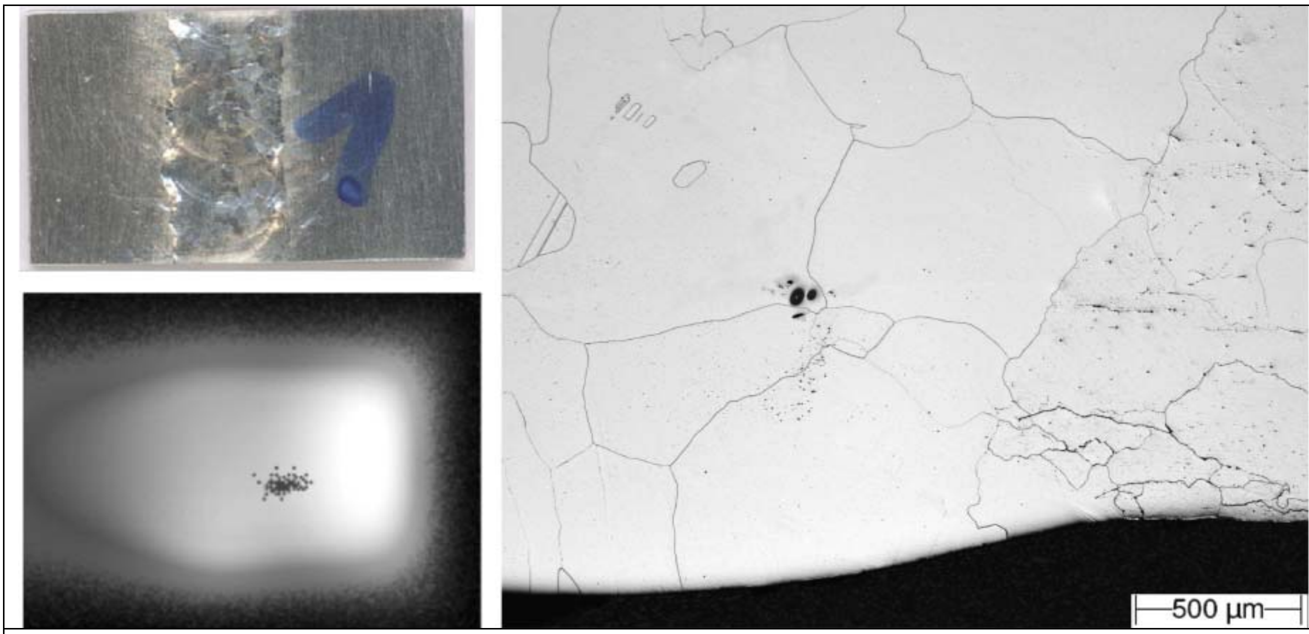
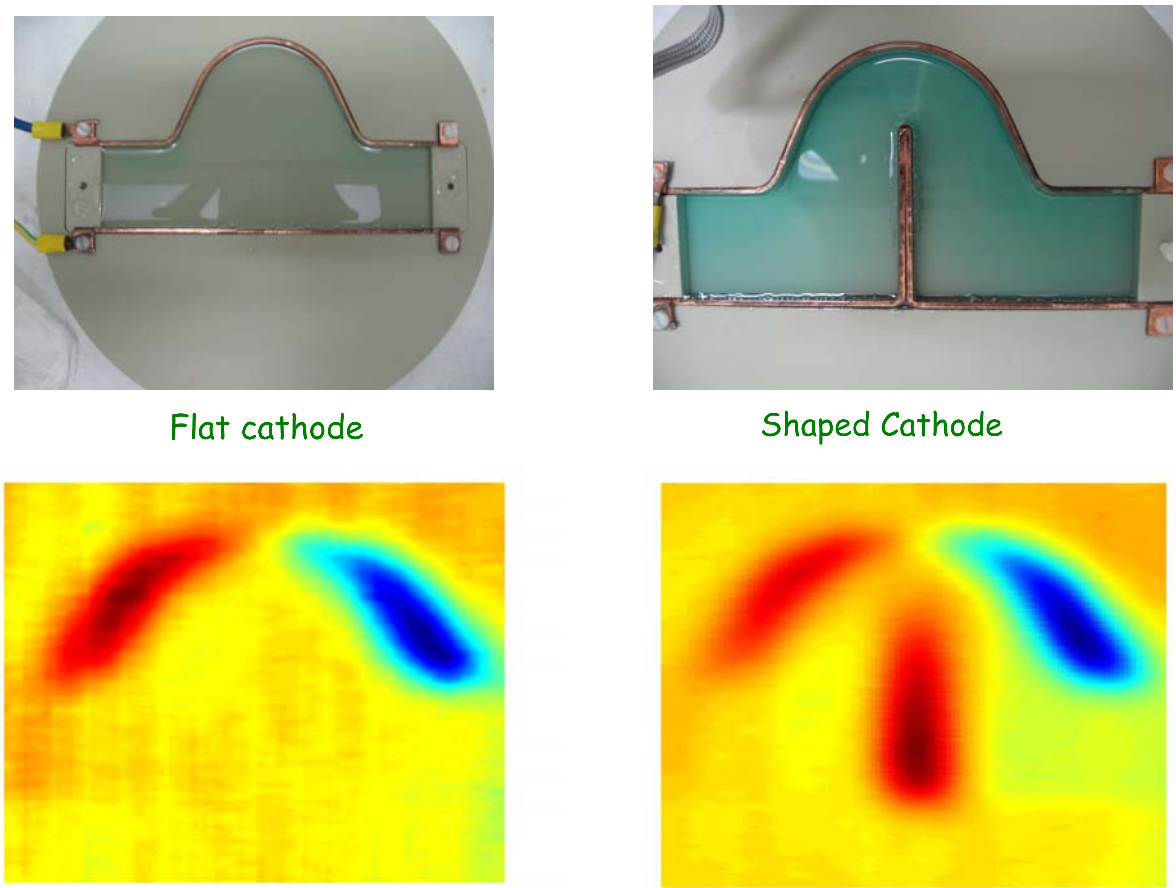


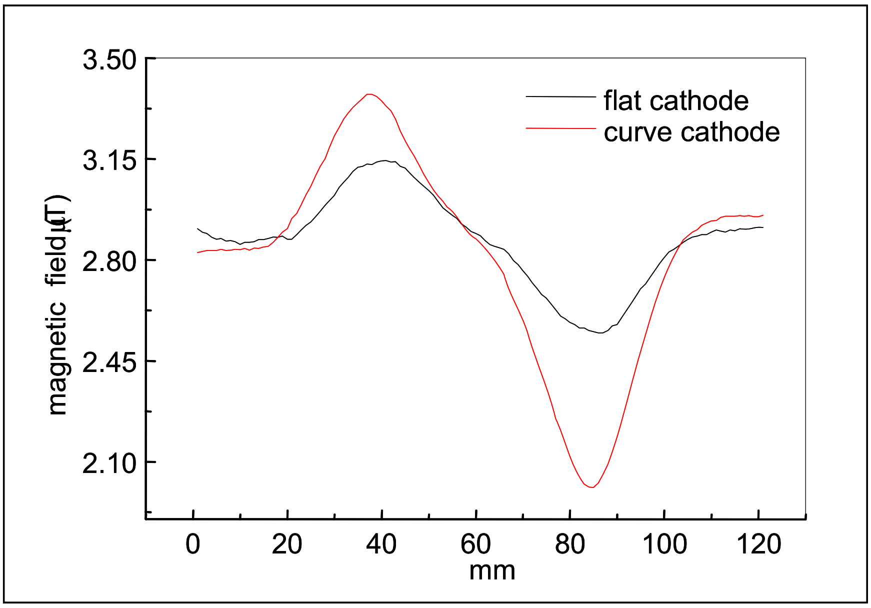
Figure JRA1.6.5: Welding seam of Iridium: Top left - photo, beneath left - SQUID scan, right - metallographic schliff with shrinkage void.

JRA1.6.2 Flux gate magnetometry

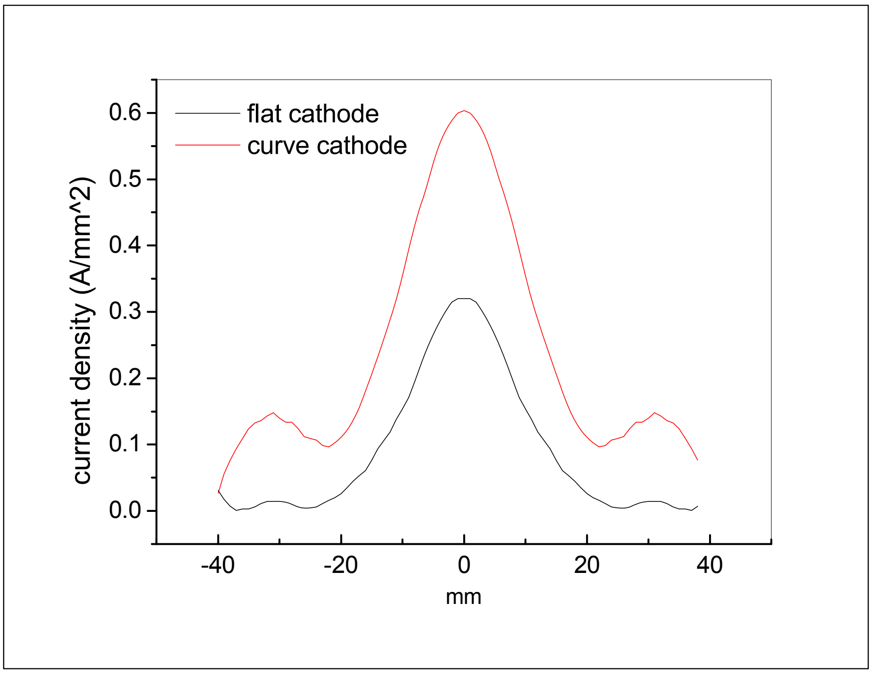
After having compared flux gate sensors with GDR, we have seen that both GDR and flux gates, whenever applied to the cavity electropolishing, show the same result, i.e. a shaped cathode works definitely better than a flat electrode. The cavity section shows that the viscous layer is more uniformly distributed in the case of shaped electrode, while there is a difference in the cell magnetic map, but this is quantitatively an information difficult to interpret.



In the next figure the maximum intensity of magnetic field along the cavity internal wall is mapped along the cavity axis, and from this picture it is already understandable that the magnetic field at the equator is higher for the shaped cathode case.



Therefore, we used the inversion of magnetic field maps, in order to get the current distribution along the cavity profile for the two different cathodes. The result in the figure below, where the current distribution is plotted versus the cathode length, showing that the effect at the equator is almost doubled.



In synthesis, the experiment definitely proves that the EP cathode should not be a simple tube but a shaped electrode. It is obvious that the insertion of such a cathode inside a cavity could be difficult, however an umbrella type cathode would give the advantage of a uniform thickness removal during EP.

JRA1.6.3 DC field emission scanning

Here we report about the effectiveness of dry ice cleaning (DIC) to suppress the enhanced field emission (FE) from crystalline Nb samples of very good surface quality. Three large grain Nb samples with 30 µm BCP +HPR, which had shown the onset of FE at high field of 150 MV/m, were dry ice cleaned at DESY and were measured again with a field emission scanning microscope. A new series of four large grain Nb samples, with increased BCP layer thickness of 100 µm was also prepared at DESY for systematic FE measurements on crystalline Nb samples. The surface treatments and measurement details of the samples are listed in the table below.

Sample	Surface treatment/ Production method	Intermediate measurements	Final treatment	Measurement, Analysis
SCNb1	30 µm BCP + HPR	FE measurements, SEM, EDX	Dry Ice Cleaning	FE measurements, SEM, EDX
SCNb2				
CryNb1		FE measurements		
ScNb3	100 µm BCP + HPR	FE measurements, SEM, EDX	--	--
CryNb3				

The main results of this work can be summarized as follows:

I. Dry Ice Cleaned large grain Nb samples (30 µm BCP):

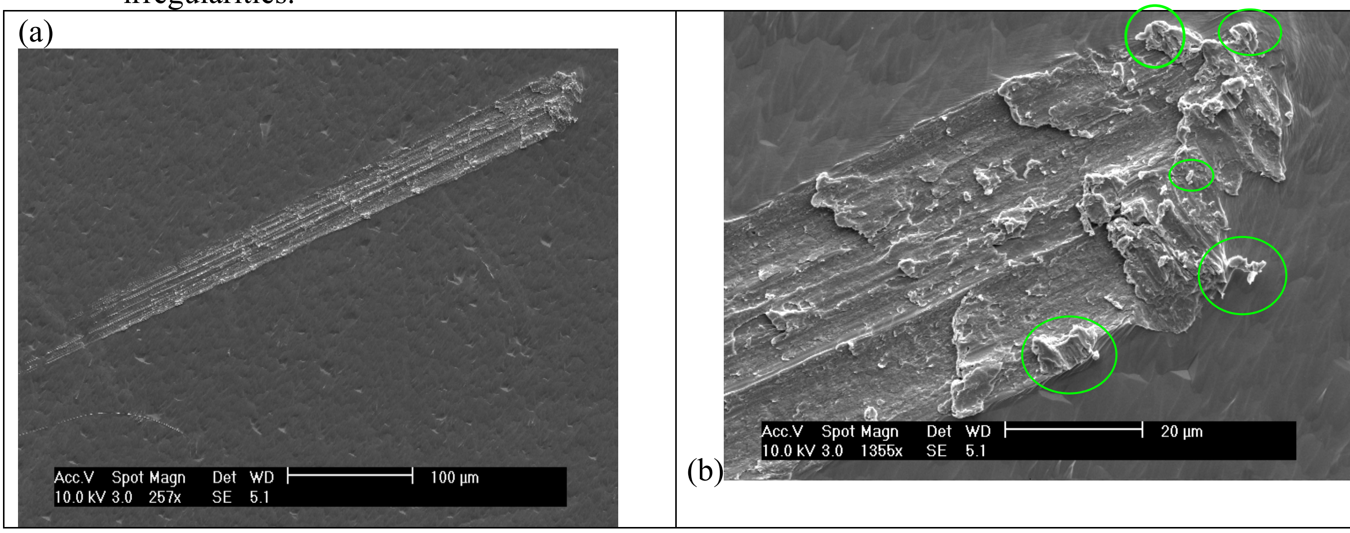
- The onset of FE for single crystal Nb samples in the regulated V-scans for 2 nA current was observed at 200 MV/m, showing a positive shift from 150 MV/m (before DIC) for the same scanned area.
- FE particulates down to 400 nm were observed to be removed by DIC and the effect of DIC on surface irregularities was observed for the first time. SEM images in Fig.JRA1.6.6 and 6.7 show the removal of the delamination and partial smoothening of sharp scratch-edge-features by DIC. The scratch in Fig. JRA1.6.6 showed field emission at 60 MV/m before DIC, while no emission up to 150 MV/m after DIC was observed.

⇨ It proves that DIC is capable to efficiently suppress FE caused by particulates as well as surface irregularities like scratches.

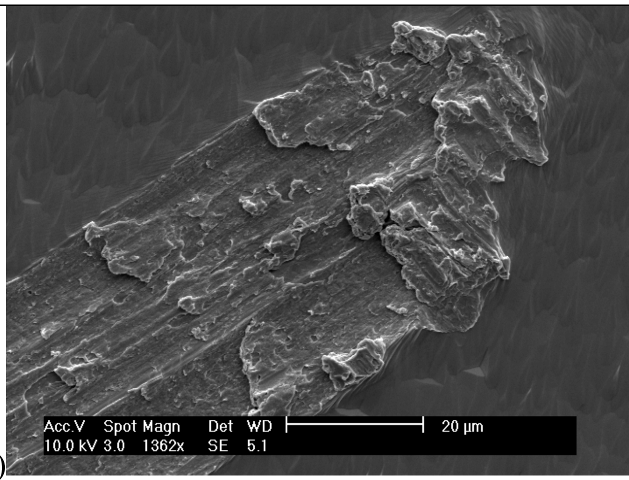
II. Large grain Nb samples (100 µm BCP):

- First evidence was found for the higher onset field with the increased BCP treatment. The onset of FE for single crystal Nb was observed at 200 MV/m for 100 µm BCP and 150 MV/m for 30 µm BCP. The emitter density at 250MV/m is 9 and 16 /cm^2 for ScNb3 and CryNb3 samples.
- Locally measured emitters showed stable FN behavior after current processing. Reduced local field enhancement factors between 20 to 85 and S parameters in the range of 10^{-1} to 10^{-8} μm^2 were observed, which are typical for particulates and surface irregularities.

(a)



(b)

Figure JRA1.6.6: SEM image of ~500 µm long scratch (a) observed on a large grain Nb sample surface; high resolution images of the scratch head before DIC (b) and after DIC (c); showing the removal of the (encircled) delaminations by dry ice cleaning.	(c) 

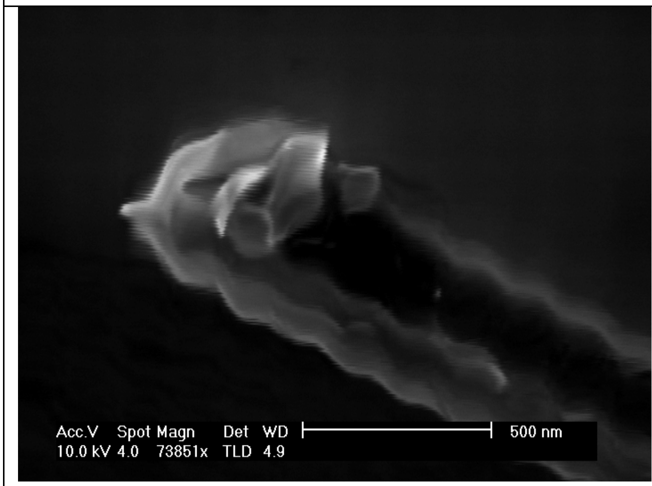
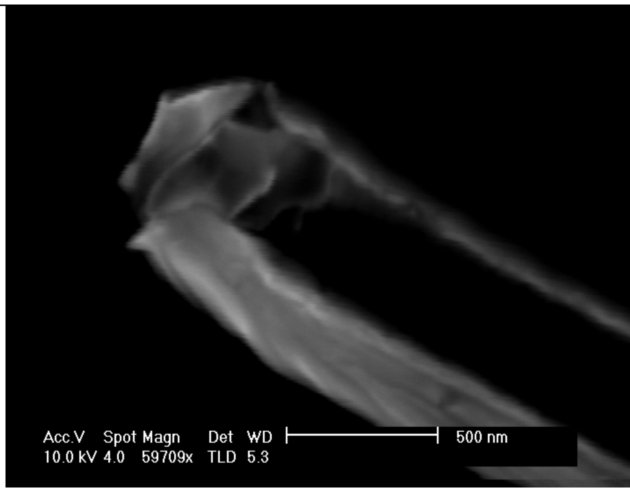
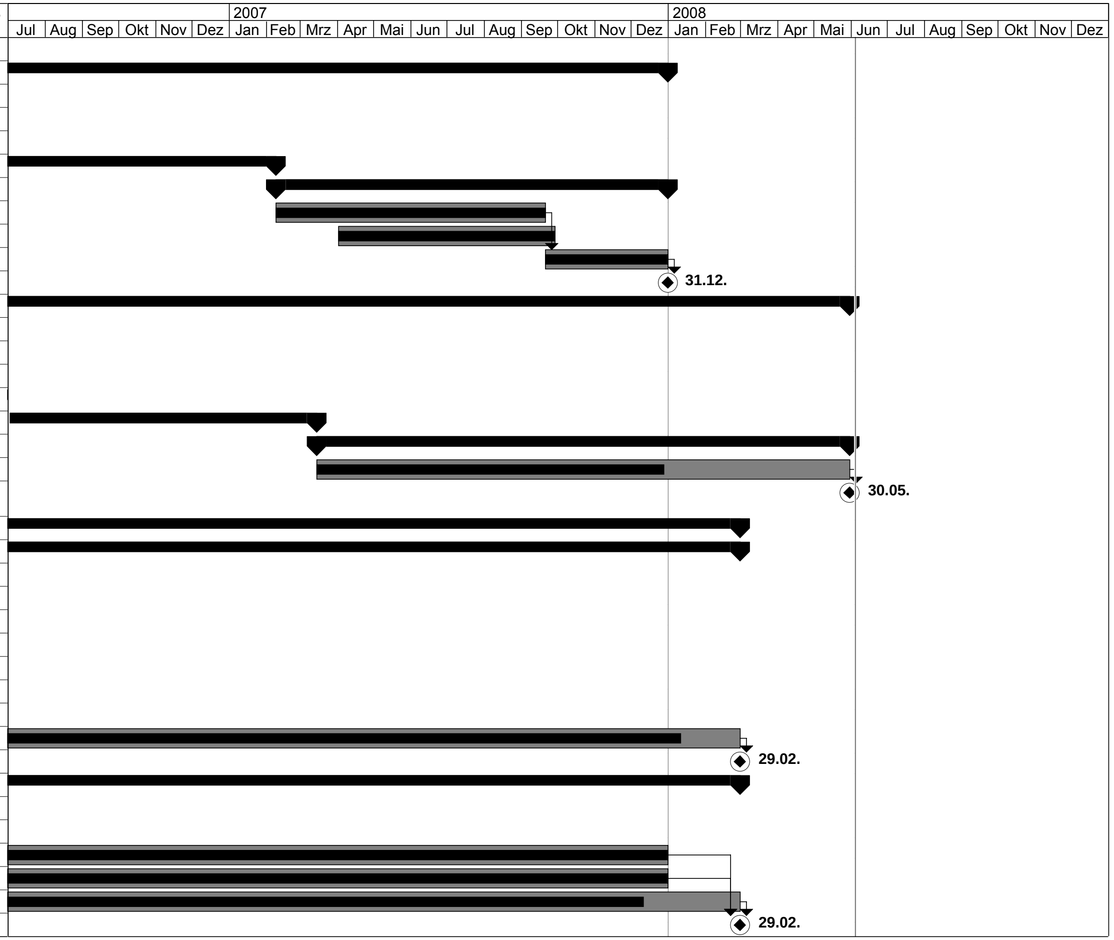

	

Figure JRA1.6.7: High resolution SEM images of a scratch head before (left) and after (right) DIC, showing partial smoothening of the scratch –edge-features.	
To complete the systematic study, detailed analysis are ongoing on the rest of the measurements performed over 100 µm BCP treated large grain Nb samples.	

JRA1.6.4 Overall Progress of Work Package 6

N°	Task Name	Status	Deliverables
6	**WP6 MATERIAL ANALYSIS**	**97%**	
6.1	**SQUID scanning**	**99%**	
6.1.1	**Produce calibration defects**	**100%**	
6.1.2	**Design components of Squid scanner**	**100%**	
6.1.3	**Construction of scanning apparatus**	**100%**	
6.1.4	**Scanning of sheets with artificial defects**	**100%**	
6.1.5	**Scanning of production sheets**	**99%**	
6.1.5.1	Scanning of sheets of different producers	100%	
6.1.5.2	Identification of defects by (EDX, SURFA etc.)	100%	
6.1.5.3	Conclusive comparison with eddy current data	100%	
6.1.5.4	**Final report on SQUID scanning**	80%	**Report**
6.2	**Flux gate magnetometry**	**93%**	
6.2.1	**Produce calibration defects**	**100%**	
6.2.2	**Design components of flux gate head**	**100%**	
6.2.3	**Fabrication of flux gate detector**	**100%**	
6.2.4	**Commissioning of flux gate detector**	**100%**	
6.2.5	**Operation of flux gate detector**	**100%**	
6.2.6	**Comparison with SQUID scanner**	**65%**	
6.2.6.1	Compare measurements	65%	
6.2.6.2	**Conclude SQUID scanner vs. flux gate detector**	50%	**Report**
6.3	**DC field emission studies of Nb samples**	**97%**	
6.3.1	**Quality control scans**	**97%**	
6.3.1.1	Modification of Scanning apparatus	100%	
6.3.1.2	Calibration of Scanning apparatus	100%	
6.3.1.3	**Start scanning activity**	100%	
6.3.1.4	BCP and HPR samples	100%	
6.3.1.5	EP and HPR samples	100%	
6.3.1.6	BCP/EP and DIC samples	100%	
6.3.1.7	**First report on BCP/EP and DIC surface**	100%	
6.3.1.8	Continue QA scanning	95%	
6.3.1.9	**Evaluation of scanning results**	80%	**Report**
6.3.2	**Detailed measurements on strong emitters**	**97%**	
6.3.2.1	Calibrate apparatus for high current	100%	
6.3.2.2	**Start strong emitter evaluation**	100%	
6.3.2.3	I/V curves and current limits	100%	
6.3.2.4	SEM and AES	100%	
6.3.2.5	Influence of heat treatment and ion impact	90%	
6.3.2.6	**Evaluate strong emitter investigations**	80%	**Report**



JRA1.7 Work Package 7: Couplers

JRA1.7.1 New Prototype Couplers

TTF-V :

The RF inspection of the two new TTF V couplers detected that the optimum transmission frequency was shifted by 20 MHz from 1.3GHz to 1.32 MHz**.** This is most likely due to mechanical fabrication errors or a deviation of the dielectric constant of the RF window material. In order to proceed with the high power high test of the couplers a standard microwave technique was applied: additional mechanical changes are introduced to RF compensate the original mistake. This was possible by changing every coupler antenna penetration in the waveguide test box from 33.75 mm to 27.75 mm. In addition some spacers were added between each cold part flange and the respective waveguide test box flange. Using this solution, we found that the two TTF-V coupler pairs now have a perfect match at the operating frequency of 1.3 GHz (minimum reflection coefficients less than – 40 dB, see figure JRA1.7.1).

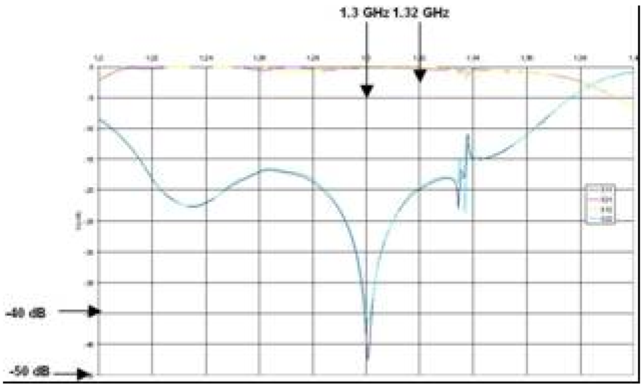


Figure JRA1.7.1: Optimum transmission (i.e. minimum reflection) of the first TTF V couplers at 1.3 GHz after correction of the mechanical tolerances by RF compensation technique.

High power RF tests of the TTF-V couplers are planned in December 2007.

TW60 :

After fabrication the coupler pair was cleaned with the TTF-III couplers cleaning procedure. The TW60 pair was also baked under vacuum in the class 10 room oven at 150°C. After assembly the couplers were baked in-situ at 130°C. The design of these couplers offers large pumping ports for better pumping performances, but unfortunately we had to use the same pumping arrangement than for the TTF-III processing.

Low power level RF measurements illustrated a minimum reflection at 1.3 GHz of less than – 32 dB. The RF matching was possible thanks to the position adjustments of the RF stub located in the warm waveguide part of the coupler. No significant RF leaks were detected through the RF choke used to screen the bias system from the RF power.

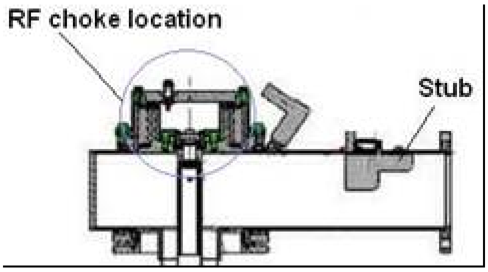


Figure JRA1.7.2: Warm waveguide part of the TW60 coupler.

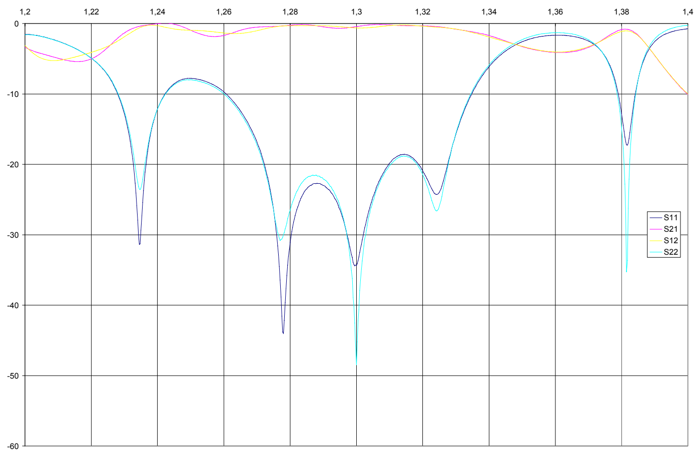


Figure JRA1.7.3: Comparison of calculated and measured minimum reflection data of the TW60 coupler pair assembly at 1.3 GHz. Upper curve is the measured transmission power.

A RF processing of the pair of couplers has started using 20 µs pulses. The processing seemed to be long and many vacuum and current interlocks took place. The most limiting factor was the e- currents interlocks for any exceed of 5 mA. We also noticed that the e-current enhancements take place at a precise power levels and decrease drastically at some others. A progressive decrease of e-current levels was possible at all processed power levels.

As there is some differences between the shape of the TW60 pick-ups and those of TTF-III, we can't make an exhaustive comparison between their relative e- current issues at this time.

The maximum power reached was 660 kW. The conditioning was stopped for the annual maintenance of the modulator cooling water system. Many ramps of power was made before this stop. They showed that, after this processing period, we can increase power easily to 660 kW without having any interlocks. Besides, vacuum steel relatively low below this RF power level.

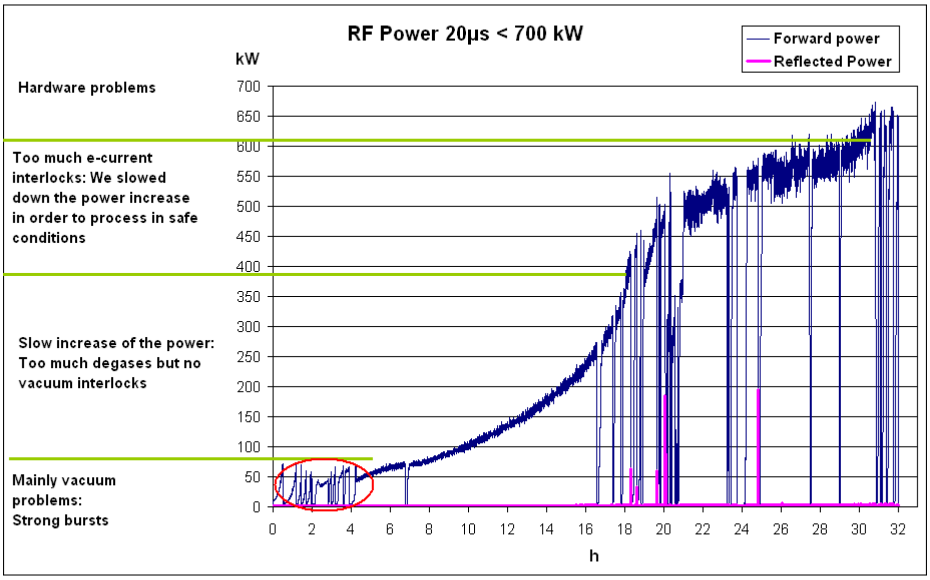
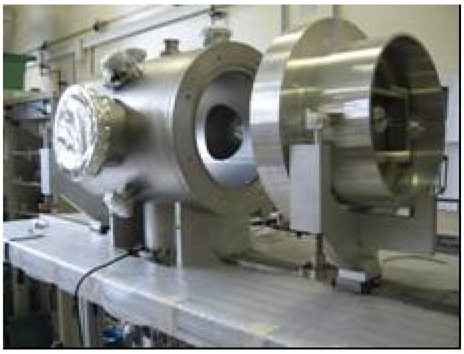


Figure JRA1.7.4: Conditioning of TW60: Processing was interrupted due to hardware problems

JRA1.7.2 Fabrication of a titanium-nitride coating bench for the coupler ceramic windows

Concerning the task 7.2, a new recruit in post-doctoral position has joined the team since April 2007 to work on TiN sputtering in coupler ceramic windows.
In order to prepare the reception and the installation of coating bench in LAL, a visit was made at the beginning of May to our collaborator at Ferrara Ricerche (Italy). This allowed us to follow the advance of machine assembly, to note works to undertaken and to discuss the next steps to be carried out.
During this visit, we have noted that the machine assembly is still in progress (see photos).

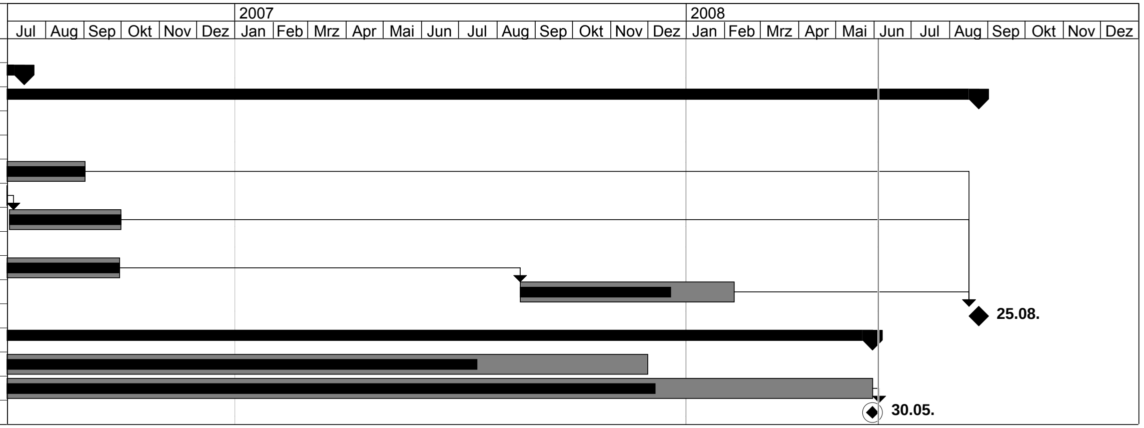

It was also the opportunity to discuss the best way to move sample holder to obtain the best deposit accordingly to the specifications.
The fitting out of the local where sputtering bench will be installed is already started. Partitions and ceiling installation, electrical and computer work as well as plumbing and ground painting are programmed. The end of this works is planned before the end of July, just on time to receive the machine.
As mentioned in the contract, before the reception of coating machine, the person who will work on it will spend one week in Italy in order to make first experimental tests and checks. Once that the process is validated the machine will be transferred to LAL. Here an expert from Ferrara Ricerche will assist to the final in situ test of the coating bench that will take to the acceptation or refuse of the machine.

JRA1.7.3 Conditioning studies of proto-type couplers

We still maintain a conditioning time between 19 h and 24 h. The last result obtained in 05 Mai 2007 was about 23 h of conditioning time. Future test aims to reach better performances.

JRA1.7.4 Overall Progress of Work Package 7

N°	Task Name	Status	Deliverables
7	**WP7 COUPLERS**	**90%**	
7.1	**New Prototype Coupler**	**100%**	
7.2	**Fabrication of TiN Coating System**	**96%**	
7.2.1	Mechanical design of vacuum chamber	100%	
7.2.2	Fabrication drawings	100%	
7.2.3	Construction of vacuum chamber	100%	
7.2.4	Define vacuum needs	100%	
7.2.5	Appropriation of vacuum equipment	100%	
7.2.6	Design of electronic circuitry	100%	
7.2.7	Fabrication of electronics in industry	100%	
7.2.8	Installation and Test at Orsay	70%	
7.2.9	**First Window Coating**	0%	
7.3	**Conditioning Studies of Proto-type Couplers**	**80%**	
7.3.1	Conditioning of couplers	80%	
7.3.2	Evaluate conditioning results	80%	
7.3.3	**Final report on conditioning**	50%	**Report**



JRA1.8 Work Package 8: Tuners

JRA1.8.1 UMI Tuner (INFN-Mi)

The cold test of the coaxial piezo/blade tuner (UMI Tuner) was prepared at DESY and for the horizontal test facility CHECHIA. The TTF cavity Z86 has been chosen to be installed into a modified helium tank, where a central bellow allows for coaxial tuning. In figure JRA1.8.1 the two ends of Z86 9 cell cavity are shown after EB welding of the rings at Lufthansa machine shop.

Figure JRA1.8.1: Z86 cavity after the rings EBW at Lufthansa facility

The cavity integrated in the modified helium tank, after TIG welding at DESY, is shown in figure JRA1.8.2.

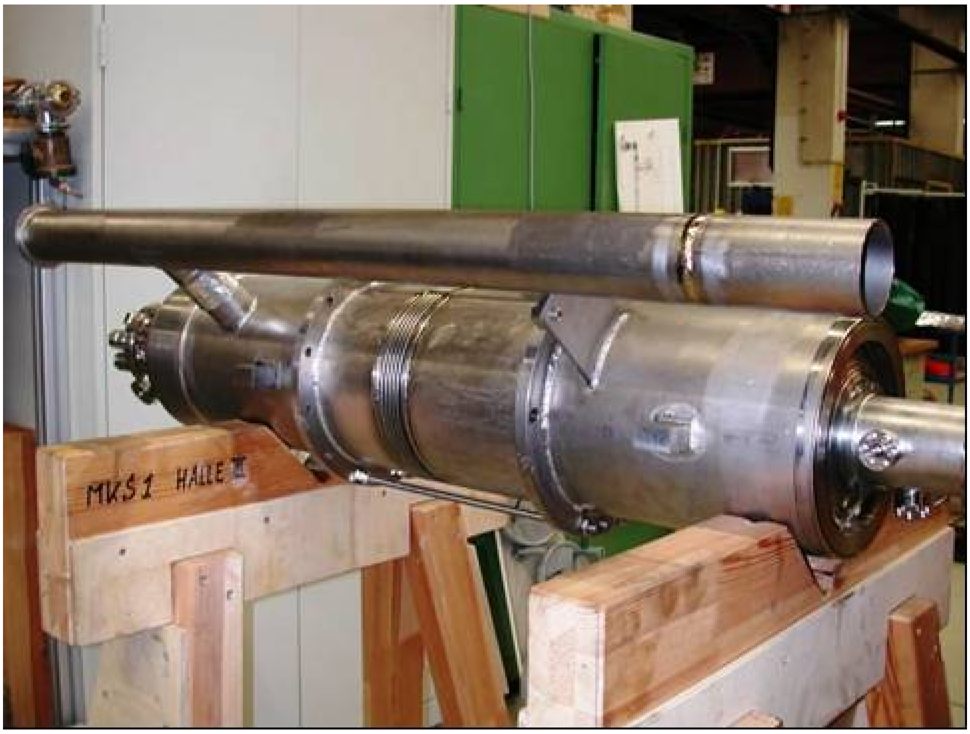


Figure JRA1.8.2: Cavity integrated in the modified helium tank in Halle III at DESY

The placing of the coaxial tuner assembly and the cavity warm tuning operation will took place between August and September, followed by the preparation for CHECHIA.

Meanwhile, a new design of the blade tuner has been developed in order to optimize the total cost of the apparatus and improving the performance. The starting point of this final design is the existing blade tuner that proved to fulfill the slow tuner requirements. For this purpose two alternative prototypes have been recently designed and built. They mainly differ in the used materials (titanium or stainless steel). They have been optimized to minimize material and construction cost, while fulfilling the reviewed performance required for the high gradient cavity operation up to 35 MV/m (or even higher). The new prototypes main features are:

- **Lightness**: The redesign of rings allowed an important weight reduction (about 40%) maintaining the full symmetry with collinear blades.
- **Highest tuning range**: The different blade geometry improves the slow tuning capabilities to more than 1.5 mm at the cavity level.
- **New Driving Mechanism**: The new driving mechanism is simpler, cheaper and more compact, simplifying the installation of an external magnetic shield.
- **Compliancy with future steel tanks**: The tuner can be built both with titanium or stainless steel rings. The use of an high strength alloy for blades allows to exploit the full tuning capabilities without plastic strains.
- **Low cost**: The new geometry and mechanism lead to an important reduction of costs.

Figure JRA1.8.3 shows the the new tuner installed on the current modified TTF/FLASH helium tank.

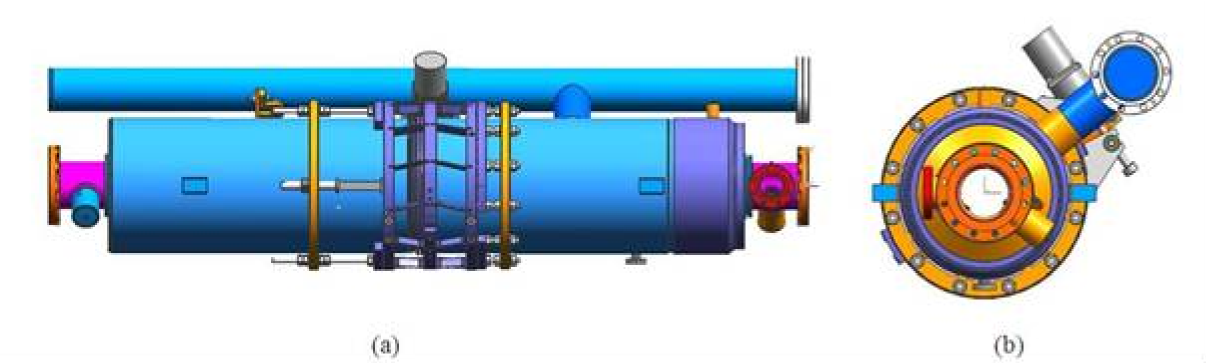


Figure JRA1.8.3: the new tuner installed on the TTF helium tank. Lateral (a) and frontal (b) view.

The new tuner, together with the revised driving system, mounted on a single cell test apparatus, is shown in figure JRA1.8.4.

Figure JRA1.8.4: the optimized coaxial tuner for ILC.

Together with DESY and TUL we are working for the compensation of Lorentz Force Detuning (LFD) for FLASH cavities. A algorithm for optimum LFD compensation is developedt and implemented into the FPGA based boards, such as SIMCON 3.1 LLRF boards. In figure JRA1.8.5 an example is shown, where one can see the compensation with pulsed piezoelectric ceramics of the whole detuning of cavity 3 in Module 6 at MTS, operated at 35 MV/m.

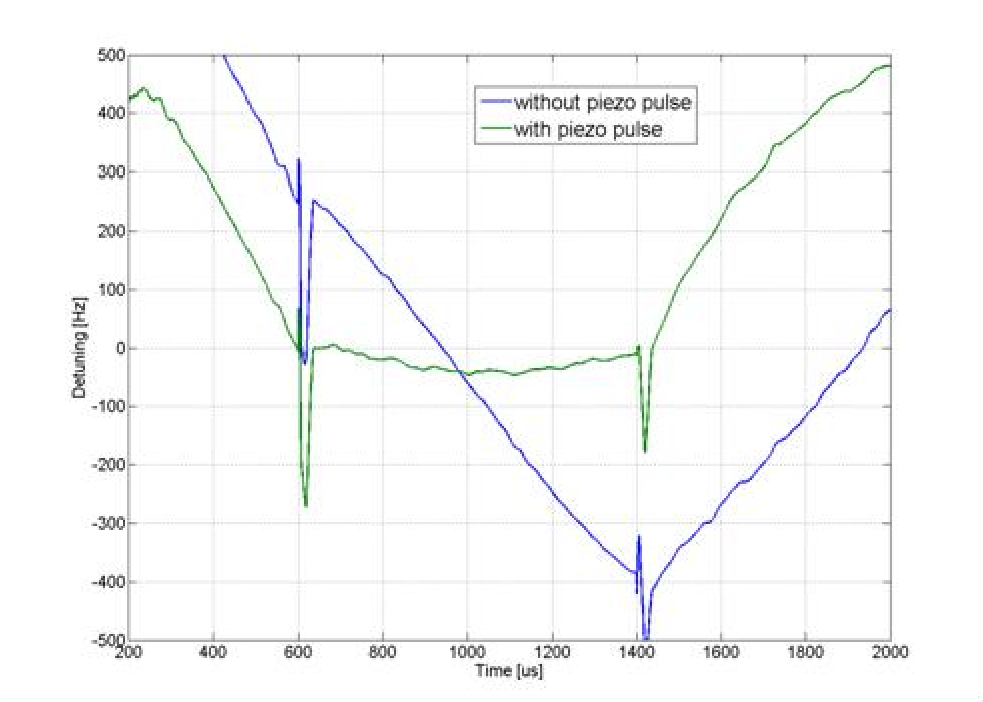


Figure JRA1.8.5: detuning of cavity 3 in Module 6 at MTS, operated at 35 MV/m.

JRA1.8.2 Magnetostrictive tuner (TUL)

The prototype of magnetostrictive tuner is ready for test with the cavity. The control system as well as the driver have been completed. Due to the movement of the CRYHOLAB, the experiment with magnetostrictive tuner is postponed. According to the recently updated schedule, the test will be done before end of the year.

The control algorithm has been developed for both piezostack and magnetostrictive operation. The worked out algorithms were implemented in the FPGA-based control system. The SIMCON board is used, which allows to perform parallel, deeply pipelined calculations (see figure JRA1.8.6). The new approach allows integrating the algorithm dedicated for cavity shape control with the LLRF system used for vector sum control.

The new algorithm for on-line detuning calculation which is based on the electromechanical model of the cavity is presented.

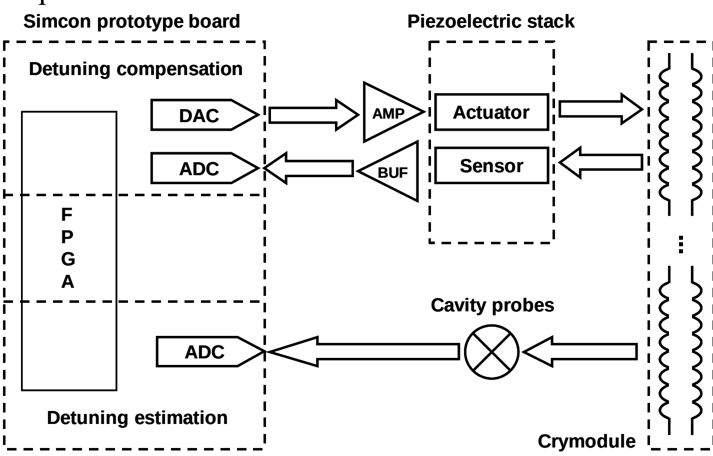


Figure JRA1.8.6: Block diagram of control system

The system was tested with Module Test Stand (MTS) at DESY with the high gradient cavities (up to 37 MV/m). The results are presented in figure JRA1.8.7.

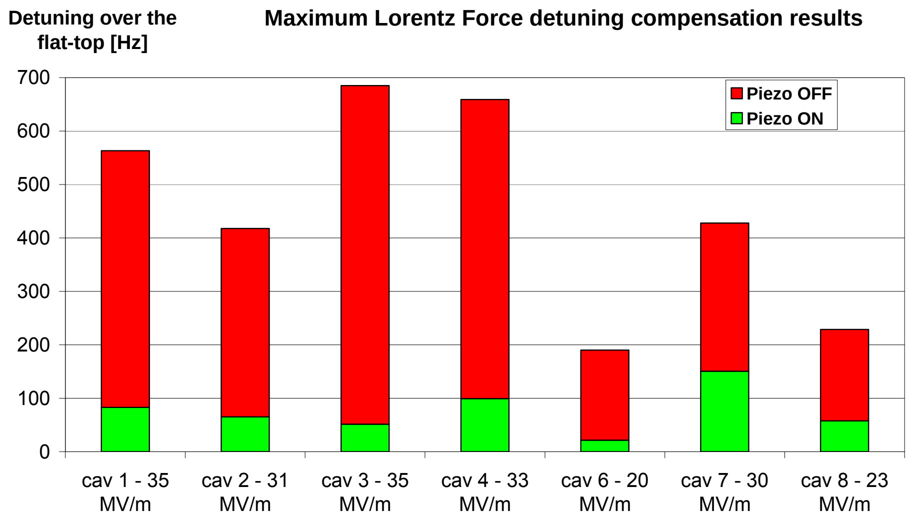


Figure JRA1.8.7: The results of detuning compensation

The best results of active Lorentz force compensation was observed for cavities 1, 3 and 4 which were detuned at gradients of 35 MV/m. The detuning over the flat top region for cavity 3 was decreased from around 700 Hz down to 50 Hz. The output signal for cavity 5 was too small to receive approvable results.

For the digital control system test purpose, a simple cavity simulator has been developed. The raw data sampled from the operational system are taken from DOOCS servers. The samples are stored in internal BRAM memory blocks of Virtex II Pro FPGA. The system is driven by a trigger signal with flexible range (2-10 Hz) repetition rate, as in the RF pulse operating mode. A strobe signal with 1 μs period time is also added. The simulation data can be easily changed using a C++ control application running on an embedded Sparc computer. The system also contains a MUX, which allows selecting the results from various processing blocks. The results can be easily analyzed using Matlab environment.
The results were published in the PAC07 conference. The acquired results connected with static force measurement was published in the MST-IOP Journal.

JRA1.8.3 CEA tuner (CEA)

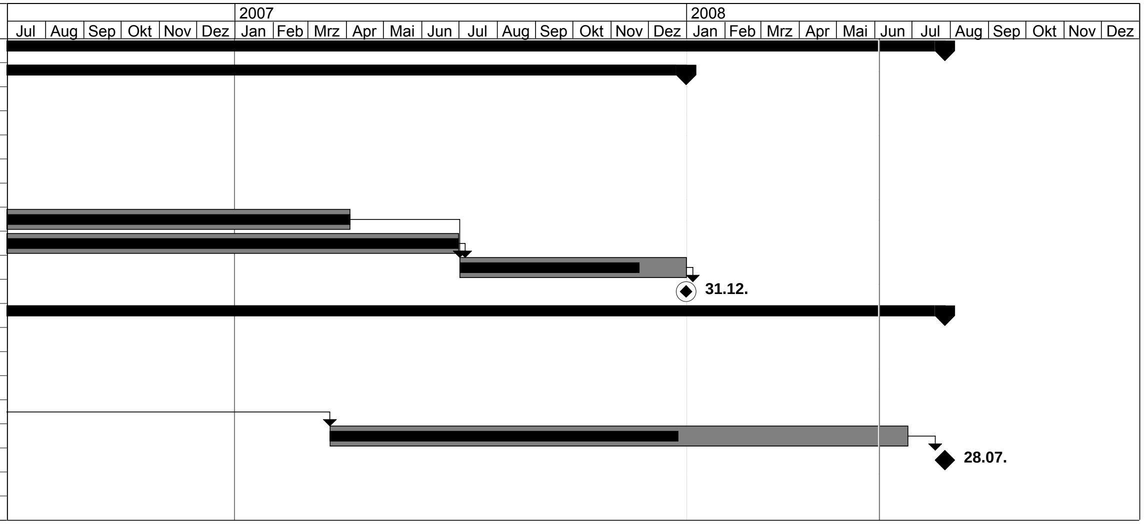
The new CEA tuner has been completed, mounted and tested in CRYHOLAB.

JRA1.8.4 IN2P3 activities (CNRS-Orsay)

The final report, which is a deliverable for WP8 was submitted. A CARE note dedicated to the radiation hardness of elements was also published. Both documents summarize the previously performed experiments detail. The results were also presented on MIXDES conference and in the MST-IOP Journal.

JRA1.8.5 Overall Progress of Work Package 8

N°	Task Name	Status	Deliverables
8	**WP8 TUNERS**	**95%**	
8.1	**UMI TUNER**	**98%**	
8.1.1	Control electronics	100%	
8.1.2	Tuner design	100%	
8.1.3	**Tuner design finished**	100%	
8.1.4	Tuner fabrication	100%	
8.1.5	Fast piezo tuner design	100%	
8.1.6	Piezo fabrication and bench tests	100%	
8.1.7	Cavity-tuner-coupler integration	100%	
8.1.8	Pulsed RF tests	80%	
8.1.9	**Evaluation of tuner operation**	30%	**Report**
8.2	**Magneto-strictive Tuner**	**75%**	
8.2.1	Complete specification	100%	
8.2.2	Conceptual design	100%	
8.2.3	Prototype and performance evaluation	100%	
8.2.4	Finalize tuner and drive electronics design	100%	
8.2.5	Test of tuner	60%	
8.2.6	**Report on magneto-strictive Tuner**	50%	
8.3	**CEA Tuner**	**100%**	
8.4	**IN2P3 Activity**	**100%**	



JRA1.9 Work Package 9: Low Level RF (LLRF)

JRA1.9.1 Operability and technical performance

Transient detector

During 2007 the activities were focused on development of the cost-effective version of transient detection system and on improvements of the measurement accuracy.

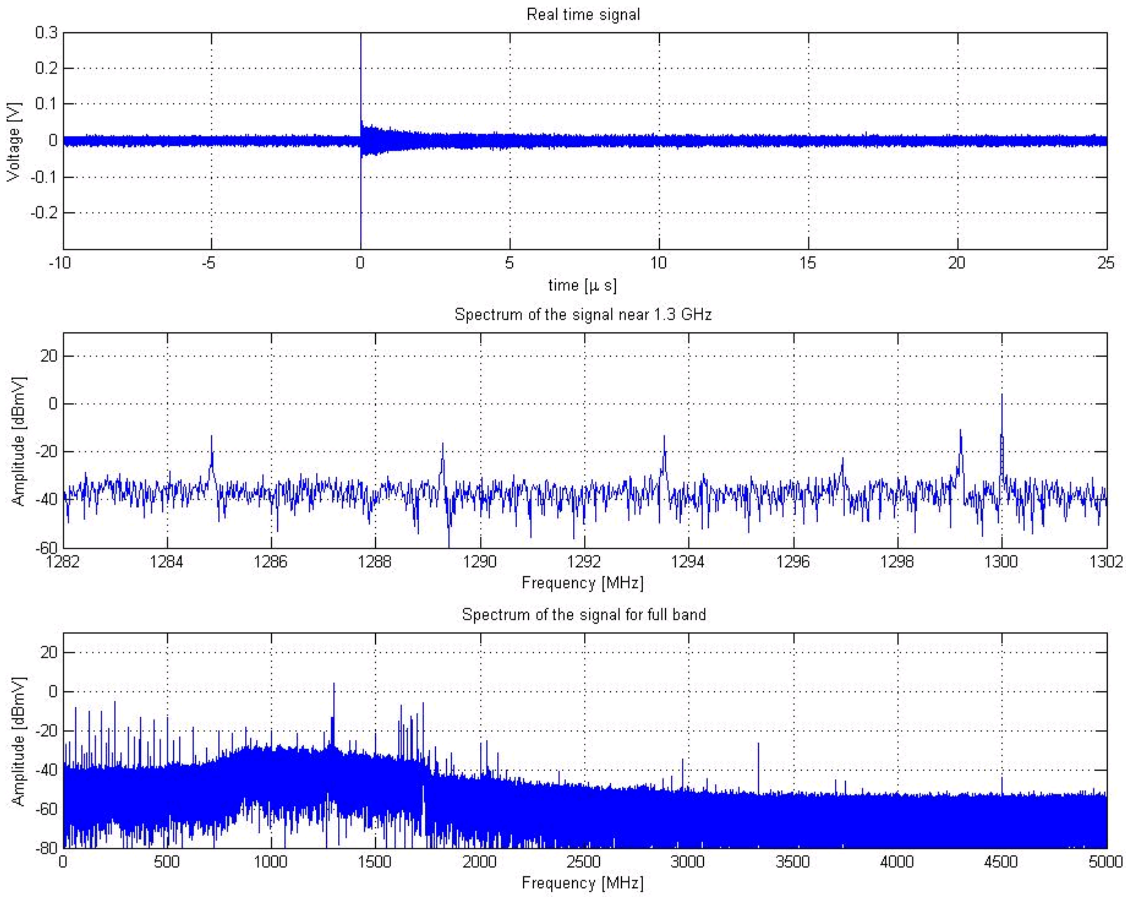


Figure JRA1.9.1: The transients induced by single bunch

Many measurements have been made to investigate the influence of signals coming from excitation of the other passband and higher order modes. The single bunch induces transients (Figure JRA1.9.1 – upper part) not only at the base resonant frequencies of cavity (1300.091 MHz) but also at others passband frequencies (1299.260 MHz, 1296.861 MHz, 1293.345 MHz, 1289.022 MHz, 1284.409 MHz – Figure 9.1 – middle and bottom parts) and even higher order modes. The transient detection system measures the sum of transients at different resonant frequencies of cavity and therefore the measurement accuracy is limited. The already demonstrated performance of the transient detection system is absolute accuracy of few degrees in phase. The new method which is currently evaluated is based on the measurements of higher order mode excited by electron beam with respect to the RF generated by klystron. This method gives the relative beam phase and requires calibration by absolute beam phase measurement.

JRA.1.9.1.. LLRF Automation

Automation:
During 2007 the activities were focused on improvements of general framework for designing and development of automation software for the FLASH (**F**ree-Electron **Las**er in **H**amburg). The ultimate goal of the framework is to systematize the way of automation software development and to improve its dependability. The principal results of the latest work concerning automation belong to three different areas.

- The methodology of designing automation software for such installations as the FLASH.
- The domain specific languages supporting practical specification and implementation of the automation software.
- Implementation of general expert system infrastructure.

The most significant achievements are enumerated below:

1. The methodology of automation design.
    - Utilization of UML (Unified Modelling Language) diagrams for specification preparation, which facilitates cooperation with the system experts
    - Implementation of the tool facilitating perceptual evaluation of the specification for the planner
    - Implementation of several algorithms for verification of syntactical correctness of the specifications
    - Utilization of constraint solvers for verification of certain aspects of semantical correctness of the specification
    - Integration of formal verification tools into the process of automation software design
    - Implementation of the testing environment which facilitates the automation software introduction.

2. The domain specific language for automation design and implementation.
    - The specification language allows to design the automation scheme using domain specific nomenclature which is understand by the system experts and the operators, namely: operation modes, activities, exceptions, to name a few.
    - The specification language is also an implementation language, therefore designed automation scheme can immediately be put into practice.
    - The language offers expandability in automation design. Adding a new task to be automated does not involve redesigning of already specified tasks.

3. The general expert system infrastructure.
    - Unlike the DOOCS (Distributed Object Oriented Control System) state machines or the EPICS (Experimental Physics and Industrial Control System) sequencers the planner is equipped with state estimator keeping the active state of the finite state model of the plant in sync with its physical condition.
    - Improvement of dependability of the automation software by formal verification of cooperation protocol assuring correct causal behaviour of automation software modules.
    - Elaboration of method for resolution of conflicts among mutually occurring exceptions.

All the methods and tools mentioned above have been tested in proof-of concept automation for the RF-station (Radio Frequency) for the FLASH.

Linearization of the high power chain of the RF control system.
The method of linearization of the high power chain of the RF system based on the pre distortion was implemented in LLRF (Low Level Radio Frequency) control system field controller called SIMCON 3.1 (**Sim**ulator-**Con**troller) based on FPGA (Field Programmable Gate Array) chip.

The operator panel was created as a part of software control system DOOCS (widely used in the FLASH operation). Mentioned graphical user interface is used for characterisation and linearization of the high power components.

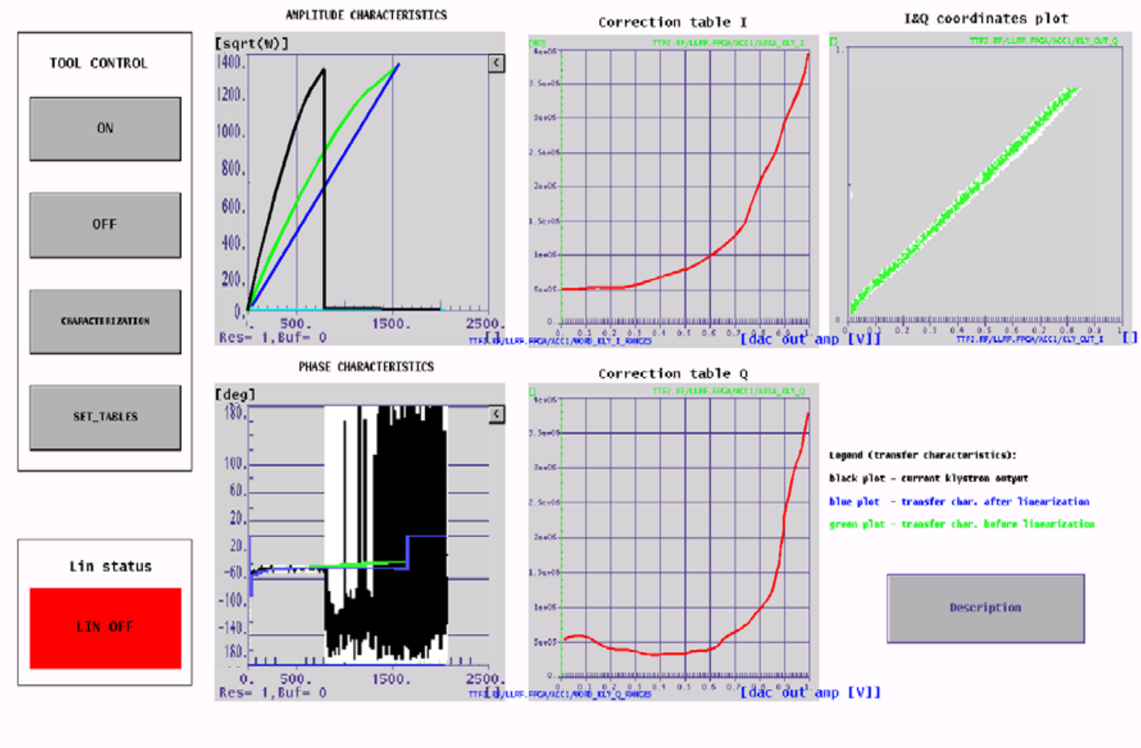


Figure JRA1.9.2: Characterization and linearization tool management panels for the klystron 2.

Prepared and evaluated tool for the RF system amplifiers chain characterization and linearization allowed for the transfer characteristics (amplitude and phase) linearity improvement.
Implementation of the presented tool in the ACC1 (**Acc**elerating Module) LLRF controller give an opportunity for comprehensive study of the amplifiers amplitude and phase deviation's in case of the amplifier chain components exchange or system work conditions change (for instance various high voltage level of klystron).

1.9.1.2 Control Optimization

During 2007 the novel firmware implementation was still developing to investigate the optimal control methods for LLRF system. The control algorithm based on the system identification is the proposal verified by the experimental results. It has been introduced in the ACC1 module of the FLASH. Moreover, the MTS (Module Test Stand) setup in DESY has been remotely controlled from the WUT-ISE laboratory in Warsaw. The general idea realized as Multi-Cavity Complex controller (MCC) is presented below (Figure JRA1.9.3).

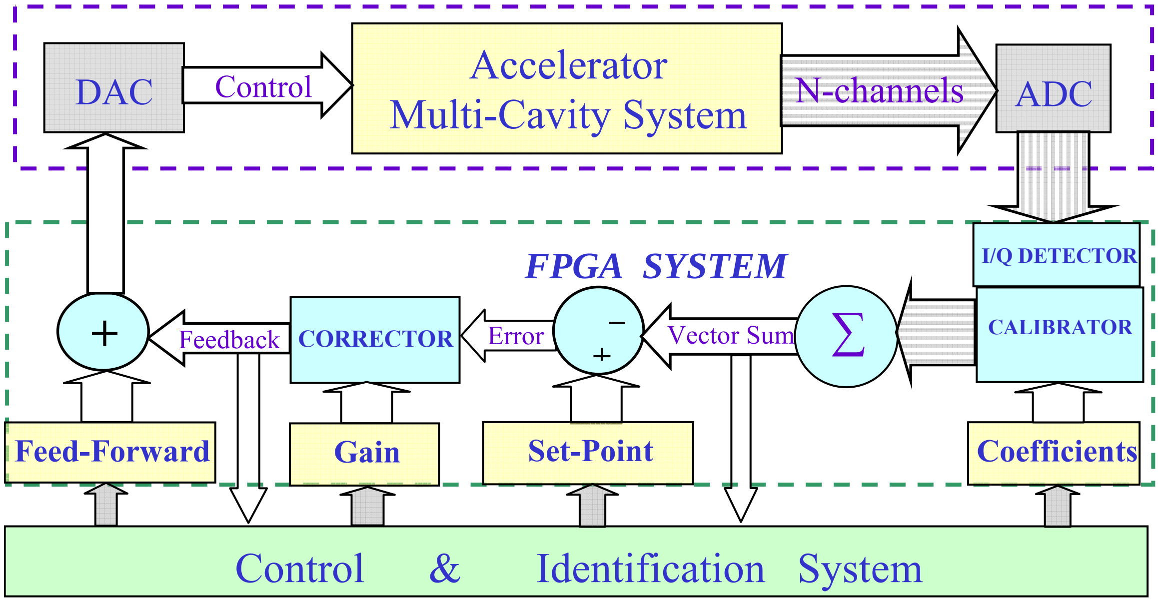


Figure JRA1.9.3: Block diagram of Multi-Cavity Complex controller for LLRF system

The required cavity performance is to drive in the resonance during filling and to stabilize the field for the flattop range. The multi channel auto-calibration is considered for a vector sum control. The cavities module is driven in a feedback mode supported by feed-forward to fulfill desired operation condition for the vector sum. The FPGA based controller executes procedure according to the prearranged control tables: Feed-Forward, Set-Point and Corrector unit. Nonlinearities and deterministic disturbances are compensated by feed-forward table for the open loop operation (Figure JRA1.9.4). The closed loop correction (tuning) for the feed-back mode is performed by a complex gain of the Corrector table. It also includes the klystron linearization. The loop gain value 300 has been achieved for the vector sum control of ACC1 at FLASH. The adaptive control algorithm is applied for feed-forward and feedback modes according to the recognized process. The presented method is useful for the repetitive, deterministic condition what has been verified experimentally. Achieved field stabilization: amplitude relative accuracy ~ 10^{-4}, phase accuracy ~ $2{\cdot}10^{-4}$ rad.

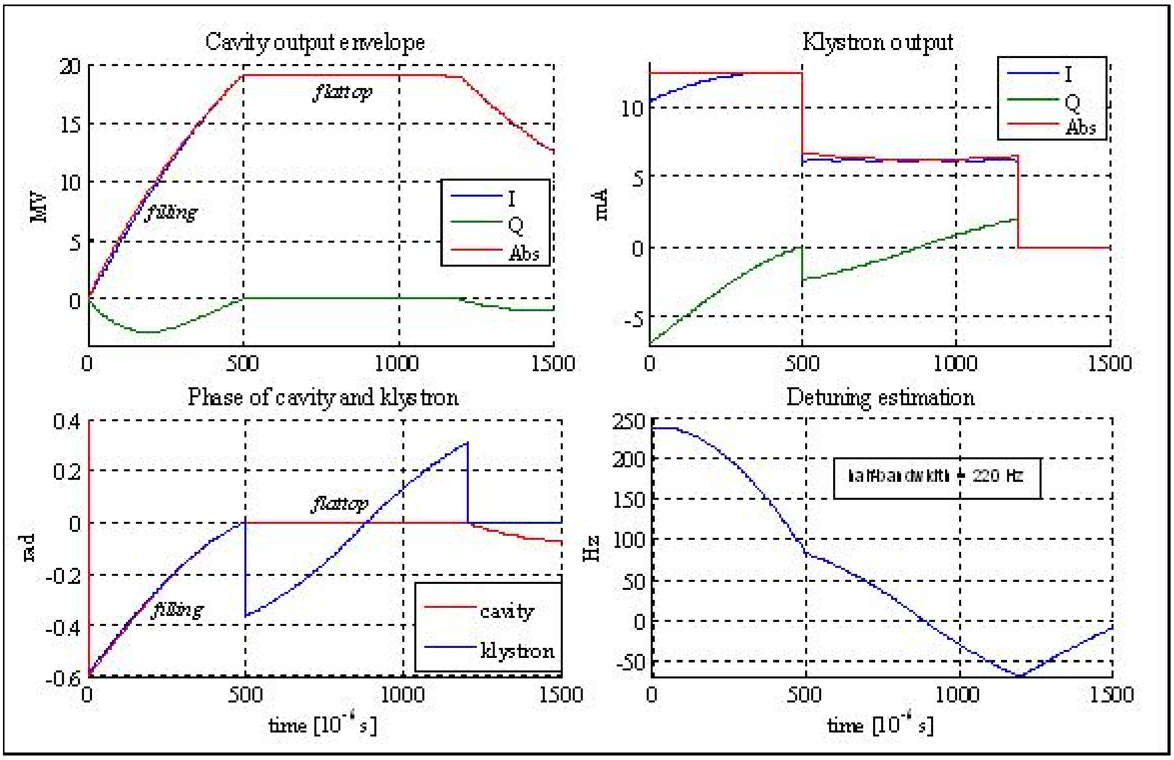


Figure JRA1.9.4: Feed Forward remote control for vector sum of MTS cavities (gain=0)

JRA1.9.2 LLRF cost and reliability

JRA 1.9.2.1 Radiation damage study

During 2007 the radiation monitoring system RADMON (**Rad**iation **Mon**itor) installed in FLASH tunnel was extended (up to six permanently mounted sensors and two mobile) and tested. The radiation level is recorded on-line and stored for further processing.

We also performed experiments with various electronic components being irradiated in LINAC2 (linear electron accelerator at DESY site) tunnel, not only digital ones but analogue as well. The integrated circuits (reference voltage sources) were placed for the long time in the tunnel (3 months) and after irradiation the voltage was measured and compared to the initial one. Also the new IRES boards (IRradiation Experiments System) able to perform various tests of digital electronics e.g. SRAM (Static Random Memory) and FLASH memories and Virtex 5 FPGA chip) in radiation environment are under development (boards are designed and ready to produce).
The further development of software based fault detection and correction was also performed. The SIFT (Software Implemented Fault Tolerance) methods were being developed and implemented in a C++ compiler. They are based on automatically generated redundancy in software (redundant data and program flows) that allows detection and correction of radiation induced errors. The worked out methods, algorithms and software tools will be used in LLRF control system.

JRA1.9.3 Hardware

JRA 1.9.3.1 Multichannel downconverter

During 2007 a new carrier board were designed and manufactured as shown in Figure JRA1.9.5. The digital motherboard can carry mezzanine (mezzanine board - an extension a motherboard) boards. Different VME (VERSA Module Eurocard bus) sized mezzanine boards for various applications are designed, namely

- Analog frontend multi-channel downconverters with integrated ADCs (),
- Analog high resolution ADCs for new beam arrival monitors,
- Analog high resolution ADCs for new beam position monitors.

Figure JRA1.9.5: Digital motherboard suited to carry mezzanine boards with downconverters and ADC

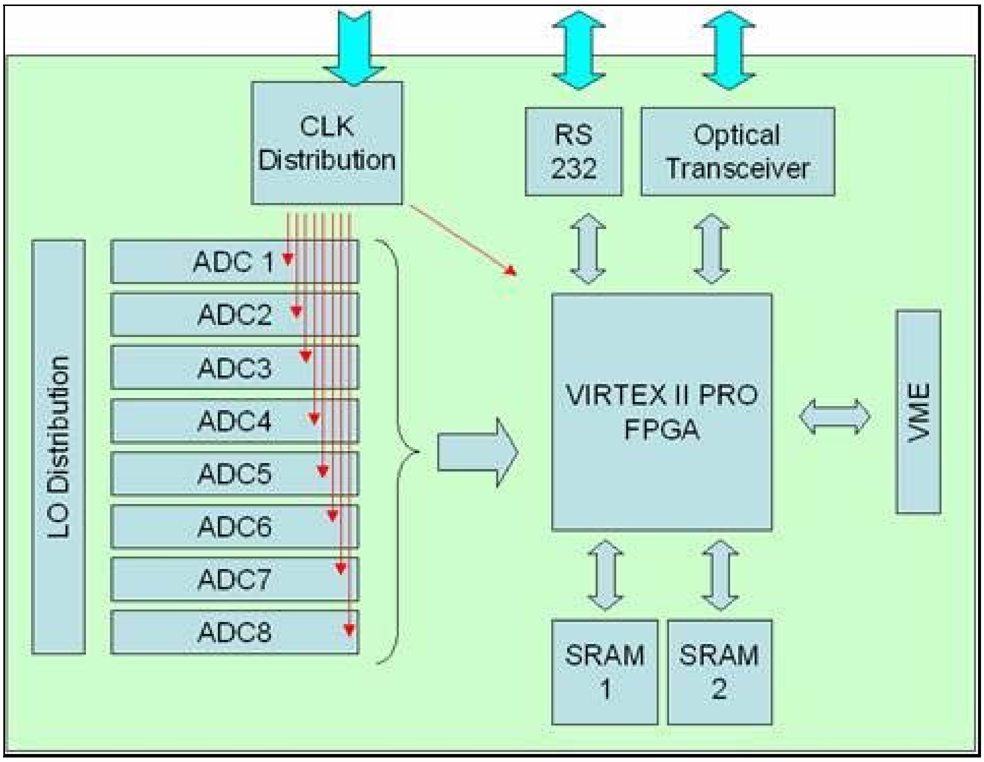


Figure JRA1.9.6: Block diagram of the digital VME carrier board.

As depicted in Figure JRA1.9.6, the carrier board provides a clock distribution, fast optical transceiver, VME interface, RAM and an FPGA for data pre-processing.

JRA 1.9.3.2 Third generation RF control

During 2007 the SIMCON DSP (SIMCON board equipped with DSP processor) board was tested and debugged. After making necessary corrections to the schematics 10 SIMCON DSP boards were manufactured (Figure JRA1.9.7). They will be used in the development of the control algorithms for LLRF.

Figure JRA1.9.7: Debugged control board SIMCON DSP

JRA 1.9.3.3 Stable frequency distribution

During the reporting period a new frequency distribution system was partially assembled and tested. The stability requirements of Master Oscillator (MO) were 100fs and 1ps for times shorter than 100ms and longer 1000s respectively. The frequency distribution system (Figure 9.8) consists of MO supplying several reference frequencies and power amplifiers for signals distribution. The low level part of the system is already finished. The implementation and testing of the power part of the system is in progress (Figure JRA1.9.9).

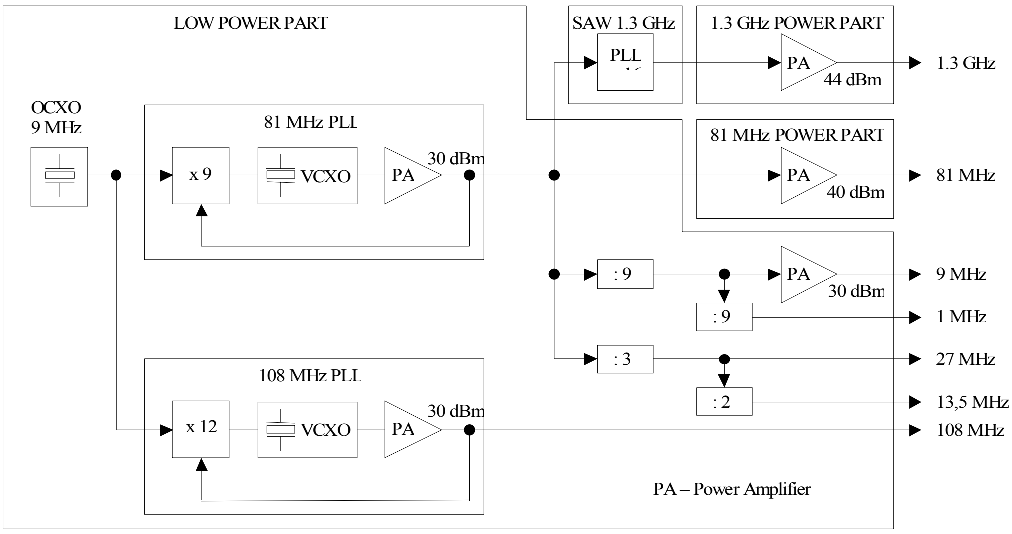


Figure JRA1.9.8: Block diagram of frequency distribution system

Figure JRA1.9.9: Frequency generation and distribution boxes

JRA1.9.4 Overall Progress of Work Package 9

N°	Task Name	Status	Deliverables							2007												2008											
				Jul	Aug	Sep	Okt	Nov	Dez	Jan	Feb	Mrz	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez	Jan	Feb	Mrz	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
9	**WP9 LOW LEVEL RF (LLRF)**	**100%**																															
9.1	**Operability and technical performance**	**100%**																															
9.2	**LLRF cost and reliability study**	**100%**																															
9.3	**Hardware**	**100%**																															
9.4	**Software**	**100%**																															

JRA1.10 Work Package 10: Integrated RF tests in a Horizontal Cryostat

JRA1.10.1 Activity Status

The RF infrastructures transfer from ”l’Orme des Merisiers” to the main Saclay Center is now finished since May 2007, one year after the last RF test performed in CryHoLab.

Tests on cavity are only restarted at low RF power in vertical cryostat and not yet in the horizontal one CryHoLab (DI water is still not in operation at this time). Water supplying for cooling klystron, compressor and pumps is only planned for September; so high power RF, helium liquefying, and pumping on helium bath (test at 2 K) can not be possible before October.

Nevertheless preparation of the third series of tests in Cryholab related to the Saclay cold tuning system equiped with magnetostrictive element is on the way (figure JRA1.10.1):

- the mechanical part to adapt the magnetostrictive actuator on the cold tuning system is finished (figure JRA1.10.2 left),
- the whole system is already assembled on a 9-cell cavity (figure JRA1.10.2 right).

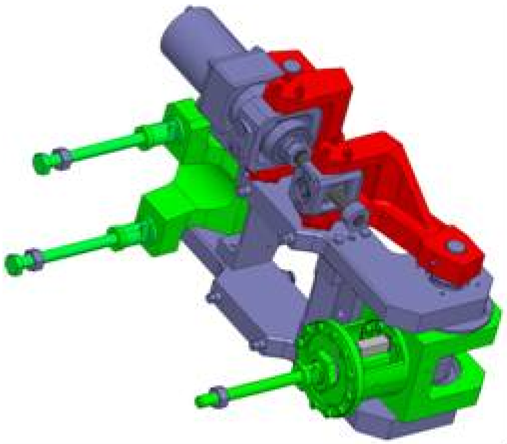


Figure JRA1.10.1: Cold Tuning System equipped with Magnetostictive Actuator

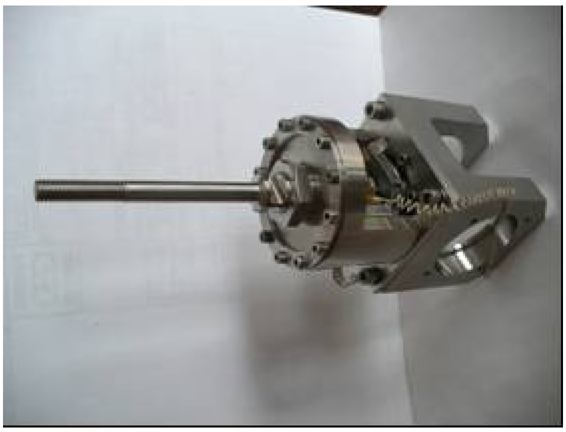


Figure JRA1.10.2: Magnetostrictive Actuator: mechanical part (left) – installation on a 9-cell cavity (right)

JRA1.10.2 Overall Progress of Work Package 10

N°	Task Name	Status	Deliverables							2007												2008											
				Jul	Aug	Sep	Okt	Nov	Dez	Jan	Feb	Mrz	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez	Jan	Feb	Mrz	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
9	**WP9 LOW LEVEL RF (LLRF)**	**100%**																															
9.1	**Operability and technical performance**	**100%**																															
9.2	**LLRF cost and reliability study**	**100%**																															
9.3	**Hardware**	**100%**																															
9.4	**Software**	**100%**																															

JRA1.11 Work Package 11: Beam Diagnostics

JRA1.11.1: Beam Position Monitor (CEA)

Our objective was to improve the mechanical design and validate the copper coating in order to install the cavity BPM in a XFEL cryomodule. A second electronics is making to improve the resolution (< 1 µm) but reduce the dynamics range to +/-1 mm.

Mechanical design

To be installed in an X-FEL cryomodule, the alignment of the two parts composing the re-entrant BPM has to be improved. The copper plating has to be validated, too.

A cavity body (Fig. JRA1.11.1) was fabricated to adjust the alignment of two pieces and to validate the copper plating of the beam pipe. With a three-dimensional measurement, the alignment of two pieces was measured with an angle around 0.02°.

Figure JRA1.11.1: Two pieces of the re-entrant BPM

The copper plating was fabricated with the DESY specifications and its thickness was measured to be around 12.7 µm. This copper plating was validated by DESY after a firing at 400°C for 2 hours and a complete cleaning procedure inclusive supersonic bath.

A cryogenic test was carried out at Saclay on twenty antennas (Fig JRA1.11.2).

Figure JRA1.11.2: Antenna of the re-entrant BPM

Each antenna was cooled, 3 times, in N2 cold vapour then a leak test is carried out. Eighteen antennas passed this test.

The next cavity BPM in final design will be installed in a cold cryostat but won't be tested with beam.

Measurements

During the next studies at the end of August, the resolution will be improved in adding an amplifier on each channel, in the signal processing electronics. The Figure JRA1.11.3 shows the signal processing electronics with the amplifiers.

Figure JRA1.11.3: Signal processing electronics

As the limitation of the resolution is due to the ADCs noise, to improve the resolution, the dynamic range has to be reduced. With a dynamic range around ± 1 mm, the simulated resolution was calculated to be around 0.5 µm.

JRA1.11.2: Beam Emittance Monitor (INFN-LNF and INFN-Ro2)

JRA1.11.3: The HOM-BPM Program

In January 2006 a block of machine shifts were dedicated to the experiment of measuring the transverse beam dimension through the analysis of the Optical Diffraction Radiation (ODR) angular distribution.
The maximum beam energy achievable was of the order of 700 MeV, and the transport of the beam along the by-pass more comfortable. In these conditions, we succeeded in producing, at the ODR screen position, a beam narrower than the .5 mm slit, as it is shown in Fig. JRA1.11.4.

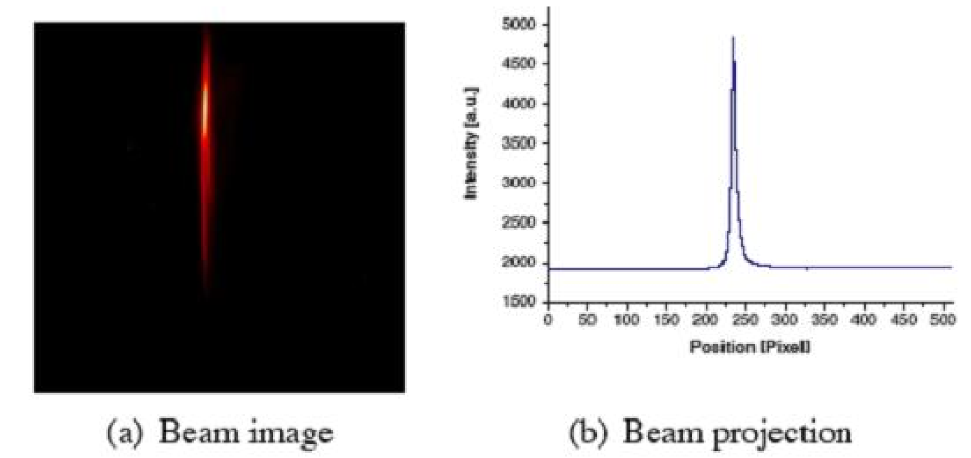


Figure JRA1.11.4: Image of the beam on the OTR screen (a) and its projection (b).

With the limitations due to a non complete background subtraction, moving the beam across the slit showed the expected behavior, and also the intensity dependence on the beam position was what expected from theory (see Fig. JRA1.11.5 and Fig. JRA1.11.6).
The minimum of the total intensity of Fig. 3 is obtained when the beam is perfectly centered inside the slit. In this position we performed a more accurate measurement, resulting in the profile shown in Fig. JRA1.11.7, together with a simulation obtained with the measured beam parameters.
In this case we have also a good quantitative agreement with the experimental data, but the uncertainty that still remain about the effectiveness of the background subtraction prevents us to affirm that the real beam dimension can be extracted by the experimental data. To obtain this result, which is the final goal of the experiment, we need to reduce the impact of the background.
This can be obtained in two different ways: increasing the beam energy will increase the signal level without affecting the noise, and the synchrotron radiation background itself can be largely stopped by a metallic screen with a slightly larger slit few centimeters in front of the detector screen.
A better lead shielding of the camera could also reduce the X rays background.
All these effects will be tested next year in the next machine study period.

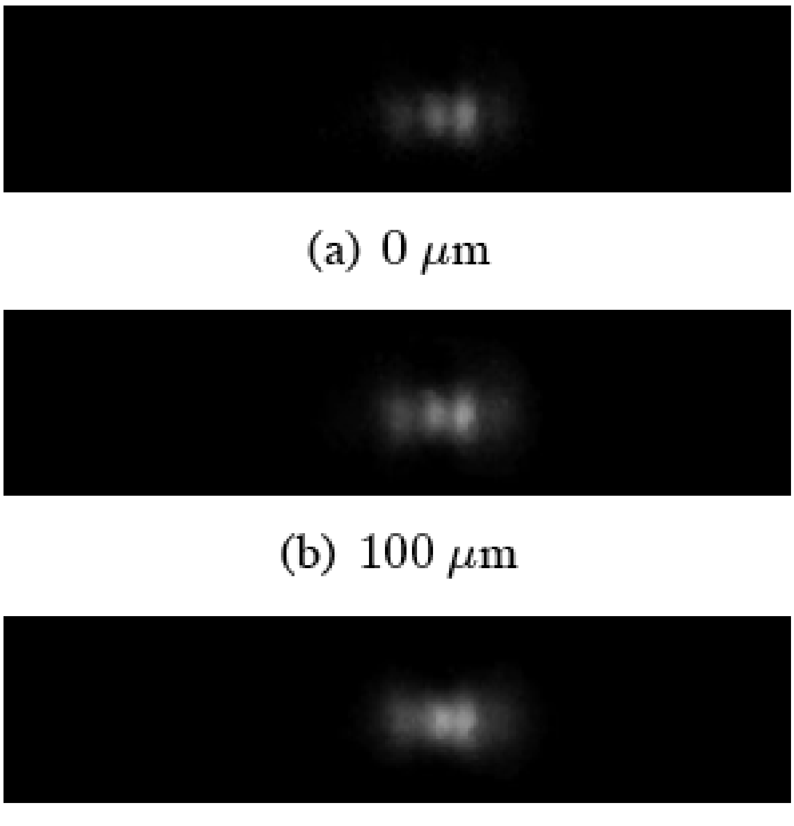


Figure JRA1.11.5: Vertically polarized angular distribution for different position of the beam within the slit.

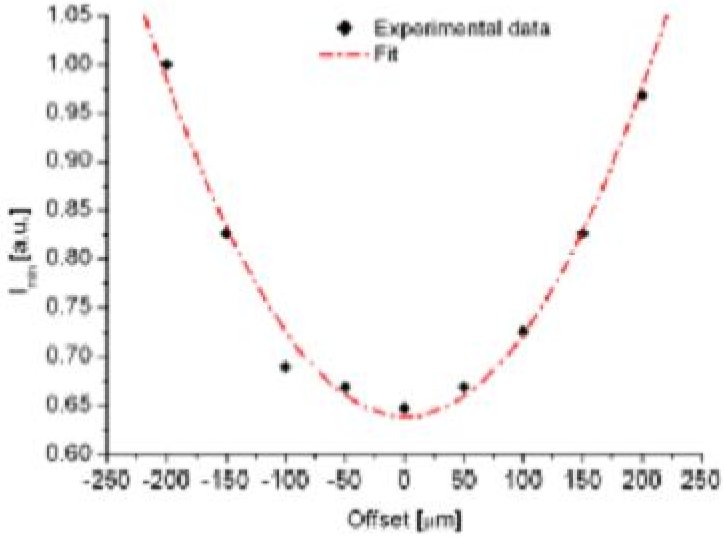


Figure JRA1.11.6: Measured dependencies of ODR minimum intensity as function of the displacement of the beam within the slit.

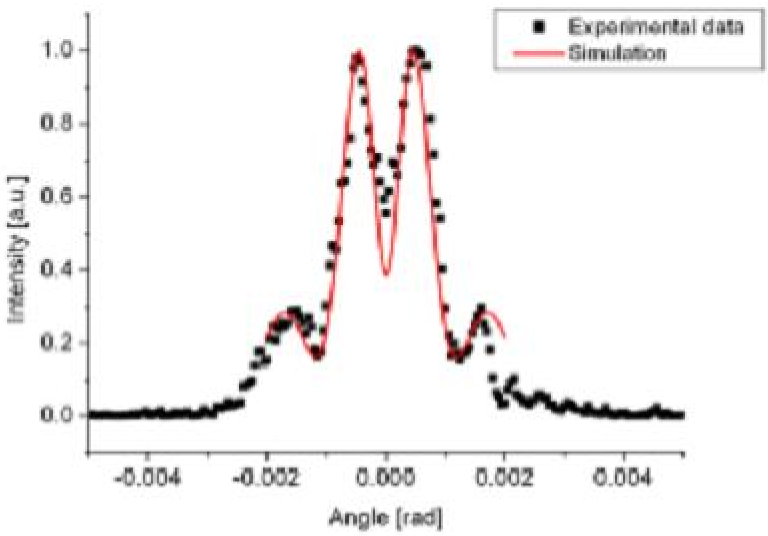
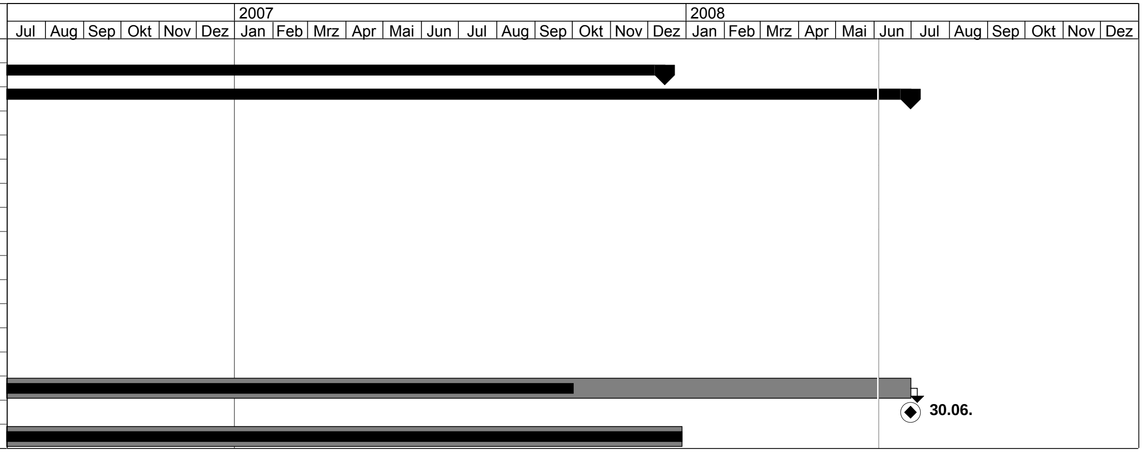


Figure JRA1.11.7: ODR angular distribution: 25 bunches, 0.7 nC per bunch, 0.5 mm slit. Polarizer and 800 nm filter are inserted.

JRA1.11.4 Overall Progress of Work Package 11

N°	Task Name	Status	Deliverables
11	**WP 11 BEAM DIAGNOSTICS**	**94%**	
11.1	**Beam position monitor**	**100%**	
11.2	**Beam Emittance Monitor**	**84%**	
11.2.1	Slit width simulations	100%	
11.2.2	Slit design	100%	
11.2.3	Optics simulations	100%	
11.2.4	Optics appropriations	100%	
11.2.5	System assembly and tests	100%	
11.2.6	Mechanical assembly at TTF	100%	
11.2.7	Optical assembly at TTF	100%	
11.2.8	Integration of controls into TTF	100%	
11.2.9	**Ready for beam test in TTF**	100%	
11.2.10	Beam tests at TTF	100%	
11.2.11	Evaluate first beam test result	100%	
11.2.12	Successive measurements	70%	
11.2.13	**Final evaluation**	0%	**Report**
11.3	**HOM Beam Emittance Monitor**	**100%**	



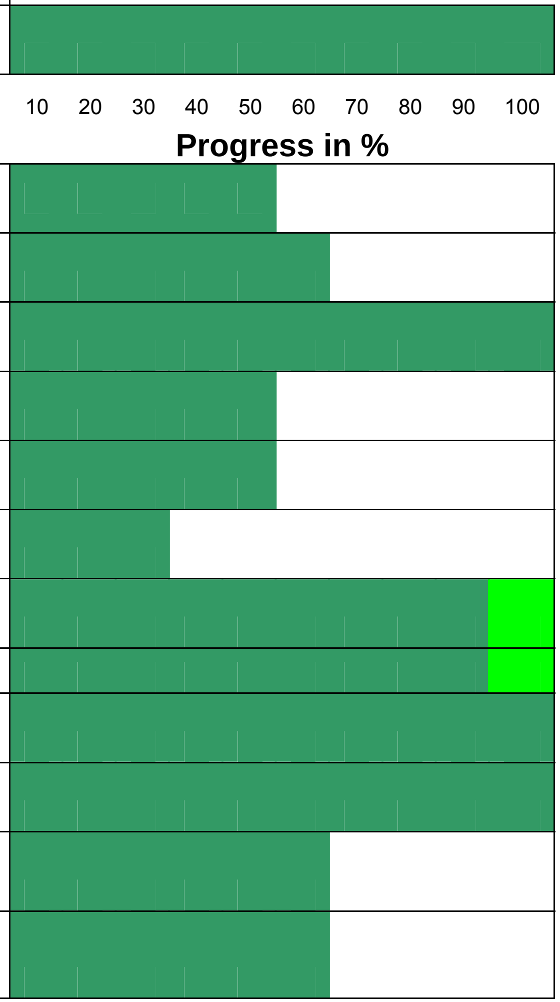
JRA1.12 Significant Achievements

- Great progress has been made by the group of W. Singer (WP3.2) in fabrication of the first 9-cell hydroformed cavity and also a 9-cell cavity from large grain material. Based on these results it can be expected to fabricate high gradient and high Q (low RF loss) cavities at reduced material and processing costs.
- Excellent results on electro polishing followed by alcohol rinsing have been reported in a highlight talk at the CARE07 annual meeting at CERN. The progress of this work follows the experience of intensive EP studies of Niobium cavities at the labs and also by industrial studies.
- A further highlight in2007 was the very successful test of the beam position monitor of WP11. This BPM will be used in FLASH and also in the XFEL accelerator.

  Some tasks which are due at the end of 2007 will continue in 2008. Among these tasks are those with high risk, such as dry ice cleaning and thin film.

JRA1.13 List of all milestones and deliverables (D) during the reporting period

N°	Deliverable Name	Type	Task	Lab	Planned
2006/7	1-cell spinning parameters defined	Report	3	INFN-Leg	36
		2007	**SRF**		
5	Fabrication of new cavity with improved components	Prototype	2.2.5.2	INFN	47
6	Fabrication Multi-cell cavities by spinning	Prototype	3.1.7.2	INFN-Leg	48
7	Fabrication of hydroformed 9-cell cavities	Prototype	3.2.6.3	DESY	47
8	First multicell coating with linear-arc cathode	Prototype	4.1.2.2	IPJ	48
9	First multicell coating with planar-arc cathode	Prototype	4.2.2.4	INFN-Ro2	41
10	Report on quality of HTc superconducting properties	Report	4.2.3.2	INFN-Ro2	48
11	EP on single cells: parameters fixed	Report	5.1.5.2	CEA	48
12	Evaluate oxipolishing experiments	Report	5.2.3.9	DESY	40
13	Final report on industrial electropolishing	Report	5.2.4.8	DESY	48
14	Automated EP: Conclude on best electrolyte	Report	5.3.5.5	INFN-Leg	44
15	VT CO_2 of 9-cell cavities: evaluation of experimental results	Report	5.4.4.2	DESY	48
16	Dry ice cleaning of horizontal 9-cell cavities: evaluation of experimental results	Report	5.4.6.2	DESY	48



17	Final report on SQUID scanning	Report	6.1.5.4	DESY	48	
18	Conclude on comparison of SQUID scanner vs. flux gate detector	Report	6.2.6.2	INFN-Leg	48	
19	DC field emission: evaluation of scanning results	Report	6.3.1.9	DESY	48	
20	DC field emission: evaluate strong emitter investigations	Report	6.3.2.6	DESY	48	
21	Prototype couplers: final report on conditioning	Report	7.3.3	CNRS-Ors	47	
22	Evaluation of INFN tuner operation	Report	8.1.10	INFN-Mi	48	
23	Cryostat integration tests: final evaluation	Report	10.6.3	CEA	46	
24	Evaluation of BPM operation	Report	11.1.12	CEA	48	
25	Evaluation of beam emittance monitor operation	Report	11.2.13	INFN-Ro	48	
26	EB Welding of prototypes of components	Prototype	2.3.3.6	DESY	48	

JRA1.14 List of major meetings organized under SRF during the reporting period

Date	Title/Subject	Location	Number of attendees	Website address
April 2007	WP5 Meeting onelectro polishing	Legnaro	10	
April 23-24, 2007	CARE-JRA1-WP4 Working Meeting	Tor Vergata -INFR – Rome, Italy,	9	Not available
May 23-24, 2007	CARE-JRA1-WP4 (Thin film production) Working Meeting No. 2-2007; Draft of the Midterm 2007 Report on WP4, proposals of new papers and joint experiments.	IPJ Swierk, Poland	5	None
June 7, 2007	Status of the experiment and future work of WP11	DESY	6	
June 21-23, 2007	14th International Conference Mixed Design of Integrated Circuits and Systems, special CARE session	Ciechocinek, Poland	170	www.mixdes.org
Sept. 17-19, 2007	CARE-SRF Annual Meeting 2007	Warsaw	18	https://indico.desy.de/conferenceDisplay.py?confId=438
Oct. 10-19, 2007	13th Int. Workshop on RF Superconductivity (SRF2007)	Beijing	273	http://www.pku.edu.cn/academic/srf2007/home.html
Oct. 29-31, 2007	CARE07 Annual Meeting	CERN	105	http://indico.cern.ch/conferenceDisplay.py?confId=15901

1.4.2 JRA2: Charge Production with Photo-Injectors (PHIN)

The list of participants and their implication in the PHIN Work Packages (**C**: Coordination, X: Participation) is given in the table below. The overall management is done by INFN-LNF and by CERN.

Number	Participant	WP1 M&C	WP2 CP	WP3 LASER	WP4 GUN	Person-months
3	**CNRS**	X	X	X	X	78,04
	CNRS-LAL	X	X	X	**C**	
	CNRS-LOA		X		X	
9	**FZR**	X			X	48(12)
10	**INFN**	**C**		X	X	36(19)
	INFN-LNF	**C**		X	X	
	INFN-Mi			X		
11	**TEU**		X	X		3,5
17	**CERN**	**C**	X	X	**X**	12,20(8)
20	**CCRLC/STFC**	X		**C**		
	RAL	X		**C**		

Main Objectives: Perform Research and Development on charge-production by interaction of laser pulse with material within RF field and improve or extend the existing infrastructures in order to fulfil the objectives. Coordinate the efforts done at various Institutes on photo-injectors.

JRA2.1 Work Package 1: Management and Communication

JRA2.1.1 Meetings and Publications

CARE Annual Collaboration Meeting CERN, 29 - 31 October 2007

PHIN Collaboration Meeting Parallel session of CARE07 CERN 31 October 2007

CARE Steering Committee CERN 31 October 2007

JRA2.2 Work Package 2: Charge Production

JRA2.2.1 Description of the work

FZR

The construction of the photo cathode preparation system at the FZD and the development of the preparation technology for cesium telluride photo cathodes were finished. In 2007, the preparation system was equipped with an Ar sputter ion gun of the company SPECS. The ion gun is used for pre-cleaning of new photo cathodes and rejuvenating used photo cathodes. In order to improve the vacuum, heating jackets for the exchange and storage chambers were bought. In detail the preparation system has the following features now:

1. exchange and storage system for six photo cathodes,
2. photo cathode heating,
3. evaporator for Cs and Te with heating power control,
4. precision positioning system for the evaporators,
5. deposition rate monitors,

6. cathode shutter,
7. anode grid with high voltage for photo current measurements,
8. UV laser system for Q.E. measurements and cathode scanning,
9. ion sputter gun for cathode cleaning,
10. vacuum system with ion getter pumps and residual gas mass spectrometer,
11. hard- and software (Visual C++) for computer controlled deposition.

The main part of the man power was used for the development and optimization of the preparation technology. Especially the design of the evaporators was improved. For tests a number of photo cathodes have been prepared and measured using the standard procedure (Te and Cs in succession) as well as the co-evaporation process. As an example the Figures 7 and 8 show the results of the Q.E. measurements of a cathode produced by co-evaporation with a Q.E. of about 7 - 8 % after deposition. The SRF photo gun at FZD requires a Q.E. > 1 %.

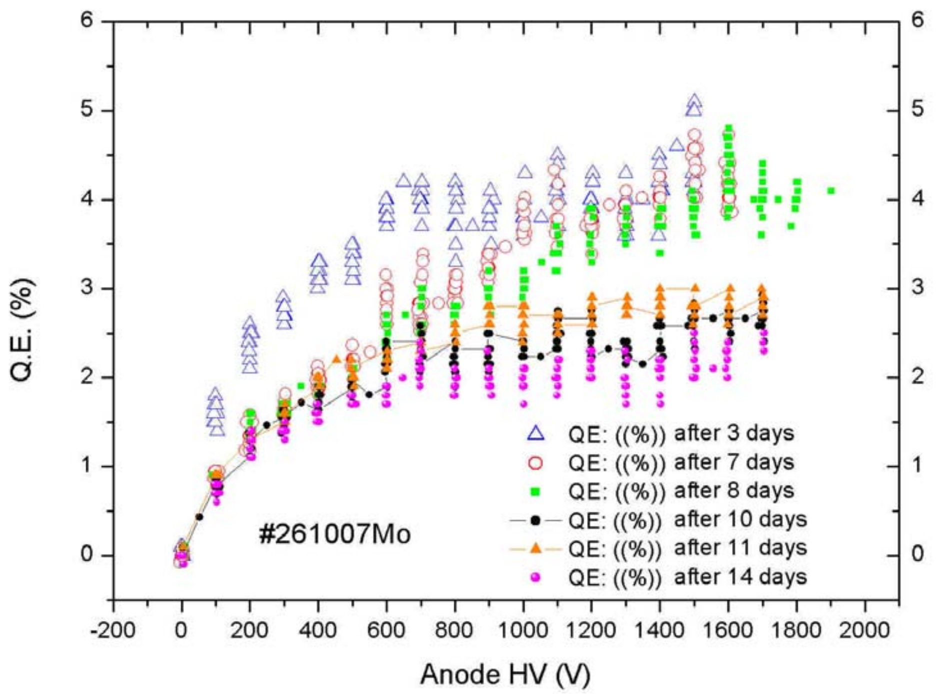


Figure JRA2.2.1: Measurement of the quantum efficiency of a Cs_2Te photo cathode produced by co-evaporation after different storage time.

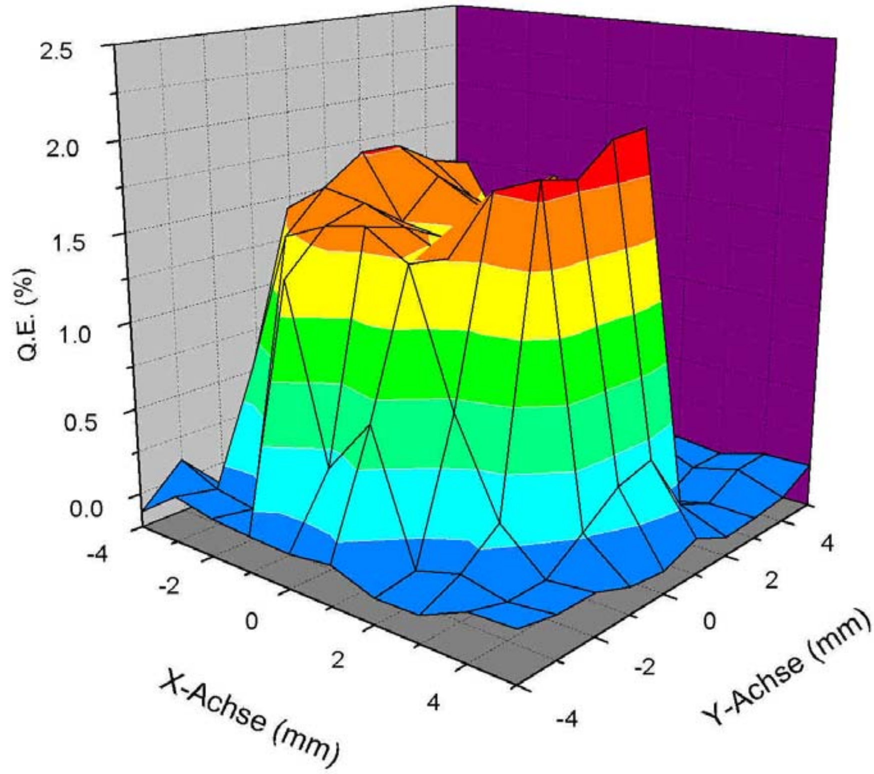


Figure JRA2.2.2: Q.E. distribution measured for the photo cathode #261007.

The second photo cathode transfer system was assembled and tested. It will be installed at the superconducting RF photo gun in the winter shutdown of ELBE in January/February 2008. After installation of the system, Cs_2Te photo cathodes can be moved from the preparation system to the SRF gun, inserted and used in the gun without breaking the vacuum. The present studies and measurements at the SRF gun are carried out with a Cu photo cathode.

At FZD, the work in work-package 2 of PHIN had been carried out by a postdoc (Dr. Rong Xiang) until November 2007 paid by the CARE project. After a break (maternity leave) the work will be continued in 2008 with payment from FZD.

CERN

Production of photocathodes has been re-started after more than 4 years. A Quantum Efficiency (QE) of 6.2 % has been measured on a new photocathode (number 166), produced in the preparation chamber of the photocathode laboratory. An image of the electron beam observed on a scintillating screen is shown in Figure 1. This result, measured using the DC gun in the photoemission laboratory, is very encouraging taking into account the fact that a QE of 3% is specified for CTF3 operation and that the preparation chamber could not be baked out due to several minor mechanical problems that have been solved during 2007. The full bake out of the preparation chamber is progressing and baseline production of photocathodes for the photoinjector commissioning has started in December 2007.

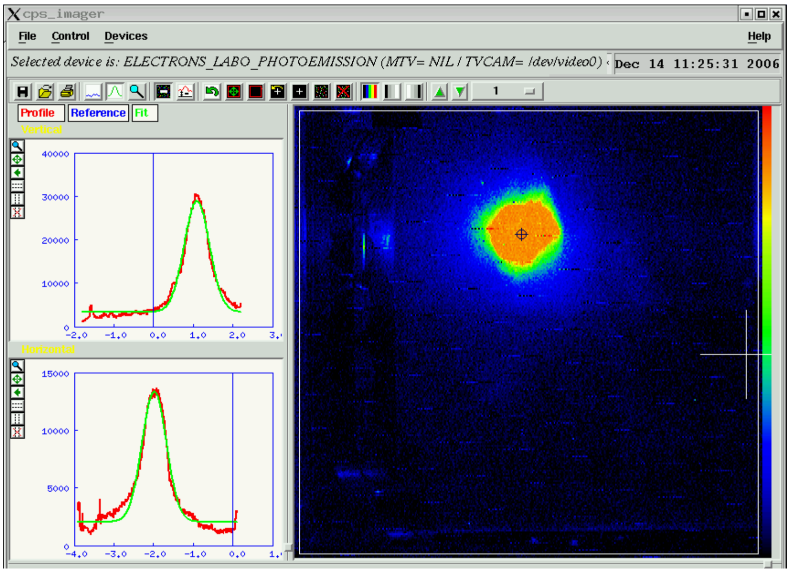


Figure JRA2.2.3: Image of the electron beam produced in the photocathode laboratory. The Cs-Te photocathode 166 is illuminated with UV laser light, and the photoelectrons produced are accelerated in the 80 kV DC gun.

A collaboration agreement established with the University of Naples "Federico II" provided the basis for presence at CERN at full time for one year of a young researcher, Andrea Barbiero, who designed a new Ultra High Vacuum (UHV) transfer arm. The goal of this new arm is to provide a lighter structure to transport photocathodes produced in the photocathode laboratory to the XPS laboratory of the CERN-TS/MME group, allowing a deeper investigation of the relationship between deposition parameters and compounds of Cesium and Tellurium present in the thin film deposed on the photocathode. Study of the effect of contamination on QE and on photocathode lifetime is also envisaged. The mechanical design (see for example Figures JRA2.2.4 and JRA2.2.5.) has been completed and approved, and procurement of the different components is in progress.

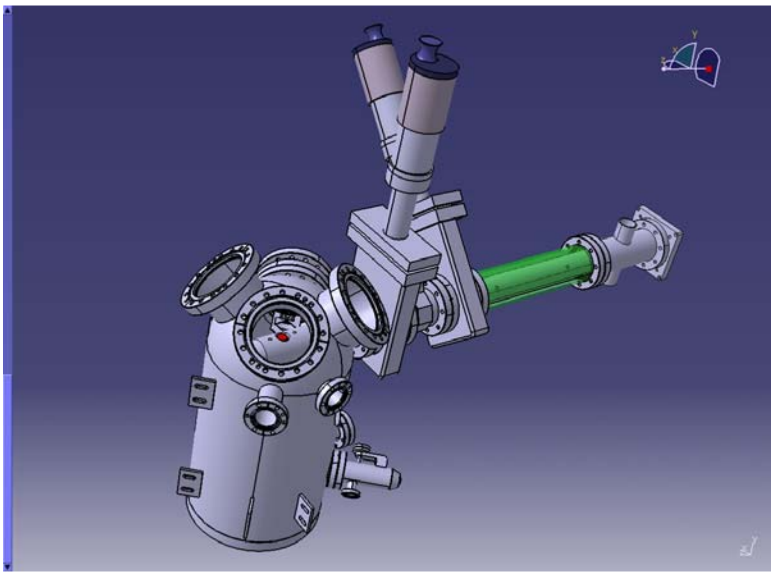


Figure JRA2.2.4: CATIA design image of the new transfer arm (in green the manipulator) connected to the XPS chamber.

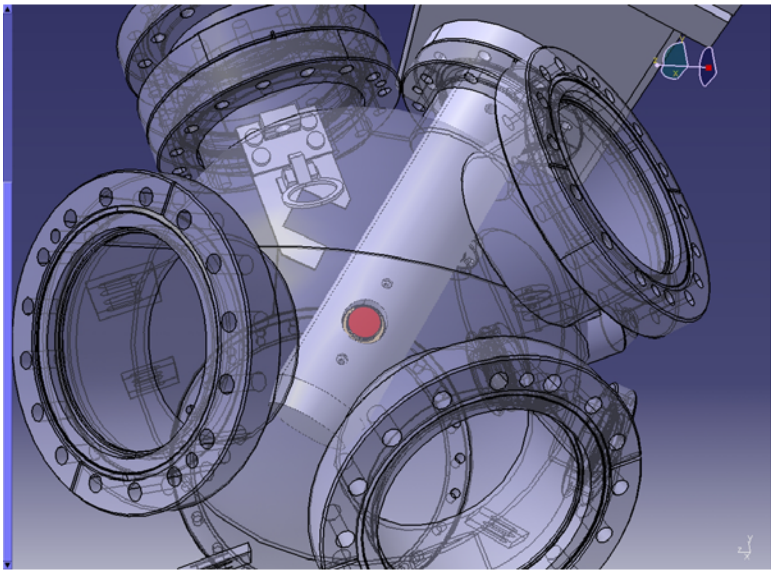


Figure JRA2.2.5: CATIA design image of the photocathode (in red) in position for XPS measurements.

A Stylus profiler (Figure JRA2.2.6) has been purchased and installed in the laboratory to measure the thickness of the coatings, to obtain a precise calibration of the thickness deposited during the process. This is particularly important to ensure a repeatable stoichiometric ratio of the Cs-Te film. The performance of this instrument is regularly checked using a Taylor-Hobson calibrated sample. A typical calibration measurement is shown in Figure JRA2.2.7.

Figure JRA2.2.6: The new Dektak 6000 Stylus Profilometer (left). Measurement of a quartz test sample with a Te coating (right). Standard film thicknesses are of the order of 20-50 nm.

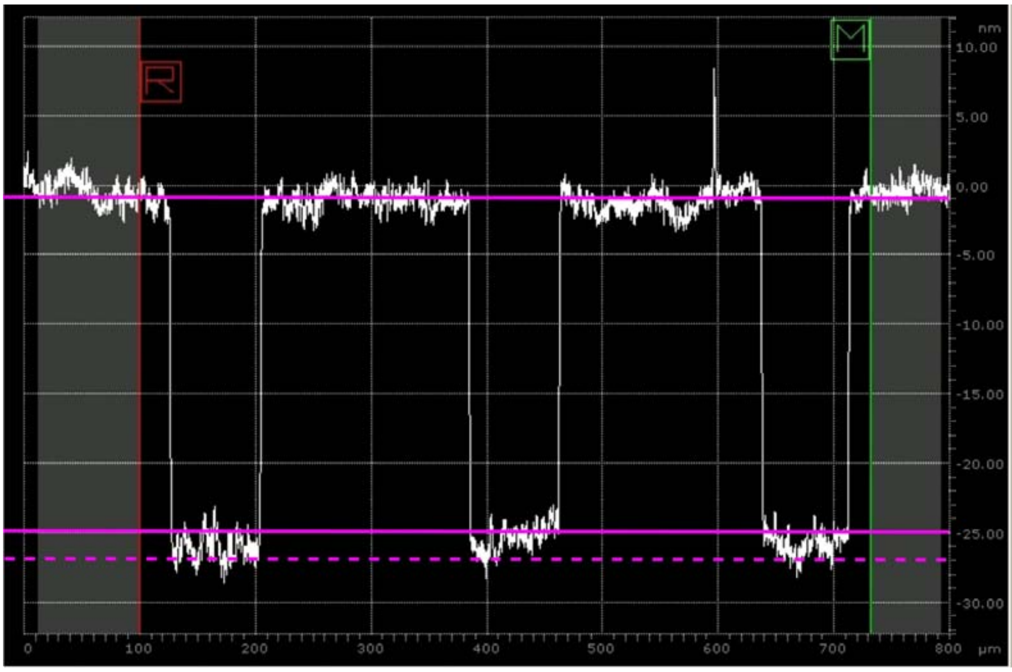


Figure JRA2.2.7: Measurement of a calibrated Taylor-Hobson sample with three 24 nm deep groves. Solid lines in the image are 24 nm apart; the dashed line indicates an additional 2 nm. Conclusion: The accuracy of the Stylus Profilometer is better than 2 nm.

LAL

The vacuum tank designed to make alkaline deposits on photocathode substrate has been machined in the LAL workshop. In addition the vacuum transfer system and the large ionic pump which have been ordered to private companies are available at LAL. But a leakage problem due to the large aluminum gasket is under investigation.

LOA

Plasma-based accelerators have been proposed for the next generation of compact accelerators because of the huge electric fields they can support. However, it has been difficult to use them efficiently for applications because they produce poor quality particle beams with large energy spreads. By focusing light pulses containing a few joules of energy in a few tens of femtoseconds onto gas jets, extremely large electric fields can be generated, reaching the teravolts per metre level. As a result, the length over which electrons extracted from the target can be accelerated to hundreds of MeV is reduced to a few millimetres. The reduction of the size and the cost of laser plasma accelerators is a promising consequence, but these electron beams also reveal original properties, which make them a wonderful tool for science. By adjusting the interaction parameters, the electron energy distribution can be tuned from a maxwellian-like distribution to a quasi monoenergetic one. The new properties of these laser-based particle beams are well suited to many applications in different fields, including medicine (radiotherapy), chemistry (ultrafast radiolysis), material science (non-destructive material inspection using radiography) and, of course, for accelerator physics. The purpose of our contribution in the project was the development of compact single shot electron spectrometers in order to optimise the coupling of the laser beam into the electron beam and especially to control the electron distribution energy. This has allow us to understand specific feature of the interaction, to demonstrated new scheme of injection (bubble and colliding), and to explore new applications. A complete document which reports the LOA/CARE activities on this field can be found on the CARE website as CARE report 07-031. Figure JRA2.2.8 presents the major result obtained this year using two counter propagative laser beam.

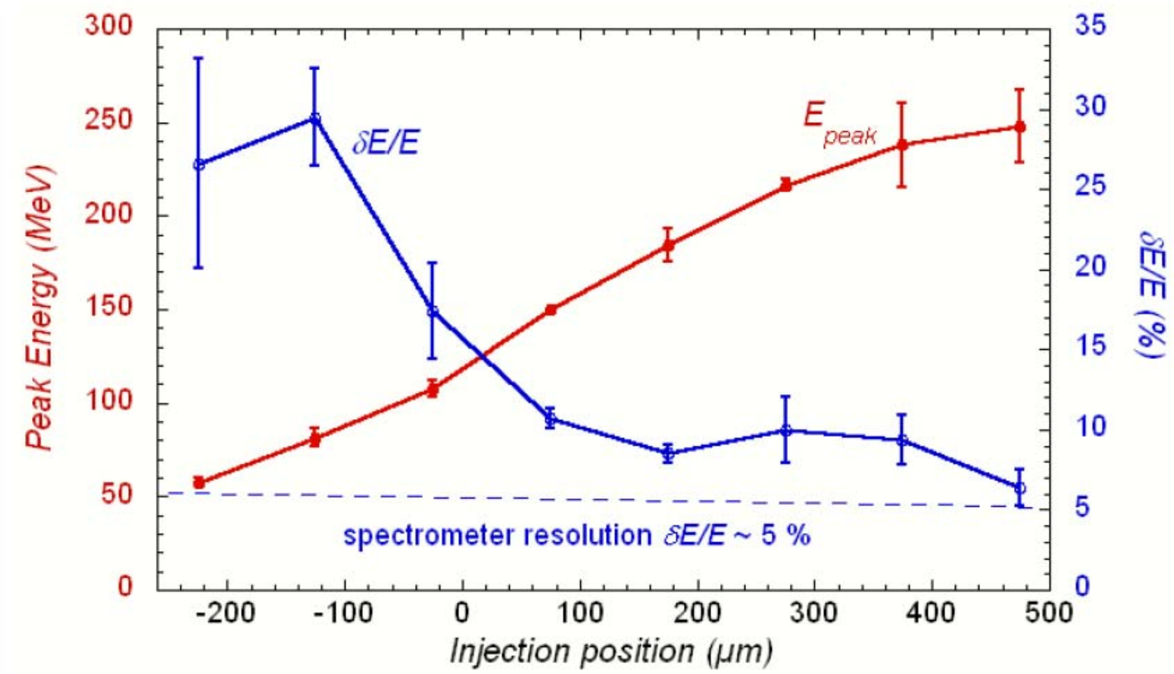


Figure JRA2.2.8: Evolution of the electron beam peak energy (red curve and left vertical axis) and its energy spread (blue curve and right vertical axis) versus the injection position z_{inj}, e.g. the position at which the two laser pulses collide. Each point is an average of 3-5 shots and the error bars correspond to the standard deviation. The position z_{inj} =0 corresponds to injection at the middle of the gas jet, whereas z_{inj} =500 µm corresponds to early injection close to the entrance of the gas jet.

TEU

During the reporting period, Dr J. Verschuur has left the group and Dr van der Slot has taken over his tasks. TEU has focused on implementing diagnostics for photocathode research and mainly on using ellipsometry for studying the formation of the layers during the growth of the photocathode. For that reason, we have implemented an interferometric ellipsometer and found that the cathode vibrations were too large to successfully use this type of ellipsometer. We therefore changed the ellipisometer into a rotating compensator ellipsometer (see Fig. JRA2.2.9).

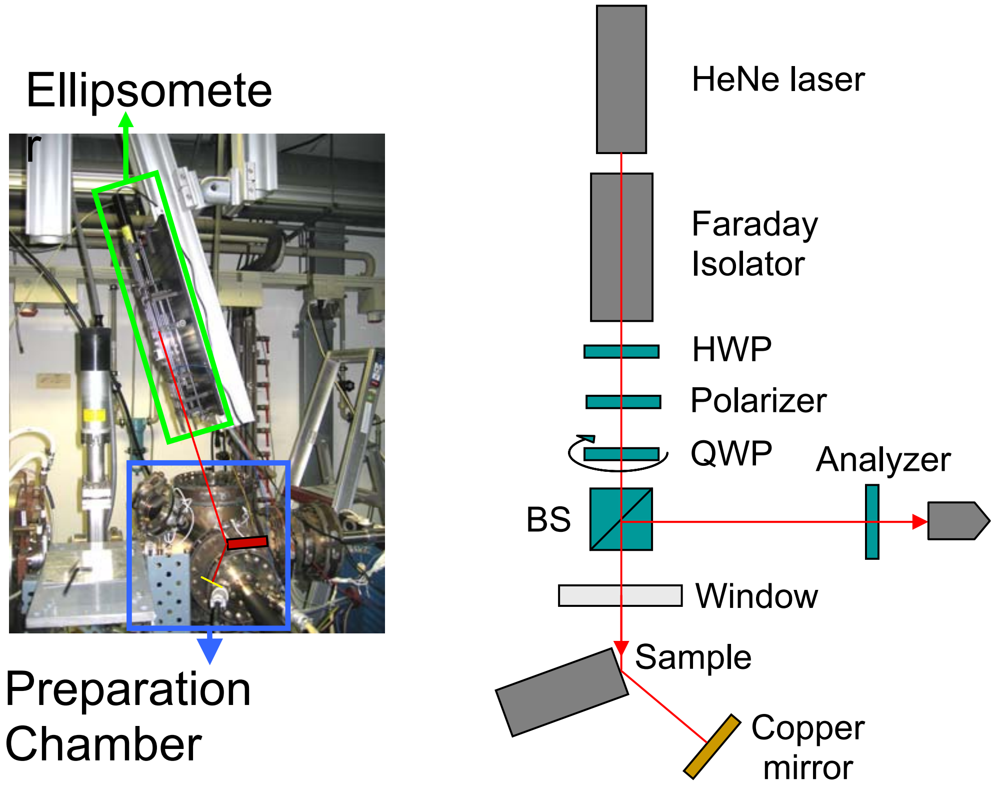


Figure JRA2.2.9: Rotating compensator ellipsometer

This elllipsometer was successfully used to measure the reflected signal of the photocathode during the deposition of Te and Cs. An example of the data retrieved from the reflected signal is shown in FigureJRA2.2.10.

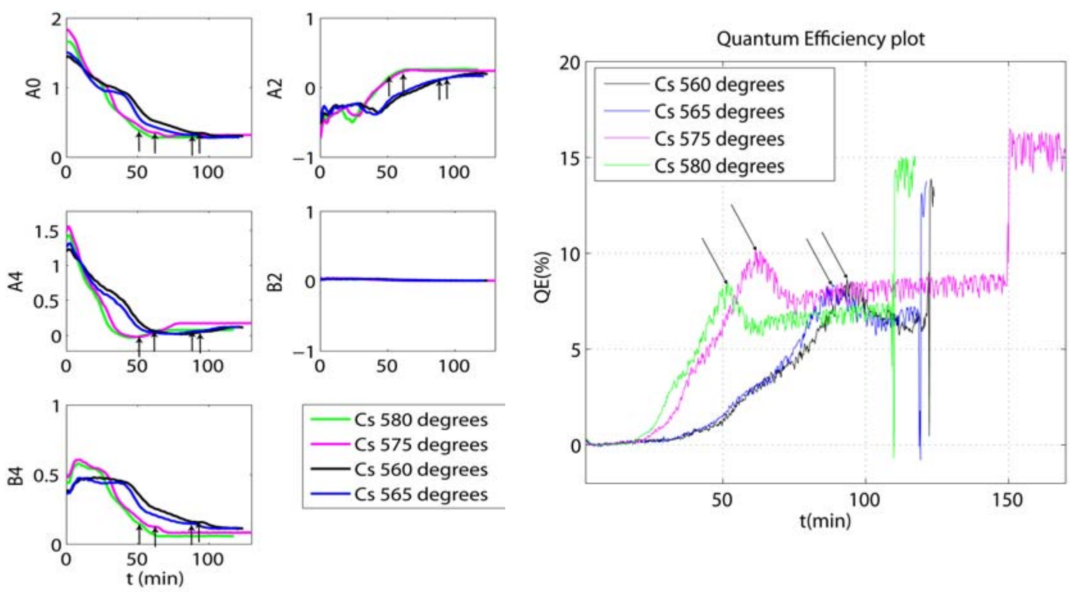


Figure JRA2.2.10: Ellipsometric coefficients A0 to B4 and quantum efficiency plot for various deposition temperatures of Cs.

These measurements show that different traces are recorded for different deposition temperatures of Cs during the growth of the photocathode. This seems to indicate that layers are formed with different properties during the formation of the photocathode, depending on the exact deposition rate of the Cs. We were not able to retrieve the ellipsometric variables from the measured data, and therefore the physical parameters of the layers, because we have insufficiently characterized the complete setup. Work to do this is currently underway and further improvements on the elllipsometer are being implemented. So far, the rotating compensator ellipsometer seems able to supply additional in-line information on the formation of the photocathode during production, and may therefore be a very interesting diagnostic tool for growing photocathodes.

JRA2.2.2 Overall Progress of Work Package 2

JRA2.3 Work Package 3: LASER

JRA2.3.1 Description of the work

JRA2.3.1.1 INFN-MI

1) The R&D on UV rectangular laser pulse generation has been performed according to the proposal. Tests of an optical apparatus based on a new principle have been done. In the scheme, which we believe is novel, the longitudinal profile of a laser pulse from a Ti:Sapphire master oscillator power amplifier system is controlled using a mechanical mask in the Fourier plane of a 4f stretcher located after the harmonic conversion crystal. Such a scheme allows us to overcome many of the difficulties faced by current state-of-art pulse-shaping designs. Beyond the clear advantages of simplicity and robustness, the proposed solution offers the possibility to deliver a pulse with very short rise and fall times and to freely change the output length. The USA company RadiaBeam has contacted the authors of the new optical apparatus for a possible production.

2) We have continued the investigation of the generation of sub-picosecond multiple electron trains generation in a RF electron gun by corresponding patterned laser trains for electron pulse trains useful for Far Infrared Radiation generation. The case of twin-pulse high quality electron beams were been especially treated for optical light FEL twin -pulse generation interesting for pulse-pulse experiments.

3) We have also performed a systematic analysis for the generation of single shaped electron bunches in the RF electron gun of the SPARC accelerator aiming to obtain single-spike FEL operation.

4) We have made some tests on the Phase-Coding system of the CTF3-CERN project. In particular we have checked the losses of the optical component of the system, finding that the fiber launch, the modulator, the fiber beam splitter and the fiber-fiber junctions have losses about a factor two above those claimed by companies. We have then made successfully the test of the principle of operation of the entire Phase-Coding system. as shown in Figure JRA2.3.1.

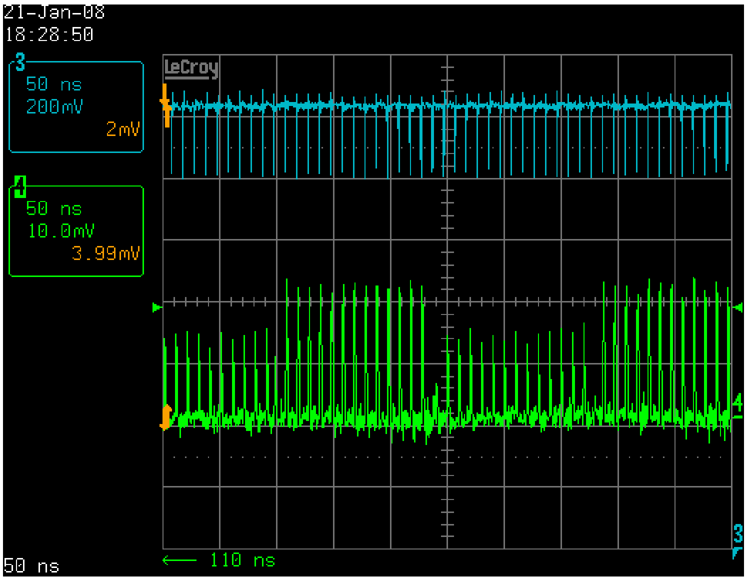


Figure JRA2.3.1: Sub-trains of right lengths are generated.

JRA2.3.1.2 INFN-LNF

The shaping of ultrafast laser pulses is of increasing interest in a wide variety of optical applications, including quantum and optimal control, high speed communications and material characterization. The promise of increasing the brightness of electron beams from RF (radio frequency) photoinjectors by using a flat top UV laser pulse to illuminate the cathode is the application inspiring the work presented here. For optimum driving a photocathode of a S-band RF cavity, such as the SPARC photoinjector, one desires ideally a relatively high energy (> 100μJ) UV laser pulse 5 to 10 picoseconds long, with a flat top temporal profile having fast (□ 1ps) rise and fall times. The current techniques to manipulate the bell shape laser pulse employ devices that work in the IR, in general before the amplification. This set up requires the pulse shapers are able to compensate the unavoidable distortions caused by the amplification and the harmonic. To perform this pre-compensation is in general advisable to work with programmable shapers. We review here two most widespread techniques: one is based on a programmable dispersive acousto-optic modulator (the DAZZLER) while the other is based on a liquid crystal mask spatial light modulator (LCM-SLM) placed in a 4-f optical setup.
The described techniques are well-known but, according to our knowledge, the two pulse shapers have never been directly compared in the same experimental conditions. We present the performances of the two devices tested with the SPARC laser system in the frame of CARE collaboration.

The principle of laser pulse shaping in time domain is based on the amplitude and phase modulation of the spectral components. The field of a light pulse has, in the time and frequency domains, respectively, the expressions:

$$E(t) = \sqrt{I(t)}\, e^{i\Phi(t)} e^{-i\omega_0 t} \qquad \widetilde{E}(\omega) = \sqrt{\widetilde{I}(\omega - \omega_0)}\, e^{i\widetilde{\Phi}(\omega-\omega_0)} \qquad (1)$$

The pulse shaping manipulation is a linear filtering process. In the time domain the filter action of the shaper is represented by an impulsive response function h(t); in the spectral domain the filter action is represented by the Fourier transform H(ω) of h(t). The output electric field $E_{out}(t)$ is the convolution of the input $E_{in}(t)$ and the response function h(t): $E_{out}(t) = h(t) \otimes E_{in}(t)$. In the frequency domain we can write: $\widetilde{E}_{out}(\omega) = H(\omega) \cdot E_{in}(\omega)$.
In general H(ω) is a complex function that can be decomposed as an amplitude and phase terms: $H(\omega) = T(\omega) e^{i\phi(\omega)}$. Appropriate T(ω) and phase ϕ(ω) modulation can lead to any kind of output signal compatible with the original spectral width. When the input and output fields are given and it is possible to introduce both amplitude and phase modulation the solution of the problem is unique. This solution can be computed by using those particular functions T(ω) and ϕ(ω) that make the Fourier transform of the input equal into the Fourier-transformed output. Nevertheless, in order to obtain the target pulse, it is possible to apply only an appropriate phase function modulation; in this case there are multiple solutions to the problem of find the filter transfer function.

Experimental setup for SPARC laser

The experimental set-up used to perform the comparison between the two pulse shapers is reported in Figure JRA2.3.2. Due to their low optical damage threshold and relatively high insertion losses, the two devices are placed immediately after the Ti:Sa oscillator (central wavelength 800 nm, repetition rate 79.3 MHz and ~6nJ energy per pulse).

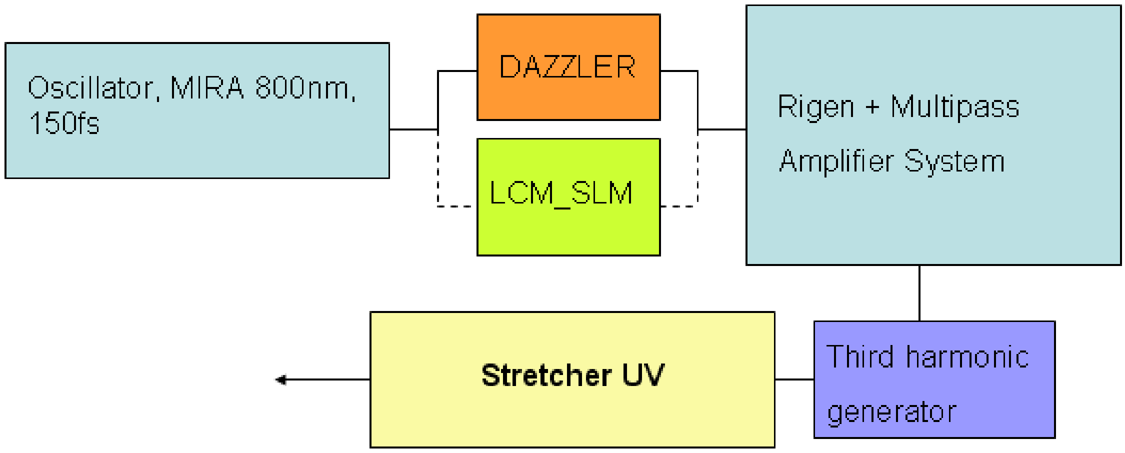


Figure JRA2.3.2: SPARC laser system; the two pulse shapers are easily interchangeable.

The amplification process is carried out by one regenerative pre-amplifier and a two double passes stages. The system delivers 100 fs pulses with energy of about 50 mJ and a repetition rate of 10 Hz.
At the output of the amplifier the IR pulses go to a third harmonic generator, where UV pulses with energy of up to 4 mJ are produced. At the end of the laser chain there is a stretcher based on a pair of 4350 groove/mm UV reflecting gratings that is used to stretch temporally the pulses up to 15 ps. The utility of a UV stretcher placed after the harmonic generation is motivated by two principal reasons:

- The stretcher is necessary in order to maximize the third harmonic conversion efficiency obtaining the maximum UV energy on the cathode; in fact it allows us to temporally lengthen the UV pulses width after the harmonic conversion process whose efficiency depends on the input optical peak power.

- The UV stretcher introduces a tight binding between the UV spectral and time profile of the laser pulses. In fact, the spectral profile is transferred into the time profile due to the large linear chirp introduced by the stretcher. This consideration, obviously, simplifies the search of the optimal spectral phase and amplitude modulation. Moreover the direct correspondence time-spectral shape makes straightforward the reconstruction of the pulse time intensity using a single shot high resolution diagnostic.

To find the optimal pulse shaper's phase and amplitude modulation to apply we developed the ORFEO code in Labview environment (see Figure 16). This software tool calculates the second and third harmonic time profile and spectra starting from the measured fundamental harmonic spectral intensity. It is possible to apply an arbitrary spectral phase function and observe the changes on the harmonics time and wavelength intensities. The program includes

also the distortions of possible non-linear crystals angular mis-alignment. Finally it is possible to simulate the linear chirp added with the UV stretcher.
The ORFEO code demonstrated to be useful and reliable tool and, it allows the direct comparison with the experimental data we presented in previous papers. In the figure JRA2.3.3. the ORFEO screenshot is reported: the upper row from left to right shows the experimental IR spectrum, the second and third harmonic wavelength domain intensity. The lower row reports the corresponding calculated IR, blue and final UV time intensity. At the bottom, some knobs are noticeable; these visual inputs permit to synthesize the proper spectral phase function. The UV stretcher's chirp and the non-linear crystal angle deviation from the phase matching condition can also be simulated.

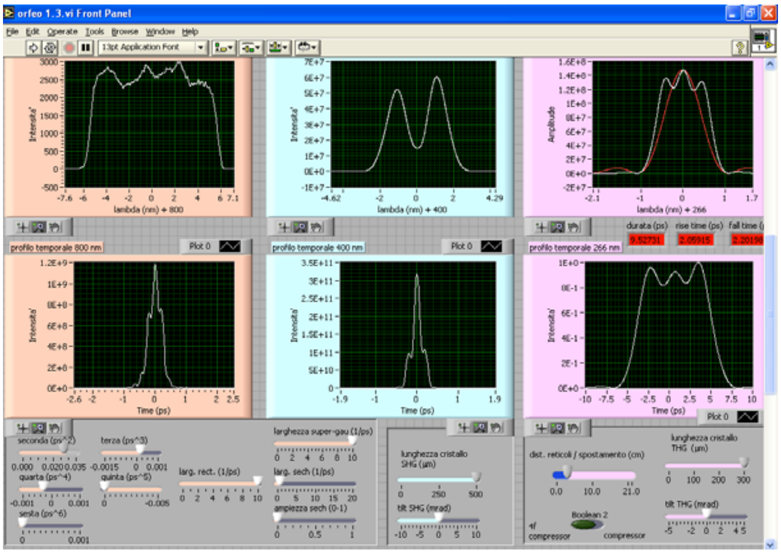


Figure JRA2.3.3: ORFEO code screen shot.

DAZZLER pulse shaper

The "DAZZLER", an "Acousto Optic Programmable Dispersive Filter", is a system designed by FASTLITE to manipulate the spectral phase and amplitude of ultrafast laser pulses.
A RF signal within 40−50 MHz excites a piezo transducer which generates an acoustic wave inside an bi-refrangent acousto-optic TeO_2 crystal. The acoustic wave propagates along the crystal spatially reproducing the RF signal. Being the optical wave velocity much greater than the acoustic wave velocity, the input optical pulse propagates as trough a fixed dielectric grating inside the crystal. The two linear optical modes of the crystal can be efficiently coupled by an acousto-optic interaction when the phase matching condition, energy and momentum conservation, between the acoustic wave and the two optical modes are satisfied. The coupling condition assures a partial energy transfer from the input to the output optical mode. The two modes emerge out of the crystal at different angle and the part of the optical pulse interacted with the acoustic grating can be easily separated from the un-diffracted one, and then it can be amplified. The efficiency of the interaction for an optical wavelength depends on the amplitude of the corresponding acoustic frequency. Therefore by controlling the amplitude of the acoustic spectrum it is then possible to perform an amplitude modulation of the optical frequencies.

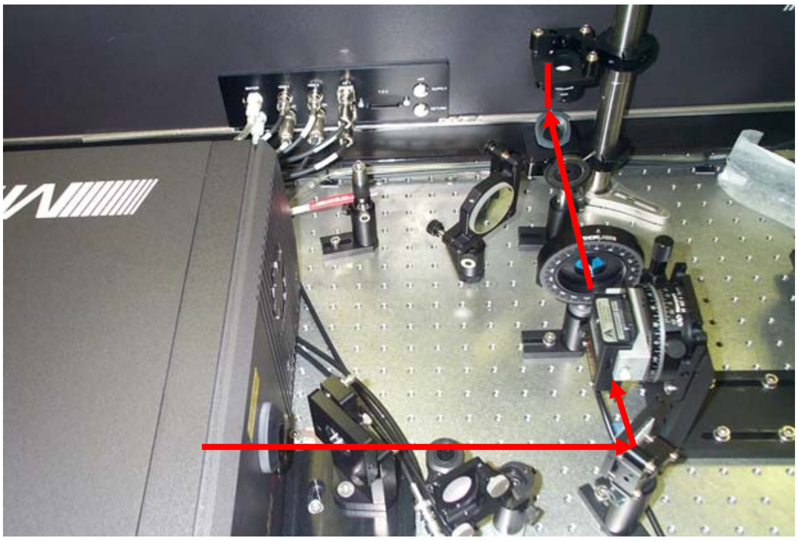


Figure JRA2.3.4: Dazzler set-up: the oscillator output is sent to the acousto-optic filter and a half wavelength wave-plate. After, a periscope is used to inject the beam in the amplifier.

Sending RF chirped signal in different position z along the crystal there will correspond different acoustic frequencies. Since locally, for a given z, there is just one spatial frequency in the acoustic grating, only the optical frequency that satisfy the phase matching condition, can be diffracted in that position z. In this way it is possible to diffract different frequencies at different depths. Due to the TeO_2 birefringence two wavelengths experience diverse propagation time and are subjected to different phase modulation.

The Dazzler we used is composed by a 2.5 cm acoustic material. It has a resolution of 0.3 nm and work over a bandwidth of 200 nm around 800 nm. The maximum chirp can apply produce a laser pulse up to 6 ps. The energy losses reach about 50 %.

As shown in the Fig. JRA2.3.4. the DAZZLER is mounted at the oscillator's exit and because polarization of the laser pulse is rotated by the acousto optic interaction, we use a lambda/2 waveplate prior to send the beam into the amplifier.

Our procedure to seek the flat top pulse is based on the search of the proper phase and amplitude modulation to obtain the target third harmonic spectrum profile that corresponds to the wanted time profile. As said before the target temporal pulse is obtained by generating a UV rectangular spectrum and then converting it into a rectangular temporal shape by the stretcher. To have the flat top spectrum at 266 nm we start generating a square-like spectrum after the DAZZLER and with proper amplitude modulation, pre-compensate the distortion introduced by the amplifier. In this way it is possible to have a flat top pulse out of the Hidra compressor.

As said before, it is not possible to produce directly 10 ps rectangular IR pulse before the harmonic generation because otherwise the conversion efficiency of the two BBO crystals would result too low. At the same time it is important to stress that it is not possible for the IR laser pulses to enter the crystals with temporal pulses that are too short. In fact, the generated second harmonic and third harmonic spectral widths depend strongly on the first-harmonic pulse length.

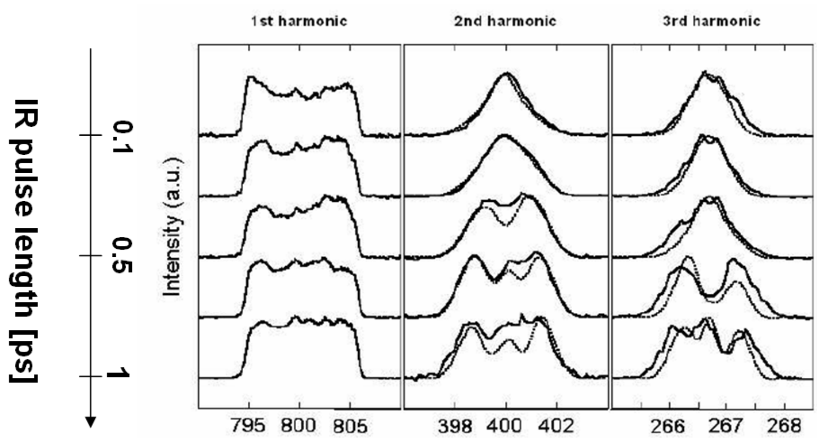


Figure JRA2.3.5: From left to right: measured (solid curve) and simulated with ORFEO (dashed curve) IR, BLUE, and UV spectra. Starting from a transform-limited pulse.

This behavior is shown in Figure JRA2.3.5. by reporting the changes that occur in the spectrum of the second harmonic and third harmonic signals as a function of the chirp introduced by the DAZZLER. In the left part of the figure the first-harmonic spectra shaped by the DAZZLER are presented; the middle and the right parts show the experimental and calculated second harmonic and third harmonic spectra, respectively. Starting from a transform-limited pulse, we increase the chirp by 0.01 ps^2 for each curve from top to the bottom. As shown in the figure there are a good agreement between the measured spectra and the ones simulated by ORFEO. The DAZZLER phase function was set to have a IR pulse enough long, 0.7 ps, to preserve the flat spectrum trough the non linear crystals, and at the same time keep the third harmonic efficiency high. Using the amplitude modulation to have a flat top amplified IR spectrum and a proper phase modulation to keep the flat top spectral shape trough the third harmonic generator it was possible to have a reasonable square-like UV pulse in time. In the Figure JRA2.3.6. is reported the UV pulse obtained with the DAZZLER shaper we measured with the multi-shot cross-correlator. The rise time obtained is about 2.6 ps and the oscillation on the plateau is limited to the 30 % ptp. The oscillation takes into account also the shot-to-shot instability of 5 % rms

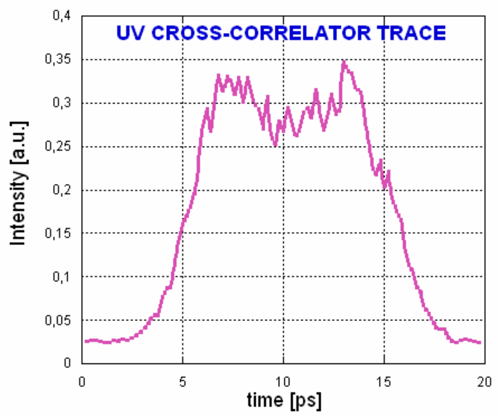


Figure JRA2.3.6: Cross-correlation of the UV flat-top obtained with the DAZZLER pulse shaper.

LCM-SLM pulse shaper

We now discuss to operation principles of the pulse shaping system based on the LCM-SLM (liquid crystal mask – spatial light modulator).

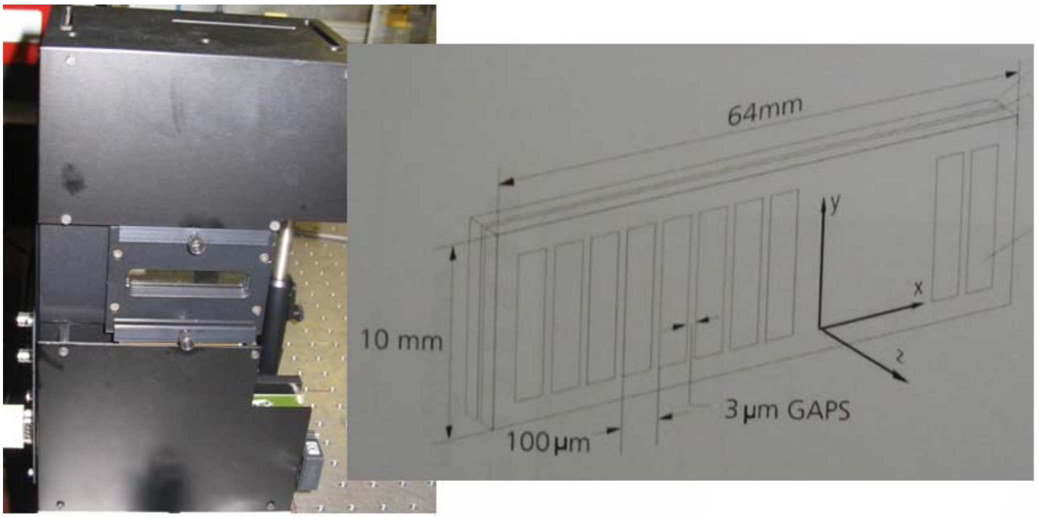


Figure JRA2.3.7: Picture of the Jenoptick SLM-S 640/12 and on the right the sketch of the liquid crystal array.

The mask is an array of pixels interleaved with small gaps (Figure JRA2.3.7.). The mask chosen for the SPARC project is the Jenoptick model SLM-S 640/12. The dimensions of the pixels and gaps are, respectively, 97 and 3 μm wide, and the number of pixels is 640.
By changing the voltage applied to a single pixel it is possible to change the refraction index for that particular pixel. In this way, it is introduced a wanted phase shift in the radiation travelling trough the pixels. A LabView program has been developed in order to control the voltage applied to each pixel composing the liquid crystal mask.
The pulse shaping with the LCM-SLM is carried out introducing a proper spectral phase in order to obtain the wanted pulse intensity in the time domain.
In order to introduce the proper phase on the pulse it is necessary to propagate the different pulse wavelengths trough the individual pixels of the array. This is possible by using an optical layout called 4f which is reported in Figure JRA2.3.8. The set-up is composed by two anti-parallel identical gratings and two focusing lenses with focal length f. The optical elements are placed as reported in the figure. The wavelengths are dispersed by the first grating, and then the first lens collimates the laser frequencies. The second lens and the last diffractive optics are used to recombine the wavelengths with no residual spatial chirp and without temporal dispersion. The mask is located at the Fourier plane of the system where the spectral components of the pulse are linearly dispersed and focused. The 4f layout shown in Figure JRA2.3.9. has been designed to be compact in order to fit the space available on the optical table. The picture of the apparatus is shown in Figure JRA2.3.10.. The overall energy losses are comparable with the DAZZLER ones.

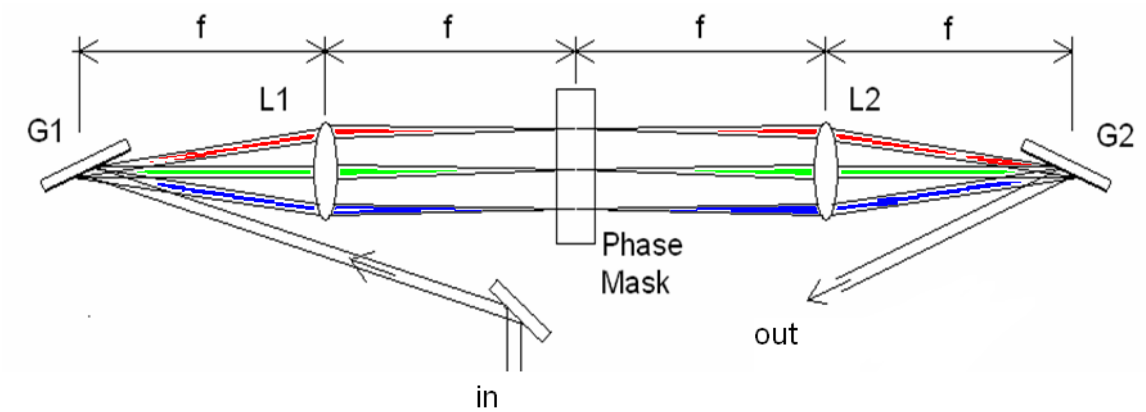


Figure JRA2.3.8: 4f optical setup. The diffraction grating G1 is used in order to apply a linear angular dispersion onto the input wavelengths. L1 is used to focus the spectral component at the Fourier plane where the mask is placed. The second lens and the output grating are positioned in a symmetric position and are used to recombine the wavelengths at the exit.

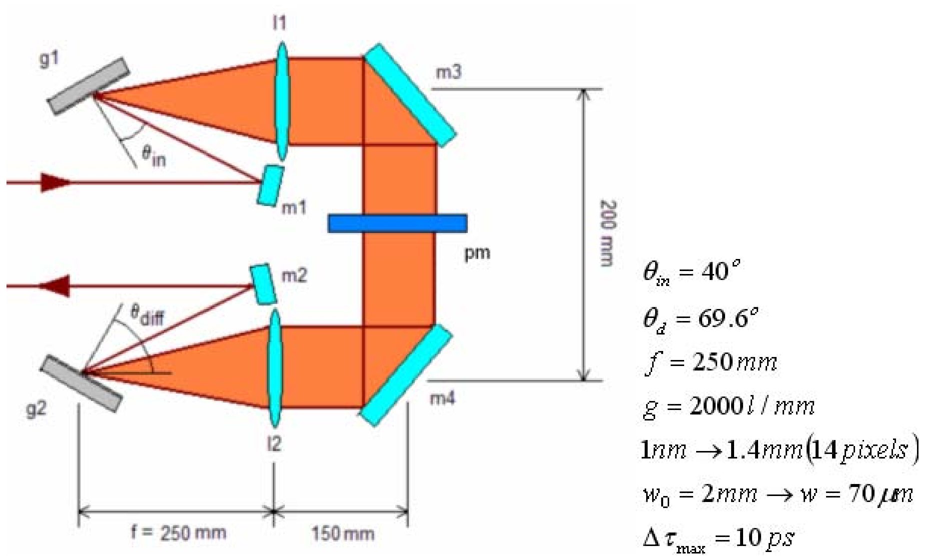


Figure JRA2.3.9: 4f optical setup implemented on the SPARC laser system

The phase function introduced by the mask and which is simulated is changed by modifying the coefficient of the following polynomial function

$$\phi(\omega) = \alpha \cdot (\omega - \omega_0) + \frac{1}{2}\beta \cdot (\omega - \omega_0)^2 + \frac{1}{3!}\gamma \cdot (\omega - \omega_0)^3 + \ldots$$

The first order coefficient "α" of the polynomial function brings a time shift of the pulse without changing its shape, the second order "β" induces a linear dispersion effect stretching or compressing the pulse and "γ" introduces a right or left asymmetry on the pulse shape. For our purposes the first four term of the polynomial function are sufficient.

The strategy that we studied and followed to obtain the results reported in this paper is based on the fact that, as said before, using the UV stretcher, the spectral profile can be converted into the time profile. We looked for a spectral phase modulation to introduce in the first harmonic pulse by the liquid crystal mask, capable to yield a third harmonic rectangular spectrum profile. The optimal phase function search was guided by the ORFEO simulations. In general a good strategy is to use the second order phase to enlarge the third harmonic bandwidth. At that point with the forth order phase we shrink the spectral tail and are able to

make a square-like spectrum in the UV. The third order is used to compensate possible pulse spectrum asymmetry.
For the liquid crystal mask, the phase function modulation can be quickly introduced and it is possible to see in real time the changes of the UV spectrum. This characteristic makes this device suitable to be integrated with an adaptive algorithm.

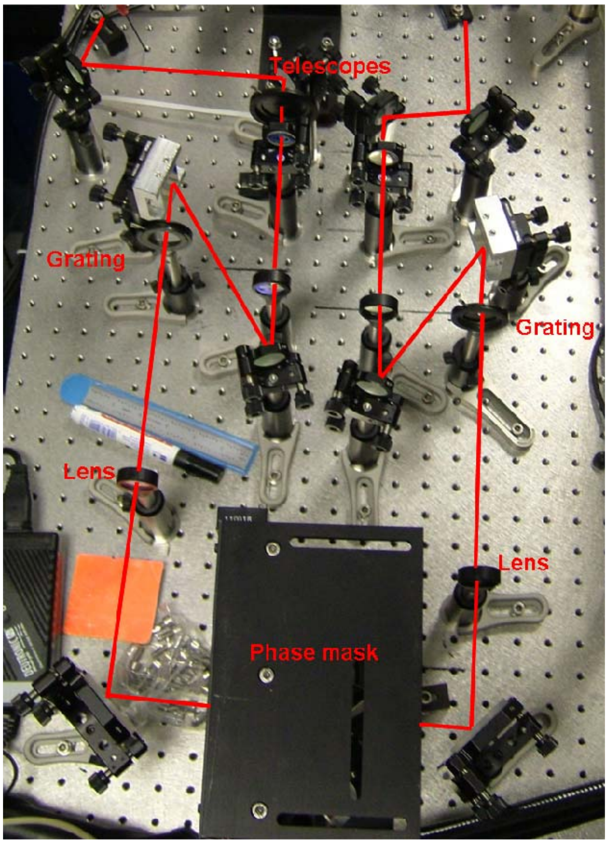


Figure JRA2.3.10: Picture of the 4f optical setup where is evidenced the optical path.

A critical point of LCM-SLM is the alignment of the system. In fact, it is not easy to perfectly align the 4f configuration in order remove any undesired effects such as spatial chirp and beam divergence of the output beam. This consideration is true especially when the optical setup is realized in small room, as in our implementation. The residual spatial chirp out of the 4f system is particularly deleterious since it seeds the regenerative laser. This amplifier is characterized by its own cavity's spatial and longitudinal modes. So, to avoid undesirable amplitude modulation of the amplified IR pulses, it is absolutely necessary that all the spectral components of the pulse coming out the 4f be well matched with the spatial modes of the RGA cavity. It is then clear that a diagnostic device for the IR before and after the RGA is mandatory to correctly align the 4f apparatus.
According to our experiences, when the chirp has been minimized out of the 4f setup it is important to accurately stir the regenerative input beam in order to produce an undistorted output spectrum out of the amplifier cavity. Anyway the output spectrum is very sensitive to even small misalignment of the seed beam and requires a real time control.
Once the alignment is done, the spectral amplitude is not influenced by the phase modulation and with the mask it is possible to control the IR manipulation up to the exit of the amplifier.
Using the simulation code to take into account the alteration introduced by the third harmonic generation it was possible to achieve the flat top with 2.1 ps rise time. In Figure JRA2.3.11. it

is reported the cross-correlation trace of the UV pulse. The ripples on the plateau are enhanced by shot-to-shot amplitude fluctuations recorded during the measurement.

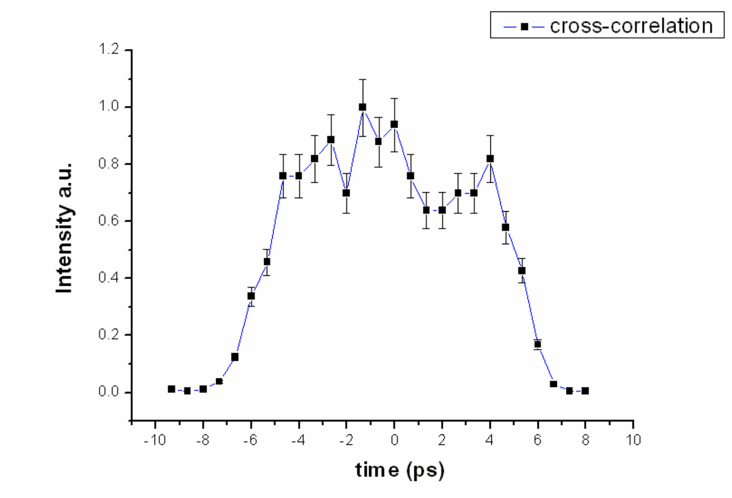


Figure JRA2.3.11: Cross-correlation of the UV flat top pulse obtained with the LCM-SLM shaper.

We have also theoretically and experimentally verified that in order to manipulate the UV spectral profile by the phase function introduced in the fundamental, the bandwidth of the IR beam must not be too large (~10nm) otherwise the third harmonic spectrum starts to be excessively modulated by the BBO crystal bandwidth and it becomes difficult to introduce the desired phase modulations and reduce the rise time. To prevent this undesired effect in the Fourier plane we added two metal sheets to block the tails of the spectrum.

Discussion

The shaping system based on the SLM is more complicated to be aligned with respect to the system based on the DAZZLER. For this reason the scheme 4f + SLM, from a maintenance point of view, is more critical also for the fact that the IR spectrum before and after the regen amplifier must be checked continuously.

The SLM requires to be found the calibration constant that allows converting the voltage applied to the single mask's pixel and the actual phase shift, between 0 and 2π, added to the optical wavelength.

Nevertheless the advantage of this scheme compared to the DAZZLER one is the better resolution and that the phase modulation can be introduced more quickly, therefore an iterative system can be simply implemented in order to find out the best modulation function.

This is basically what has happened in our case: using the DAZZLER we were not capable to obtain rise and fall time shorter that ~2.6 ps while with the SLM we obtained ~2.1ps for the same parameter values. We believed that this can be attributed to the smaller number of optimization attempts we did when the DAZZLER layout was used.

Anyway in both cases the rise and fall time is larger than 2 ps and we could not obtain faster edges. The reason for this is the smoothing effect on the UV spectrum due to the third harmonic generation process.

We have been capable to overcome this problem obtaining ~1.4 ps for the same parameter values by changing the shaping device system. Summarizing, in the new shaping scheme, we sent the IR Gaussian spectrum into the amplifier without introducing any modulation in the IR. Then we used a modification of the UV stretcher to perform a cut of the UV pulse spectral tails. By controlling the cut sharpness it is possible to generate overshoot in the time profile that compensates the curvature that would correspond to a truncated Gaussian spectrum. This new scheme let us to simplify the all procedure to manipulate the pulses obtaining not only the target shape but also more exotic profiles as for example the multi-peaks.

RAL
No work has been carried out at RAL for PHIN in 2007.

CERN

The design of the laser has been performed by Rutherford Appleton Laboratory but its construction was not completed before the shipment to CERN in 2006. A considerable delay has therefore been accumulated on the laser milestones since CERN had not foreseen in the project manpower for laser construction, but only for operation. To compensate the lack of manpower and competence, an associate from RAL was hired for six months in 2006 to help with construction and commissioning, but the contract was stopped after three months. Several severe hardware failures have delayed even more the project, since the laser oscillator and amplifier were not available for several months.
Informal collaborations were therefore established with INFN Frascati and INFN Milano, partners of PHIN but not previously involved in the photoinjector for CTF3, to fill the gap.
INFN Milano accepted to take responsibility for demonstrating the feasibility of the phase coding scheme proposed by RAL which makes use of custom "Off The Shelf" components for telecommunications.
INFN Frascati, that is developing a photoinjector for SPARC, has experienced laser scientists, and accepted to send them to CERN to help commissioning the amplifier chain.

By the end of 2006 the laser was partially assembled and the oscillator, the preamplifier and the first amplifier had been commissioned. Commissioning of the second amplifier was started in 2007. The output power of the first amplifier is satisfactory (see Figure 11) and in agreement with the specifications. The second amplifier was found below the specified value of 15 kW (see Figure JRA2.3.13.).

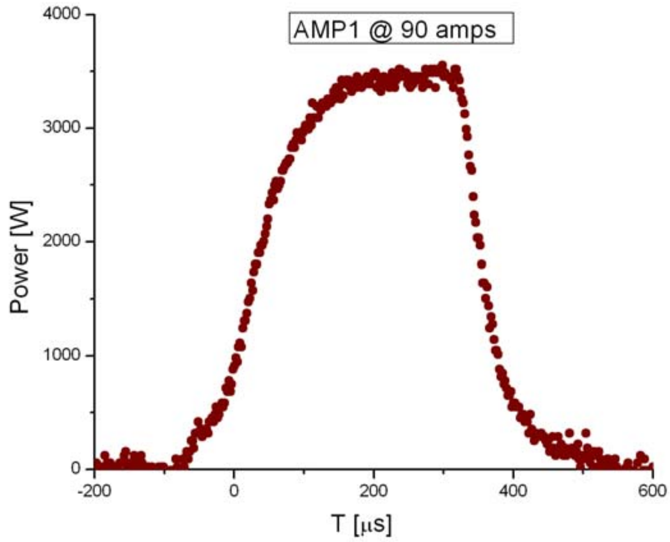


Figure JRA2.3.12: The power-time plot of the laser pulse train at the output of the first amplifier. The time window during which the amplification takes place is of 400 μs.

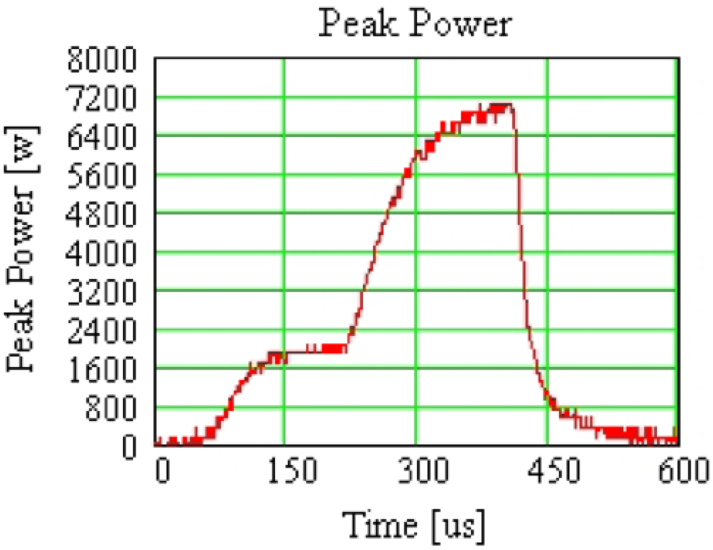


Figure JRA2.3.13: The power-time plot of the laser pulse train at the output of the second amplifier. The time window during which the amplification of the second amplifier takes place is of 200 μs and starts with a delay of 200 μs after the beginning of the first amplifier amplification.

The study of factors defining the amplification of laser power was carried out with participation of the scientific associate M. Petrarca from INFN Frascati, who will be more involved on the laser improvement, maintenance and installation from 1st January 2008 under a fellow contract at CERN. It was found that the beam size should be carefully adjusted for optimal matching to the Nd:YLF rod aperture of the second amplifier and to maintain the beam collimated during the propagation of beam into the amplifier while this is working at full power. To that purpose a three lens system was installed; with this optical system it is possible to introduce a magnification of the beam size while keeping the rays almost collimated. The layout of the laser is shown in Figure JRA2.3.14.
It has also been found that the optical pumping power of the second amplifier is below the specification, i.e. ~15KW compared to ~25 KW. To understand the reason for this fact, communication with the RAL people involved in the laser amplifier project is foreseen in 2008.

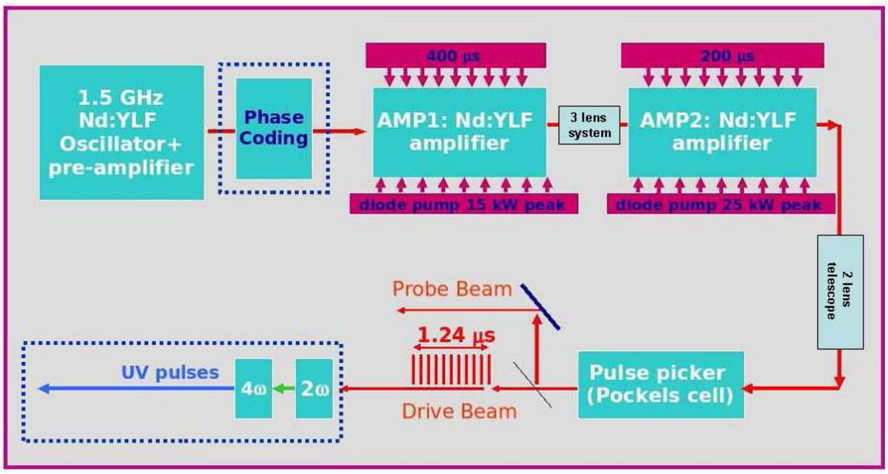


Figure JRA2.3.14: Layout of the laser setup for the CTF3 photoinjector.

It should be mentioned that the same laser will supply laser pulse bunches for the CTF3 probe beam photoinjector. This project is called CALIFES (Concept d'Accélérateurs Linéaire pour

Faisceau Sonde). To that purpose the laser pulses remaining after the bunch slicing with the Pockels cell are to be directed to the CALIFES pulse picker and frequency multiplication system. Setting up of the CALIFES laser beam was started in 2007 in collaboration with CEA Saclay.
A two lenses system has been installed between the second amplifier and the Pockels cell in order to match the fully amplified beam size with the Pockels cell crystal dimension.

The shape and divergence of the laser beam produced are important parameters for efficient generation of the required UV 262 nm beam by means of frequency multiplication in non-linear crystals. The measurements of the oscillator and preamplifier laser beam quality were performed using the beam propagation analyzer Spiricon M2-200. An example of such measurement is presented in Figure JRA2.3.15.

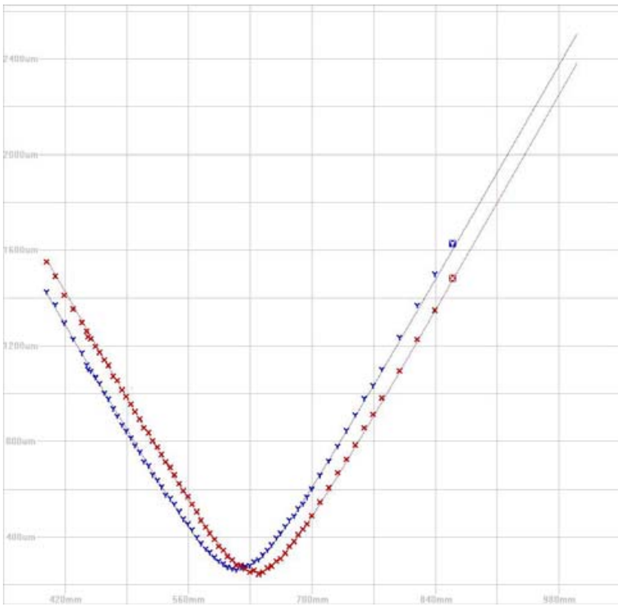


Figure JRA2.3.15: Snapshot of the measurement of laser beam divergence after the preamplifier, using the beam propagation analyzer Spiricon M2-200; on the vertical axis the beam width is reported in micron (200 µm per division), on the horizontal axis the beam propagation distance in millimetre from the input face of the Spiricon device (70 mm per division) is reported. The measured divergence parameters M^2 are: 1.23 for the X-plane and 1.27 for the Y-plane.

Measurements regarding the M^2 values for the full amplified beam gave a result between 2 and 2.8. Therefore, further studies on the possibility to improve the beam quality during amplification were made, resulting (Jan. 2008) in a value of ~1.8 for the M^2 along the X- and Y-plane. These measurements have been performed by M. Petrarca (CERN) and G. Cheymol (Saclay). Even though better results have been obtained showing a better quality of the transverse beam shape, further studies are foreseen to improve it even more.

Unfortunately, the work has been hampered by numerous hardware faults. In particular, two drivers for the amplifier pumping diode laser stacks were sent one after another to the manufacturer (Laselec) for repair (inside the warranty period). During a long period the commercial laser preamplifier (High Q Laser) was not operational because of a construction error, admitted by its manufacturer. Some problems in the laser cooling system also had to be identified and solved.

The major problem remaining in the amplification chain is the lack of power, in fact 15 KW of peak power were foreseen in the design from the RAL laboratory but only ~9.5 KW are now available.
The reason for this is to be imputed to the second amplifier which is under further studies. The 15KW of pumping power actually available to drive the second amplifier compared to the 25KW originally foreseen in the RAL design could be one of the main reasons.

The R&D work on laser pulse phase coding was carried out in collaboration with INFN Milano. The components of the phase coding system were sent to Milano. In a result of tests which have been carried out there, the feasibility of the approach based on fiber optics was demonstrated, although substantial losses of laser power at the beam injection into single-mode fibers are to be taken into account (see below INFN-MI).

JRA2.3.2 Overall Progress of Work Package 3

JRA2.4 Work Package 4: RF GUN and Beam Dynamics

JRA2.4.1 Description of the work

FZR

After the final test of the niobium cavity in the vertical test bench and the He tank welding, the assembly of the cryostat started in spring 2007. During the summer shutdown of ELBE in June and July 2007, the cryostat and the first part of the beam line were installed in the accelerator hall as it is shown in Figure JRA2.4.1. The cryostat was connected to the He supply line of the ELBE refrigerator and the first cool-down was performed at the beginning of August 2007. In the following weeks the RF system was put into operation. Tests and measurements with low-power and later with high-power RF were carried out. At the same time the 500 kHz UV laser system was delivered and tested by MBI, and the optical components of the laser beam line were installed and adjusted.

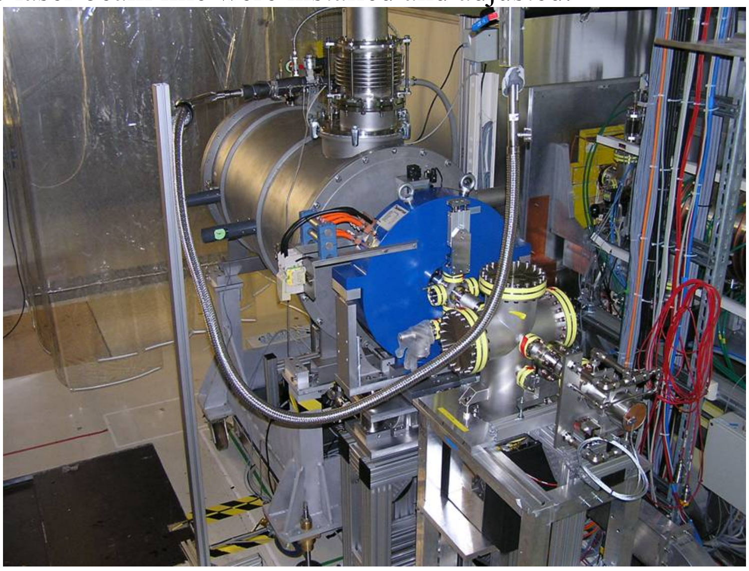


Figure JRA2.4.1: The SRF gun installed in the accelerator hall
with emittance compensation solenoid and laser input port.

The autumn shut-down of ELBE, in October 2007, was used to complete the installation of the diagnostics beam line. Designed and constructed by BESSY, this beam line is needed for the test, characterization and optimization of the SRF gun. Beside an emittance compensation solenoid downstream the gun and the beam optical components like quadrupoles and steerers, the beamline contains a diversity of diagnostics units as shown in Figure JRA2.4.2. A Faraday cup, integrated current transformers (ICT) and beam dumps allow beam current measurements. Energy and energy spread can be determined by means of a C bend magnet. The transverse emittance of the beam can be measured with a slit mask system (EMS) and for the determination of bunch length two methods will be applied: Cherenkov radiation measurement with the streak camera and electro-optical sampling.

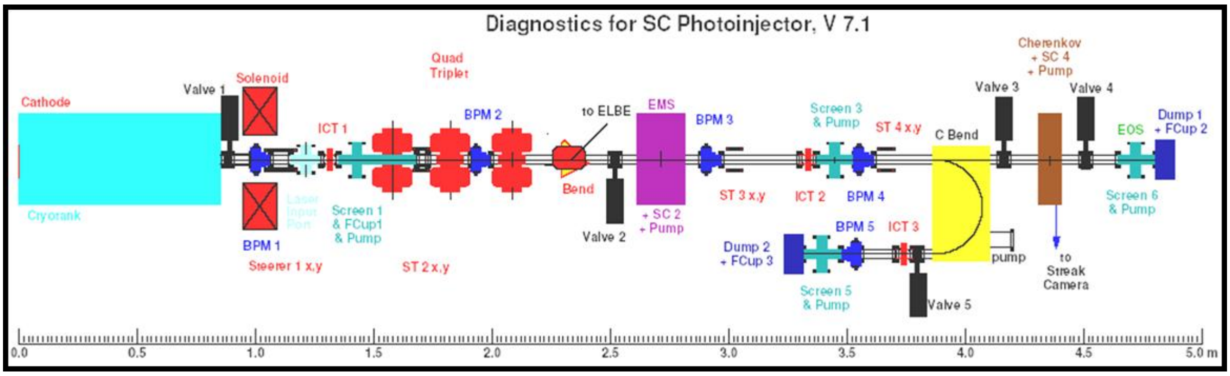


Figure JRA2.4.2: Diagnostics beamline installed at the SRF gun.

End of October, the gun was cooled down for the second time. After readjustment of the laser beamline, putting into operation the power RF, the vacuum system, screen stations and some other components of the diagnostics beamline, the first electron beam could be produced on November 12, 2007. Until end of 2007 the beam time was used for commissioning and test of further diagnostic components in the beam line and for a first characterization of the electron beam. The following measurements concerning the cryogenic, RF and beam properties of the SRF gun have been performed or started in 2007:

1. Static heat losses of the cryostat,
2. He pressure stability, He level control and interferences with the other cryostats,
3. Cool-down curve and temperatures in the cryostat, operation at 2 K,
4. Cavity frequency during cool down,
5. Pass band frequency and field distribution at 2 K,
6. Phase and amplitude stability of the low level RF system, microphonics,
7. Cavity performance (quality factor versus gradient)
8. He pressure sensitivity on the cavity tuning,
9. Lorentz force detuning,
10. UV laser power and spot size at the photo cathode (virtual cathode),
11. Photo current and quantum efficiency of the Cu photo cathode
12. Electron beam spot size,
13. Electron current and bunch charge,
14. Electron energy,
15. Laser phase scan (transmission and energy).

As an example Figure JRA2.4.3. shows cavity performance curve (quality factor versus acceleration gradient) of the 3½-cell cavity in the gun operated at 2 K. As earlier observed in the vertical tests, the gradient is limited by field emission starting at an acceleration gradient of about 5 MV/m which belongs to an peak field value of 14 MV/m in the cavity cells. The electron beam was generated from a Cu photo cathode with a laser power of about 0.4 W at a repetition rate of 100 kHz and an acceleration gradient of 5 MV/m in the gun cavity. The beam could be imaged onto the YAG screens in the diagnostics beamline. In this case the bunch charge was about 0.5 pC. Fig. JRA2.4.4.a shows a typical picture with beam on screen 1 and the solenoid switched off. On Fig. JRA2.4.4.b the beam is focused on screen 1 with the emittance compensation solenoid (31.5 A).

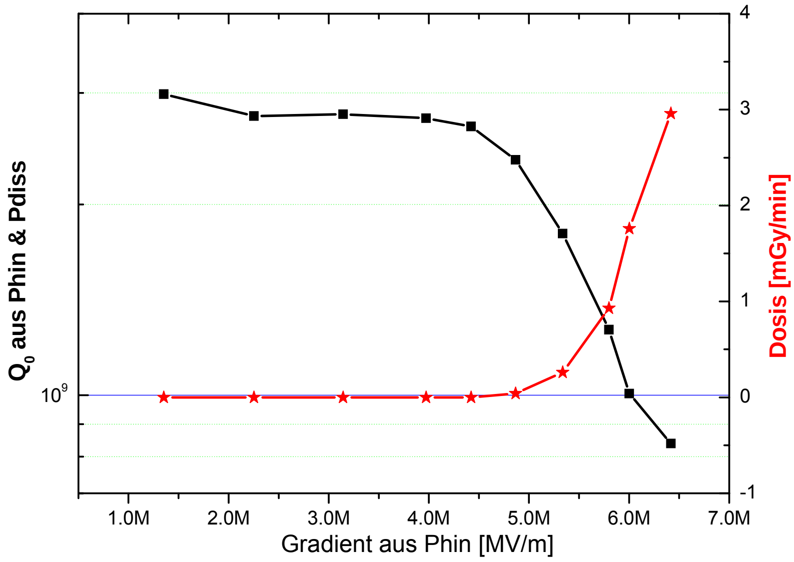


Figure JRA2.4.3: Quality factor Q_0 versus acceleration gradient and corresponding field emission dose.

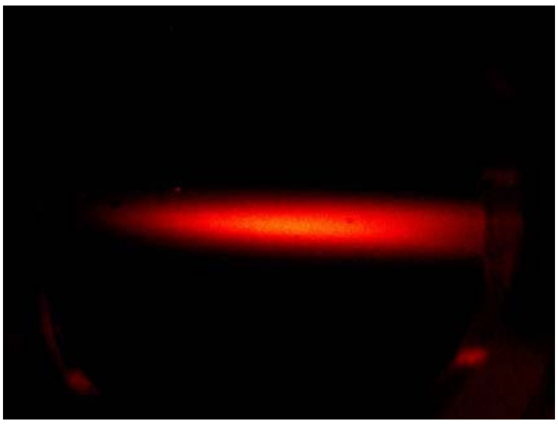


Figure JRA2.4.4a: Electron beam image on screen 1, solenoid switched off

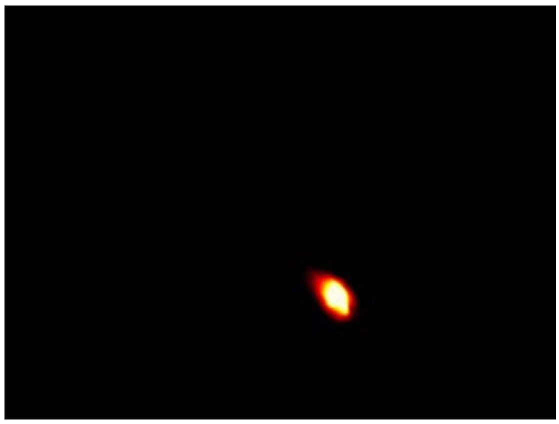


Figure JRA2.4.4b: Electron beam image on screen 1, focused with the solenoid (I = 31.5 A), spot size 1.0 mm x 1.2 m

LOA

A single shot compact electron spectrometer has been developed in order to measure the electron spectrum that will be produced in future laser plasma accelerator experiments. Electron beams produced in such accelerators have an energy distribution which is composed by a thermal distribution at low energy and by a quasi mono-energetic peak at high energy. For this purpose, this broadband spectrometer has been design in order to give access to the full electron energy distribution. It has been also tested at LOA. The B field distribution values have been found to be in very good agreements with the calculated one. The corresponding detailed report is on the CARE website as CARE report 07-034.

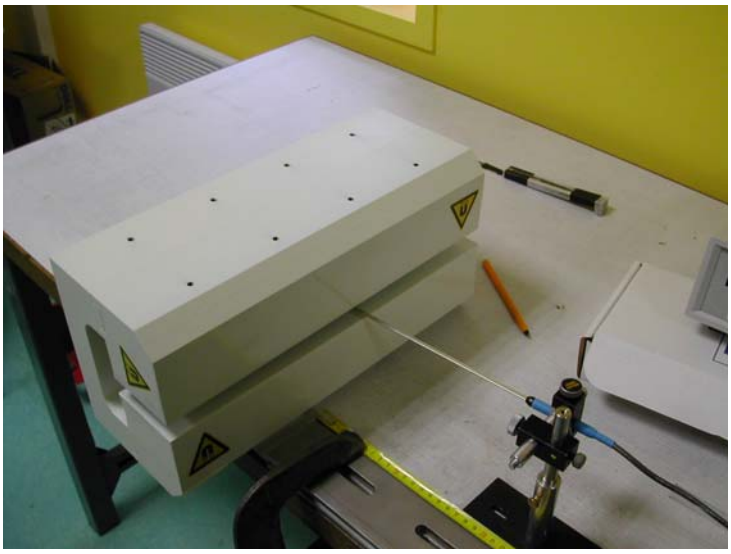


Figure JRA2.4.5: Experimental set up for the measurement of the magnetic field

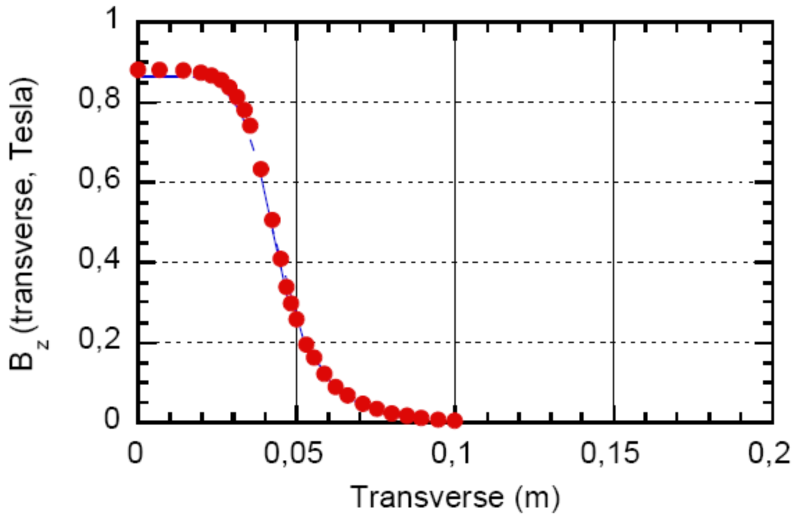


Figure JRA2.4.6: Experimental results (red dots) and simulation (blue line)

CERN

The installation of the PHIN photoinjector in CTF2 building for off-line commissioning has been completed (see Figure JRA2.4.7.). It remains to install the RF wave guides at 3 GHz.

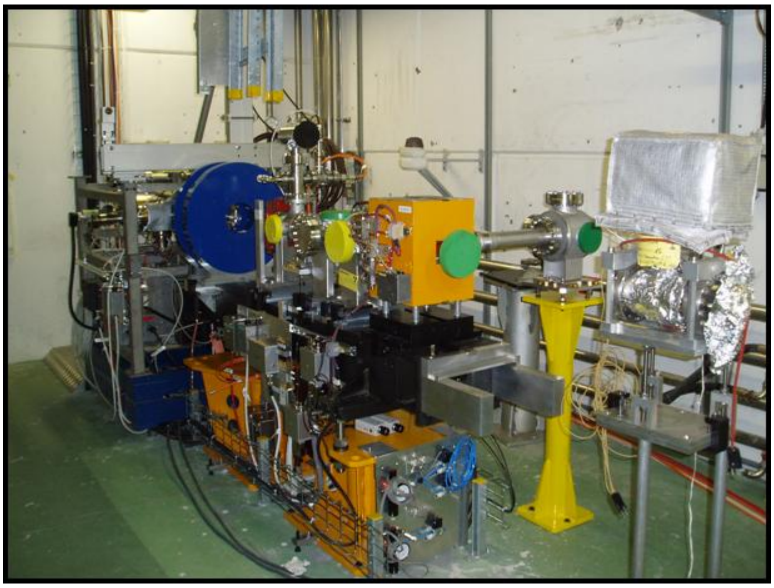


Figure JRA2.4.7: PHIN photo-injector line installed into the CTF2 building at CERN

LAL

The definitive model of the gun was matched according to the specifications the 18th of December 2006. But after a re-machining of the cells (to clean it), a black spot appeared on the surface of one cell. It was decided to send it to CERN for analyses.

For some time CERN put its veto on brazing since from the analysis of the surface of the RF cell, CERN metallurgists suspected that the copper used was not forged. The surface seemed to present in fact micro-porosity, which could lead to virtual leaks in operation, and also several inclusions. Therefore this cell was thrown away and replaced by its twin which was part of the second identical RF gun aimed to be installed in the NEPAL station.

All pieces were sent to CERN the 8th of February 2007. The brazing of the tapered waveguides was done the 20th of April 2007 and LAL received it one month later. Then the waveguides have been machined to adapt LIL (LEP Injector Linac) flanges and sent to CERN in June. So the complete RF gun should have been brazed and available at LAL in September. But due to LHC constraints, the CERN brazing workshop was very busy; hence the brazing of the PHIN gun was delayed until the end of the year (see Figure JRA2.4.8.).

In January 2008 vacuum tests have been performed and big leaks were found in the cooling circuit. The CERN brazing workshop will try to fix the problem. If it is successful the gun will then return to LAL for final measurements, tuning and welding of the NEG pumping chamber. LAL foresees to deliver the RF Gun for PHIN in April 2008.

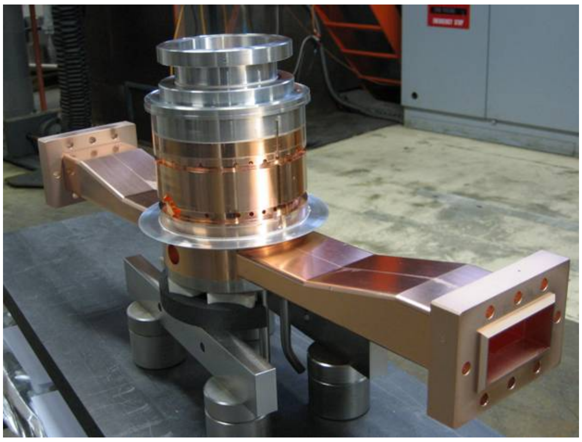


Figure JRA2.4.8: PHIN RF gun after brazing

Nepal station

In 2007, civil engineering required for the upgrade of the shielding has been finished in October. Yet, we have been prevented to install because of legal obligation to first remove asbestos. Most of the heavy and bulky elements as the bench supports will be installed as soon as the Nepal room entrance reconstruction will be achieved (foreseen during the first week of February 2008).In spite of this difficulty, the main electric switch board is ready. After a first examination of our preliminary radiation safety document by the French Nuclear Authority Agency (ASN) in October 2007, we have transmitted to them the full corrected document in January 2008.

A drawing of the accelerator is shown in Figure JRA2.4.9. Lot of components are already available: girder, modulator, klystron, solenoids with its power supply, steerer and dipole. The RF network is designed and foreseen to be provided by the tender in June 2008. The RF gun which is a copy of the one done for CERN and should have been brazed at CERN is finally brazed at LAL. It should be finished in mid-March.

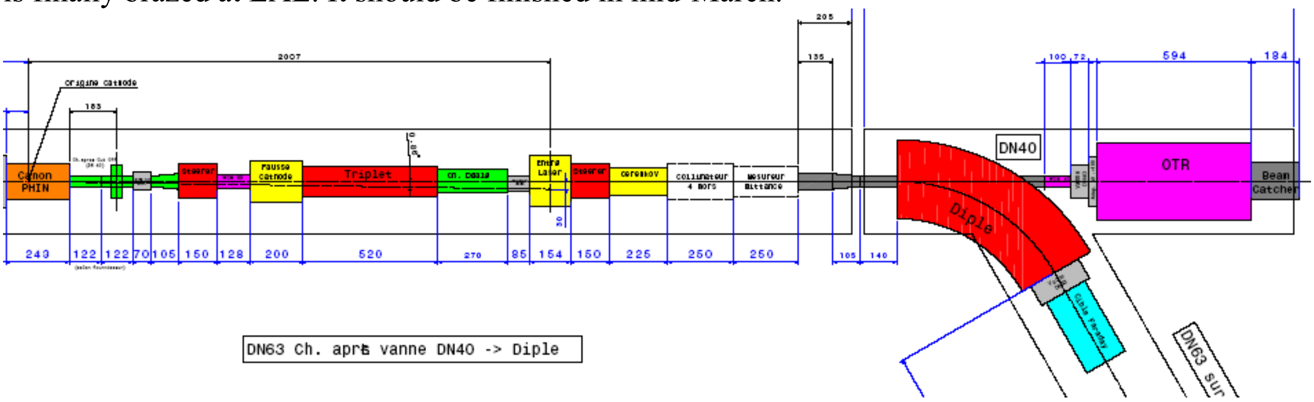


Figure JRA2.4.9: Layout of the NEPAL beam line.

Because of a lack of funds some components are delayed as a booster to rise the beam energy up to 10 MeV and the device for emittance measurements.

Simulations of the beam dynamics of this new version of the accelerator have been performed with PARMELA. Results are shown in Figure JRA2.4.10. With charge below 2 nC, beam can be transported without losses in the deviated beam line.

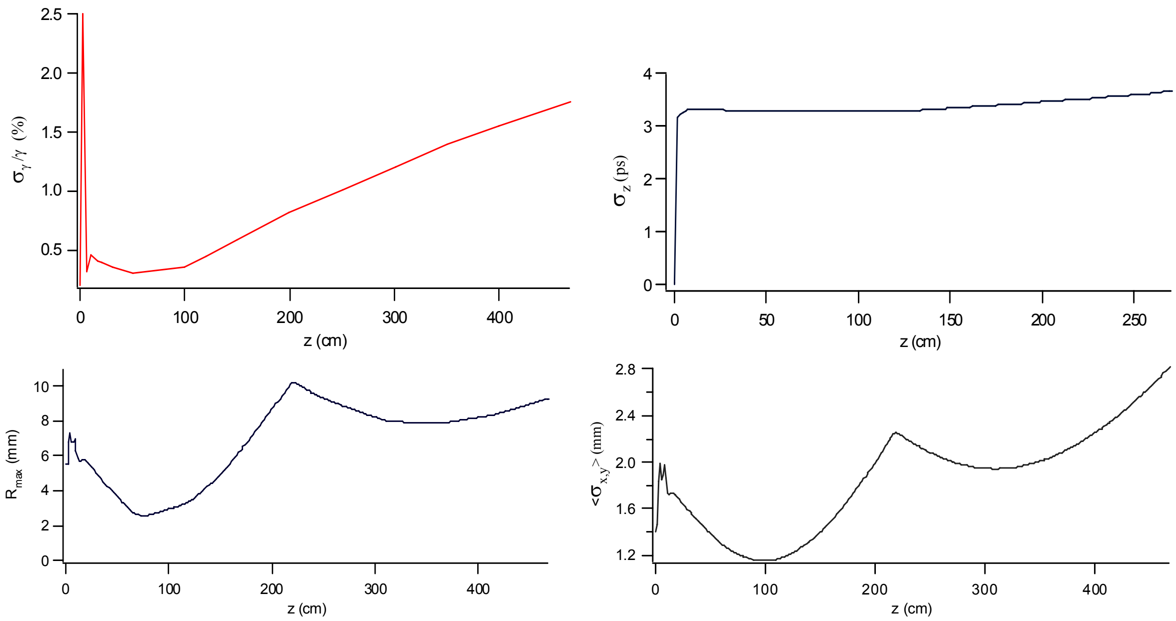


Figure JRA2.4.10: results of beam dynamics simulations with the PHIN gun, solenoids on the gun and another one at z = 210 cm, Q = 1 nC. Left up corner, rms energy spread; right up corner, rms bunch length; left bottom, maximum radius of the beam; right bottom, rms size of the beam.

JRA2.4 Significant Achievements

1) Production of photocathodes Cs_2Te with a Quantum Efficiency (QE) of 7 % has been measured at CERN on a photocathode (number 167), produced in the preparation chamber with a DC gun and a life time test up to 1000 hours (QE of 3 % is specified for CTF3 operation)

2) A Stylus profiler has been installed in the laboratory to measure the thickness of the coatings, to obtain a precise calibration of the thickness deposited during the process. This is particularly important to improve the possibility to assess the stoichiometric ratio of the Cs-Te film.

3) Development of compact single shot electron spectrometers in order to optimise the coupling of the laser beam into the electron beam and especially to control the electron distribution energy. Specific feature of the interaction understood for demonstration of new scheme of injection (bubble and colliding).

4) Construction of the photocathode preparation system at the FZD and development of the preparation technology for Cs_2Te photo cathodes finished.

5) First beam produced in November 2007 in ELBE.

6) Implementation of an interferometric ellipsometer for studying the formation of the layers during the growth of the photocathodes at TEU.

7) The rise time obtained for the Dazzler pulse shaper at INFN is about 2.6 ps and the oscillation on the plateau is limited to the 30 % ptp. The oscillation takes into account also the shot-to-shot instability of 5 % rms

8) A rise time of about ~1.4 ps for the SLM pulse shaper obtained at INFN.

9) Principle of phase-coding for CTF3 demonstrated at INFN-Milano.

1.4.3 JRA3: High Intensity Proton Pulsed Injector (HIPPI)

The list of participants and their implication in the HIPPI Work Packages (**C**: Coordination, X: Participation) is given in the table below. The overall management is done by CERN.

Number	Participant	WP1 M&C	WP2 NC	WP3 SC	WP4 CHOP	WP5 BD	Person- months
1	**CEA**	X	X	**C**	X	X	100,05
3	**CNRS**	X	**C**	X	X	X	13,47
	CNRS-IPNO			X			
	CNRS-LPSC	X	**C**	X	X	X	
4	**GSI**	X				**C**	14,6
5	**IAP-FU**		X	X		X	28
7	**FZJ**			X		X	7,65
10	**INFN**			X		X	9(0)
	INFN-Mi			X		X	
17	**CERN**	**C**	X		**C**	X	170,04(33)
20	**CCLRC/STFC**		X		X	X	31,6
	RAL		X		X	X	

1 MANAGEMENT ACTIVITY

In 2007 the main management activities went into controlling the important flow of deliverables, nine foreseen in 2007 plus some deliverables delayed from 2006.

Respecting the deadlines for deliverables has required a constant follow-up: first of all it was important to verify that the scientific objectives had been achieved, and then remained to agree with the Laboratories involved the exact format and content of the supporting document. Unfortunately the large workload in most of the HIPPI Laboratories caused some delays in the preparation of the documents, but with constant pressure and support from the Management most of the final documents have been provided.

In same cases, a more direct intervention was required, in case some of the objectives of the deliverable could not be achieved because of external constraints. This is the case for example of the tests of the chopper line (Work Package 4) foreseen at CERN using the proton beam provided by the IPHI RFQ. The IPHI project is late by almost two years, and very likely the RFQ will not be ready before the end of the JRA. Together with the people involved in this deliverables, the HIPPI Management has explored different alternatives for these beam tests, consulting as well the External Scientific Advisory Committee (ESAC). The conclusion is that no other suitable test beams are available in Europe for these tests; nevertheless it appeared that many important questions can be addressed even without a beam test. The common conclusion, supported by the CARE management, is that a series of tests without beam, more extensive than what originally foreseen in the HIPPI planning, will constitute the chopper line deliverable.

Communication (by e-mail) with the ESAC members continued during the year, between the Annual Meetings, and allowed to follow-up some interventions suggested by the ESAC, as the test of the interference (electromagnetic compatibility) between the chopper pulser and the bunch shape and halo monitor, the design of a new DTL prototype and the repair of the CCDTL prototype.

One of the main management activities was the preparation of the Annual Meeting, which took place at the Institut de Physique Nucléaire of Orsay (Paris region), from September 26th to September 28th. It was decided to hold the next and last HIPPI Annual Meeting at CERN, from October 22nd to 24th, 2008.

JRA3.1 Work Package 1: Management and Communication

The main Management activities in 2007 have been:

- the follow-up of implementing the recommendations from the ESAC reviewers,
- the preparation of Work Package meetings and of the HIPPI Annual Meeting, including contacts with the local organisers and the preparation of the scientific programme, implementing the recommendations from the ESAC reviewers,
- the follow-up of the HIPPI milestones and deliverables: contacting the responsible persons for the different deliverables, keep track of the delays, and when the deliverable is achieved be sure that the proper supporting document is prepared and submitted required a constant care from the Coordinators.

Main management problems addressed in 2007 were:

a. the follow-up of planning problems arising from delays in the supply of components from Institutes outside HIPPI. The first problem concerns a DTL prototype tank that was intended to be built by a Russian collaboration (ITEP and VNIIEF) and delivered to CERN. The power coupler for this prototype has been designed and built inside HIPPI (mentioned as "critical DTL component" in the planning) and was intended to be tested at high power with the Russian prototype, which was scheduled to be finished in February 2007. In a meeting at Moscow in February, it was announced that the prototype is late by more than a year, and that because of lack of funding it will not be equipped for high-power testing. The consequence is that the coupler will be at the moment tested only at low power, while we are looking for an alternative installation where this coupler could be tested.

b. The reorientation of the RAL contribution to WP5; the original contribution of RAL to WP5 activity was the development of a 3D space charge routine to be used by different beam dynamics simulation codes. However, this requires a highly specialised contribution, and RAL could not recruit a suitable expert (at the level of PhD student or Postdoc) for this work. However, in the meantime the different space charge routines already implemented in the beam dynamics codes showed their quality, and it was felt by the community that the development of a new space charge routine was not an urgent priority. In consequence, it has been decided together with the HIPPI representative at RAL to redirect the RAL contribution to WP5 towards beam diagnostics, considered a high priority subject. From the beginning of 2007, the RAL progress in the development of beam diagnostics devices has been included in HIPPI and reported at our meetings.

The analysis of the consequences of the delay in the IPHI RFQ on the measurement programme of WP4; the RFQ being built by the French IPHI project, which was intended to be installed at CERN at end 2007 and provide the necessary 3 MeV H- beam needed to test the CERN chopper developed in WP4, is late by more than one year. It must be stressed that this RFQ is outside of HIPPI, and that the HIPPI management has no way to influence this project. In the most optimistic scenario, it would be installed at Saclay at beginning 2009 and at CERN at end 2009, well after the end of HIPPI. A series of alternatives for testing the chopper were considered, however the only one looking promising being a test on Orsay tandem beam at 3 MeV. This option was debated with the ESAC at the Annual Meeting, and the conclusion of the ESAC is that the benefit of such a test with a low-intensity beam much different from the RFQ one are too small to justify the large investment in budget and manpower required to move all the accelerating system to Orsay. Other alternatives for the testing are being investigated, but it looks that if the RFQ will be late, the CERN chopper will have to be tested only without beam

JRA3.1.1 Overall progress of activities

JRA3.1.2 External Scientific Advisory Committee

JRA3.1.2.1. Composition

The ESAC has the following members, since the beginning of the HIPPI Activity:

- Andrea Pisent INFN Legnaro (Italy)
- James E. Stovall now retired; previously SNS and LANL (USA)
- Yoshiharu Yamazaki J-PARC Tokai (Japan)

JRA3.1.2.2. Report of the ESAC

A web site with all the slides of the presentations at HIPPI07 was made available to the members of the ESAC committee one week before the meeting.

Preliminary recommendations from the ESAC were presented during the last session of HIPPI07 and the final ESAC report was delivered on 15 November 2007. Unfortunately this year the date of the CARE Meeting was advanced to end-October, and it was not possible to have the ESAC report in time to be discussed at the HIPPI Steering Committee Meeting during CARE07.

Among the items to be improved, the ESAC suggests to continue the effort on comparing accelerating structures, both normal and superconducting, and to investigate on some specific technical points, which could be problematic at the moment when the prototypes under construction will be ready.

JRA3.1.3 List of talks

Some talks relevant to HIPPI were presented during 2007. The list is given in Table 2.1.

Table 2.1: List of talks presented by the JRA

M. Vretenar	Proton intensity upgrades at CERN (LINAC4, SPL)	APAC2007	http://apac07.cat.ernet.in
I. Hofmann (GSI)	Space charge studies in the CARE-HIPPI project	Joint DESY and University of Hamburg Accelerator Physics Seminar	http://www-mpy.desy.de/AccPhySemDESY/index.html
R. Garoby	Status of the SPL at CERN	ICANS-XVIII	http://www.icans-xviii.ac.cn/
M. Vretenar	Linac4, a new linear accelerator for the CERN complex	CERN, AB Seminar	http://ab-seminar.web.cern.ch/AB-seminar/ABsem_talks.html

JRA3.1.4 List of papers

In 2007, HIPPI has produced 3 conference papers, 1 journal publication, 5 notes, 2 Quarterly Reports and 7 CARE Reports in support of corresponding deliverables. They are listed in Table 2.2.

HIPPI papers are available on the CARE Web Site, except HIPPI Documents that are available on the HIPPI Web site.

JRA3.1.5 Web site

The HIPPI web site (**http://mgt-hippi.web.cern.ch/mgt-hippi/**) is the site where all the HIPPI news is published. It contains link to the working package pages, to the annual HIPPI meetings and presentations, to the job openings and the list of publications. It is maintained by CERN staff.

Work Package coordinators and the Laboratory link-persons contribute to keep the information up to date.

ADDITIONAL STAFF HIRING

GSI has been successful to replace Dr. W. Bayer by another post-doc, P. Clemente, effective from July 2007.

Table 3: Temporary staff hiring

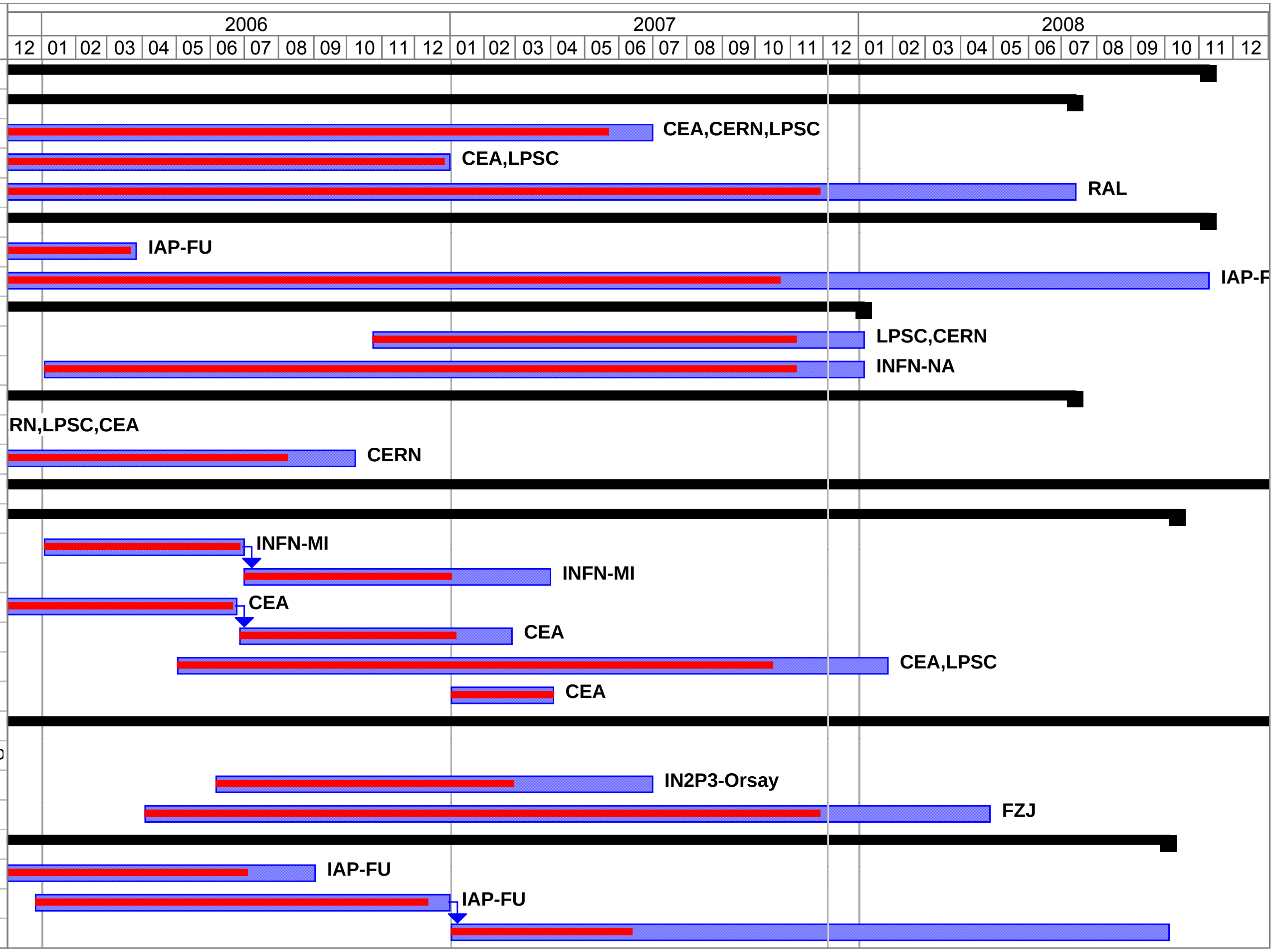
#	Lab	Job Type	Duration	Work subject	Status
1	GSI	Post-doc	18 months	Beam dynamics (replacement)	Hired , effective july07

STATUS OF THE WORK

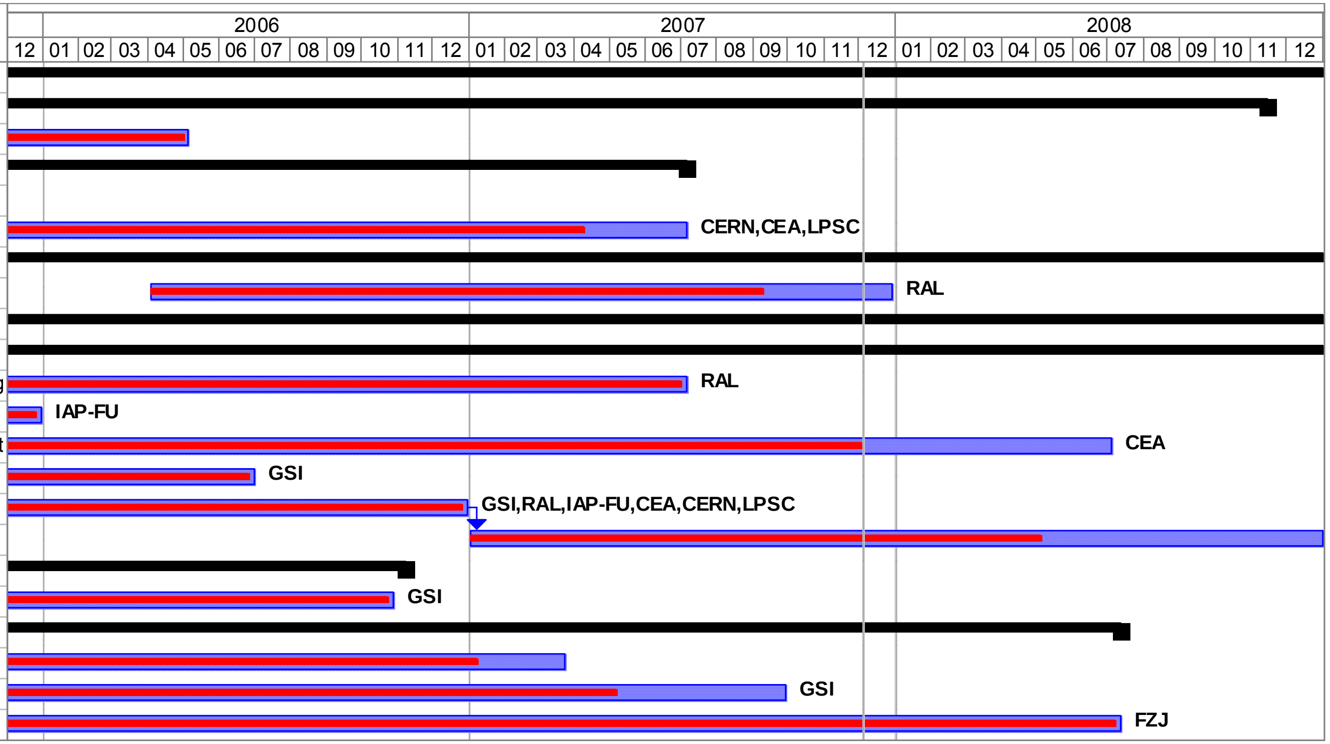
The detailed HIPPI planning for 2007, corresponding to the general planning presented in the Technical Annex, is presented in Table 4. The task numbers are those used in the Section Description of work. Progress bars indicate the progress in each task at end November 2007. The resources used by the participants during the year 2007 are summarised in Table 5.

Table 4: HIPPI detailed planning (active tasks with progress bars) for 2006-08.

ID	Task Name
1	**WP2: NORMAL CONDUCTING STRUCTURES**
2	**2.1 Drift Tube Linac**
3	2.1.1 DTL design
6	2.1.5 DTL coupler prototype construction and testing
7	2.1.4 DTL beam dynamics design
8	**2.2 H-mode Drift Tube Linac**
13	2.2.5 CH model cavity tests
15	2.2.7 CH-prototype construction, tests
17	**2.3 Side Coupled Linac**
21	2.3.4 RF model testing
22	2.3.5 SCL module design
23	**2.4 Cell Coupled Drift Tube Linac**
25	2.4.2 Pre-prototype high-power RF tests
27	2.4.4 Revision of design after prototype testing
29	**WP3: SUPERCONDUCTING STRUCTURES**
30	**3.1 ELLIPTICAL CAVITIES**
34	3.1.4 Tuner construction
35	3.1.13 Cavity A assembly with tuner
37	3.1.6 Construction cavity B
38	3.1.13 Preparation, vert. test & welding cavity B
40	3.1.9 RF couplers construction & preparation
43	3.1.11 RF source testing
45	**3.2 SPOKE CAVITIES**
47	3.2.2 Evaluation of 760 MHz resonator in vertical cryo
51	3.2.9 Test of coupler prototype
55	3.2.10 Manufacturing of 352MHz multi-gap prototype
57	**3.3 CH RESONATOR**
58	3.3.1 Design of tuning system
59	3.3.2 Construction of CH tuning system
60	3.3.3 Measurement of tuning system



ID	Task Name
61	**WP4: CHOPPING**
62	**4.1 CHOPPER STRUCTURE A**
65	4.1.3 Driver construction, testing
70	**4.2 CHOPPER LINE**
72	4.2.2 Dump construction
73	4.2.3 Beam line assembling
74	**4.3 CHOPPER STRUCTURE B**
77	4.3.3 Prototype construction
79	**WP5: BEAM DYNAMICS**
80	**5.1 Code development**
81	5.1.1 3D space charge routines development, testing
82	5.1.2 LORASR development
83	5.1.3 Neutralization and ECR source modelization st
84	5.1.4 Improvement, modelling high current
87	5.1.7 Code comparison and benchmarking
88	5.1.8 Code benchmarking with experiment
89	**5.2 Experiment at UNILAC**
90	5.2.1 Preparation, simulations
93	**5.3 Diagnostics and collimation**
99	5.3.9 Test and improvement of halo monitor
100	5.3.6 On-line transmission control
101	5.3.7 Beam profile monitor design



JRA3.2 Work Package 2: Normal Conducting Accelerating Structures

JRA3.2.1 Drift Tube Linac (DTL)

JRA3.2.1.1 Activities at Rutherford Laboratory (RAL) (WBS 2.1.4)

At Rutherford Appleton Laboratory progress has been made in defining and analyzing the RF design options of a future 180 MeV H^- linac that is being considered as a possible replacement for the aging current 70 MeV ISIS injector, and the same linac has also been included in designs for the proton driver for a possible UK Neutrino Factory. For the DTL part (3-90 MeV) of the new linac, the RF properties are being studied using Superfish (Gen_DTL) and at the same time a beam dynamics design is currently in progress using TraceWin. It is expected to present a comprehensive set of results in 2008.

Buncher cavities for the FETS (Front End Test Stand) project: All the problems with a 2D cylindrical symmetry have been studied by using SuperFish and the RF properties of the buncher cavities have been calculated. Estimated the frequency shifts due to mechanical errors have been estimated, numerically but also analytically. A 3D model using MicroWave Studio has been created to study the problems that lack cylindrical symmetry: tuning range, dissipated power distribution, the effects of ancillary equipment, etc. The design at the stage where mechanical drawings can be made and the possibility of building a cold model can be taken into account.

Hybrid quadrupoles for the FETS project: A private contractor is manufacturing various designs for the printed circuit EM quadrupoles. A series of magnetic measurements will be performed at Daresbury Laboratory in the second half of May in collaboration with the ASTeC Magnetics and Radiation Sources Group.

Beam dynamics studies and simulations: An important part of the work done at RAL was concentrated on the beam dynamics for the RAL Front End Test Stand. A code comparison between GPT and TraceWin/Partran is in progress to evaluate the accuracy and the limits of the results obtained so far with GPT for the FETS Medium Energy Transport Line (MEBT). TraceWin/Partran was used to calculate the beam dynamics in the compact RAL Scheme C that uses hybrid quadrupoles placed inside the nose cones of the re-bunching cavities. We have also performed a simulation study of high intensity beam dynamics and beam transport together with CERN when the RAL and CERN MEBT designs are each fed into the same CERN structure for LINAC4. Particular advantages and disadvantages of both structures have been observed.

JRA3.2.1.2 DTL general design at CERN, LPSC, CEA (WBS 2.1.1 to 2.1.4)

CERN has reviewed the general drift tube linac (DTL) design of 2005 that was based on the following parameters: A klystron output power at the DTL feed of 800 kW, acceleration from 3-40 MeV over 3 tanks powered by 5 reused LEP klystrons, constant accelerating field of 3.3 MV/m in tank 1 and 3.5 MV/m in tank 2 & 3, a peak electric field of 1.7 Kilpatrick.

Some new developments and ideas led to changes in overall DTL design parameters: i) the LEP klystron output power in pulsed mode was re-evaluated and it was decided to base the design on its capability to deliver 1 MW at cavity entrance; ii) the effective shunt impedances Z_STT of the DTL, higher than that of the CCDTL, leads to advantages in extending the DTL to higher beam power; and iii) the peak electric surface fields were reconsidered as some DTL structures suffer from breakdown problems in the first few accelerating cells.

With the new klystron output power value of 1 MW and by reducing the accelerating field in all tanks to 3.2 MV/m, it was found that a beam output power of 50 MeV can be reached extending the length of the DTL tanks by 14%. Seen in the broader context of the full Linac4 accelerator, this modification was found advantageous as it can virtually save one klystron and thereby also reduce the operating cost.

Following a presentation by A. Bross on a study of Fermilab for the Muon Ion Cooling Experiment (MICE) collaboration meeting 17, the influence of magnetic fields on peak surface field was reconsidered. A surface magnetic field of about 0.5 T reduces the acceptable peak electric field by about 30%. The peak fields were therefore adjusted by opening the DTL gap distances of the first cells. The modifications result in a loss of beam energy of only 1% in the DTL cavity. The new design was analysed by beam dynamics calculations and found acceptable.

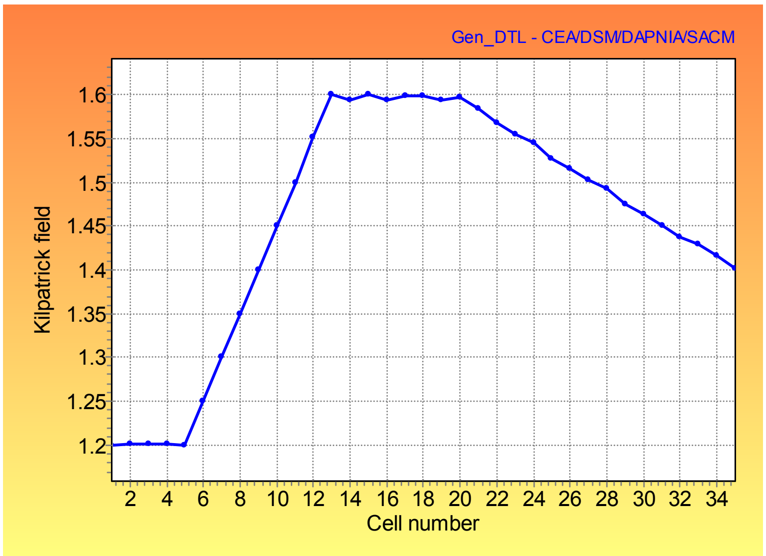
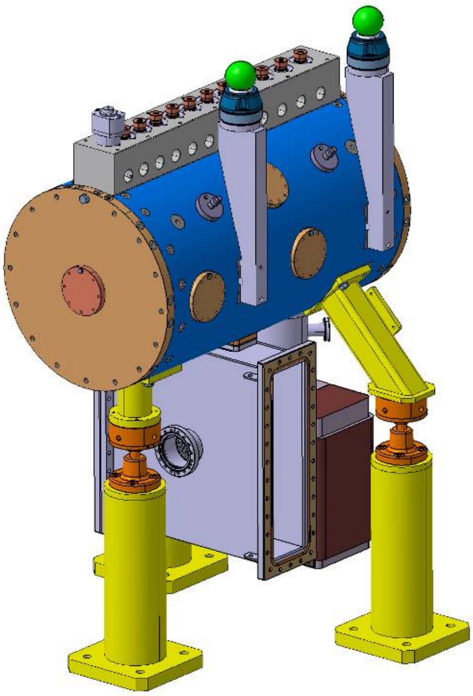


Figure JRA3.2.1.: The peak electric field in the first cells was reduced to avoid breakdown.

Following the recommendations of the HIPPI ESAC committee in 2006, a new short prototype was designed. In particular, new cavity structure and the interface to drift tubes were studied and implemented on the prototype. The new design uses a rigid steel tank of 50 mm thickness, a separate aluminium girder of steel ring inserts and relies on a new assembly strategy. In traditional designs the drift tubes are first mounted in the cavity and only thereafter adjusted to their final position. The new design foresees an adjustment of the drift tubes by machining, and after the final assembly no further adjustment shall be required. The construction of the new prototype will be financed by INFN Legnaro; the prototype will be built in Italy.



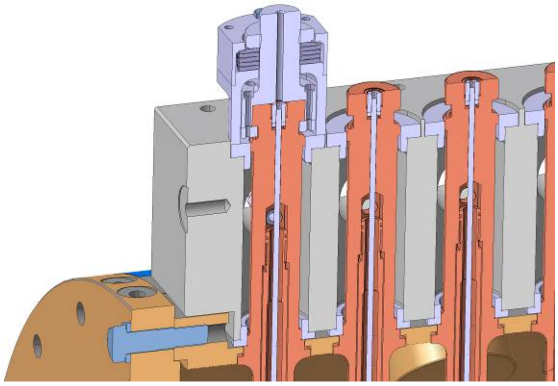


Figure JRA3.2.2.: The new prototype design and the drift tube cavity interface.

The drift tube design for this new prototype was taken from the prototype study of the ISTC project 2888. A first drift tube has been delivered to CERN and tested for vacuum tightness, flow, pressure capability, magnetic field, and dimensionally checked. A test of the laser weld is presently in progress.

JRA3.2.1.3 DTL and coupling port design at CEA Saclay and LPSC (part of WBS 2.1.3)

The 1 MW coupling port has been built by LPSC and delivered to CERN, where it is being tested.

Figure JRA3.2.3.: Side view of the coupling port and of the its cooling system. The lateral flange (on the right) is the coupling window to the DTL tank.

Figure JRA3.2.4.: View of the water-cooled coupling window

Figure JRA3.2.5.: View of the two short-circuit wave guide terminations. They will be used to know the optimal position of the short circuit.

JRA3.2.2: H-mode DTL (IAP Frankfurt)

JRA3.2.2.1 RF cold model design & construction (WBS 2.2.2)

The "cold" model has been completed, and an intensive RF investigation was performed showing an excellent agreement within the simulation and the experiments: in particular, after solving some minor problem with the ceiling the measured Q_0 was 13000, around 95 % of the predicted value of Microwave Studio. Since this model was equipped with a complete cooling system it was decided to test the cavity with a 2 kW cw amplifier available at IAP, going in this way much further the original aim of this model which was originally conceived only to test the fabrication steps and the feasibility of the copper plating process.

JRA3.2.2.2 RF model construction)

The following step was the fabrication of the scaled model (1:2) of the second resonator of the GSI proton injector. The construction has been completed and the model is assembled. The resonator consists in two CH modules coupled by an intertank section which hosts the magnetic lens needed for beam focusing. The outer cylinder is in aluminium while the stems and the lenses are in bulk brass: a special shape of the stems has been designed in order to ensure a safe RF contact with the outer cylinder.

The total number of gaps is 27, 13 in the first tank and 14 in the second one. Four mobile plungers in the first resonator and six in the second will be used to flat the field distribution along the cavity; another plunger is located in the coupling cell. Moreover, all drift tubes are screwed in the stems and can be replaced in order to reach the desired voltage distribution.

Preliminary RF measurements have been performed showing a good agreement between the simulated frequency and the measured one: in particular, the first parasite mode occurs 5 MHz from the operating mode which gives a safety margin against a potential overlapping during operation.

The construction of the full scale prototype has been approved by GSI and will start soon.

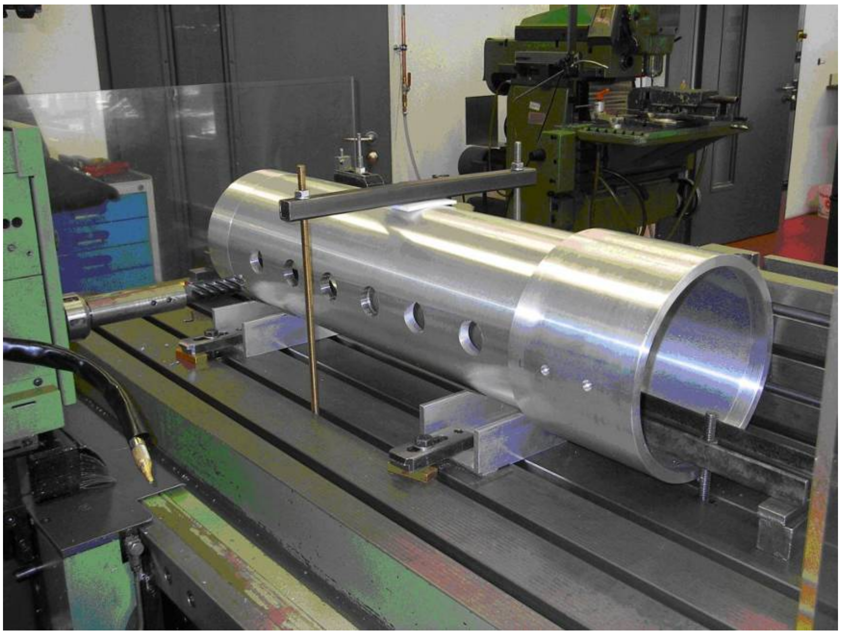


Figure JRA3.2.6.: The first tank and the coupling cell during fabrication

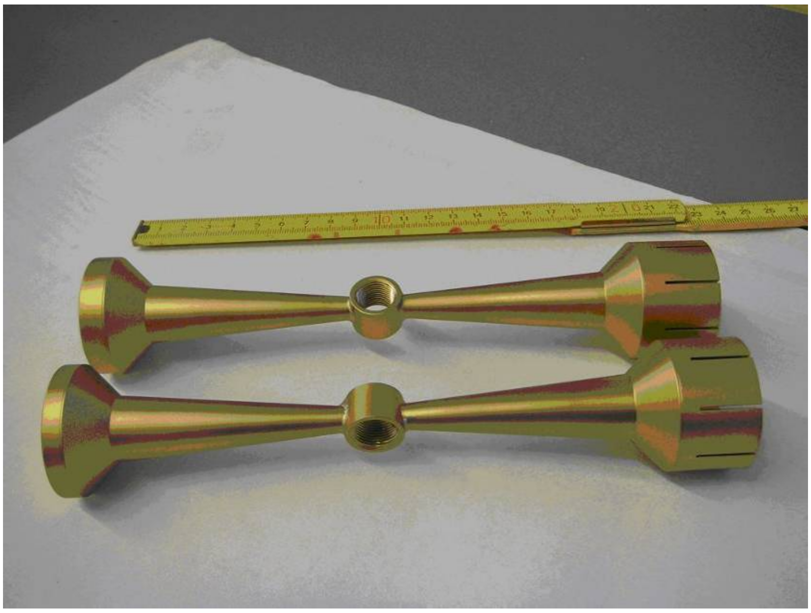


Figure JRA3.2.7.: A detail of the stems: drift tubes will be screwed and, if necessary, can be replaced to change the voltage distribution along the cavity.

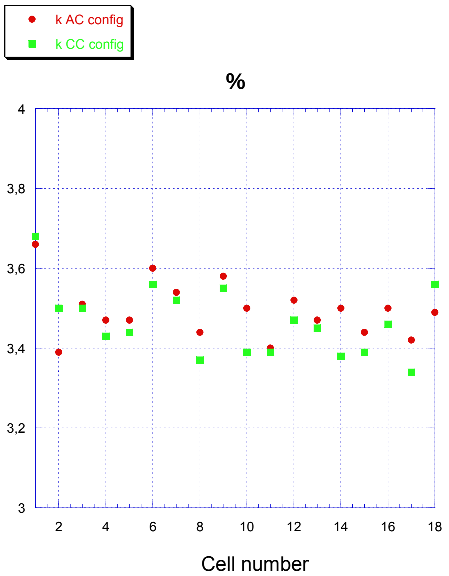
JRA3.2.3 Side Coupled Linac (LPSC and CERN) (WBS 2.3.1 and 2.3.2)

The cavity prototype has been manufactured at LPSC and is now under test. It consists of 20 plates made of a half accelerating cell and a half coupling cell. The prototype is at the 0.7 scale, so the expected resonant frequency is 1005.7 MHz (instead of 704 MHz). The individual frequency of each cell has been measured by two methods:

- direct frequency measurement, after assembling one of the cells, the half end-cells being short circuited (total one full cell + 2 half cells). This method shows that the accelerating cells frequencies are in the 1004-1009 MHz range, while the coupling cells are in the 996-1000 MHz. This shows that the accelerating cell design is acceptable but not the coupling cell design.
- assembling two successive full cells, also with short-circuiting the half end-cells (total two full cell + 2 half cells), and calculating the individual frequencies and the coupling from the coupled frequencies. The first comparisons between the 2 methods give a good agreement. The k value is around 3%, which is the expected value.

The next step was the machining of the tuning rings (accelerating cells) and of the gap (coupling cells). The 20 cells have been tuned by machining the tuning rings (accelerating cells) and the cell gap (coupling cells). Nevertheless, the most accurate way for coupling cell tuning is the use of a movable tuner. The use of a tuning ring is mandatory to achieve the frequency requirements: a direct machining requires too strong tolerances and cannot be a solution. The drawback is the very long time needed for this step by step additional machining. The final frequencies are given on figure 4.2.5, as well as the coupling factors. A dispersion can be noticed on these values, due to the shape of the coupling hole.

Figure JRA3.2.8.: View of the SCL prototype (4/5 of the cells are assembled)



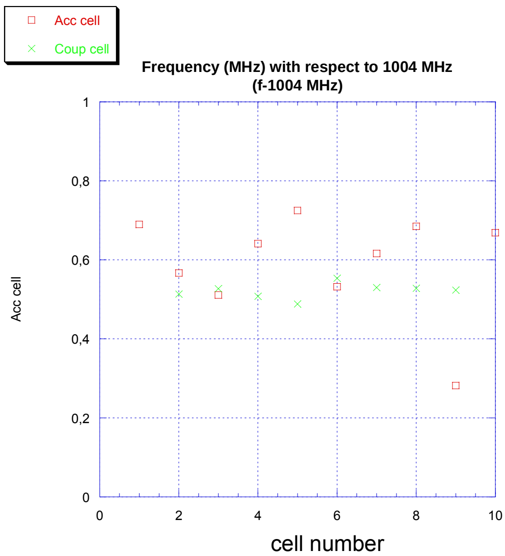


Figure JRA3.2.9.: Cell parameters after tuning. Left: coupling factors (goal value: 3%) for 2 kinds of measurements (red and green). Right: Resonance frequencies (with respect to 1004 MHz). The red points are for the accelerating cells, the green for the coupling cells.

A first assembly made of 7 cells (4 accelerating, 3 coupling) has been done for checking frequencies and first field homogeneity measurement (figure JRA3.2.10).

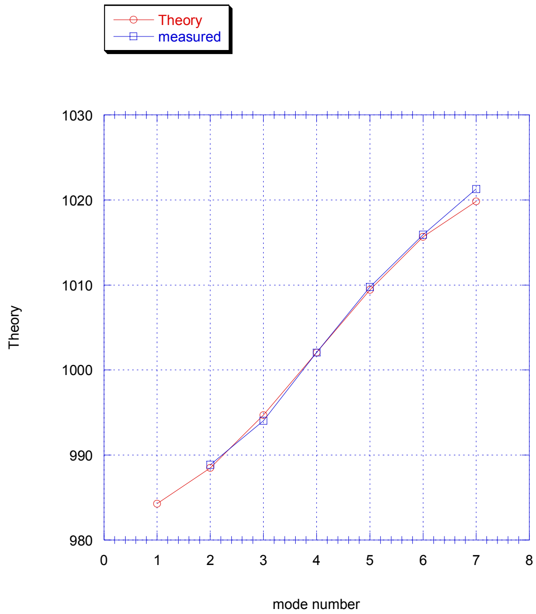


Figure JRA3.2.10.: Seven cell assembly (left) and mode frequency versus mode number (right). The blue curve is the measured values. The red one corresponds to the theoretical values. The difference between the two curves is less than 1 MHz.

In parallel, a tuning procedure is proposed and will be tested on the prototype. It is based on the expansion of the accelerating mode (pseudo π/2 mode) over the eigenmodes of an ideal structure. A correction scheme can be found, by acting on the accelerating cells only, in order to get the right accelerating frequency and good field homogeneity (goal 1%). It has to be checked and probably improved.

JRA3.2.4 Cell Coupled DTL (CERN) (WBS 2.4.1 to 2.4.3)

During the high power test of the CERN pre-prototype in November 2006 it was found that a cooling circuit inside a drift tube was obstructed, limiting the duty cycle achievable during the tests. At the end of the tests, the end plates and the faulty drift tube were dismounted. Following the ESAC recommendations, it was decided to perform a new complete copper plating of the covers in order to improve the Q-value and to investigate the effect on the Q-value of the grooves that were not plated in the first configuration. In parallel, the drift tube was sent to the CERN workshop for repair. The installation of the repaired drift tubes was completed at the end of June. The newly copper plated end covers were installed in a first time with the old Helicoflex joints, but vacuum leaks were found, forcing to use a new set of Helicoflex joints that was ordered and installed. The cavity was then retuned and new low level measurements were started. The results of low power RF measurements are listed in the table below:

Frequency 0-mode	350.8185	MHz
Frequency π/2- mode	352.3547	MHz
Frequency π-mode	353.8653	MHz
Coupling β	0.86	%
Q_0	27281	#

The new measured Q_0 value is 14% higher than the old Q_0 before replating the grooves, confirming that the non copper plated region of the joint groove was the cause of the low Q of the cavity.

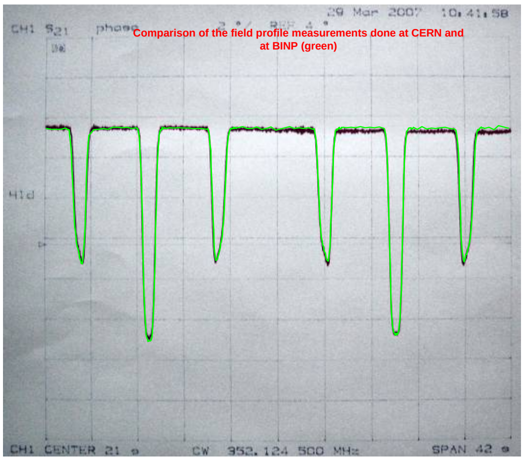
High power measurements have been completed. The cavity was easily re-conditioned and more than 290 kW were measured at the cavity pickups. Nominal power is 246 kW, for 1.1 MV effective voltage in each of the half accelerating cells. This power level was reached for both 0.1% and 5% duty cycles (respectively Linac4 and SPL operating duty cycle).

On February 6th was delivered to CERN the CCDTL prototype, which was built in Russia with the collaboration of the RFNC-VNIITF institute in Snezinsk and the BINP institute in Novosibirsk. The prototype consists in two full accelerating structures of DTL type, each equipped with two drift tubes. An off-axis coupling cell connects the two accelerating structures, so to allow the insertion of a magnetic quadrupole. Fig. 2 shows the CCDTL prototype in the assembly area, on its support frame and connected to the waveguide.
After installing the waveguide T-section, and pulling out the coupling cell tuner by 7.35 mm in order to compensate for the frequency shift, the electric field on-axis was checked with a bead-pull measurement and the coupling between waveguide and cavity was measured for different positions of the waveguide short-circuit. The results are shown in Table 1 and Fig. 2.

Figure JRA3.2.11.: The CCDTL prototype

	Frequency (MHz)	Q-value (unloaded)
Tank 1-2	352.105	36276
Coupling cell	352.352	9413
Tank 2-3	352.113	36960

Table 4.2.1. Frequency and Q-value measurements of the CCDTL prototype



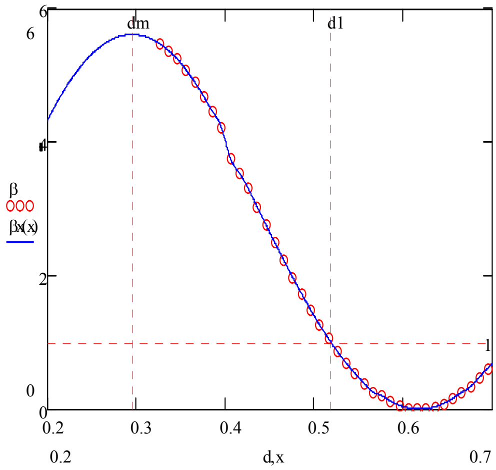


Figure JRA3.2.12: On the left: bead pull measurements comparison between CERN (black trace) and BINP (green trace). On the right: Coupling between waveguide and cavity as a function of the sliding short-circuit plate position.

The new CCDTL prototype was moved to the test area SM18 in late May. The connection of the water manifold and the installation of the waveguide short circuit were completed at the beginning of June. The final connection of the cavity to the waveguide was delayed due to a late delivery of the Helicoflex joint. Conditioning started on June 18th and lasted about 1 week. After conditioning, 330kW (6% more than nominal power) were measured in the cavity at both Linac4 and SPL duty cycle. In the latter case, a -200 kHz of frequency shift with respect to "cold" condition was observed. An upgrade of the water flow eventually allowed testing the cavity up to 10% duty cycle.

JRA3.2.5 Side Coupled Linac (SCL) and Pi-Mode Structure (PIMS) at CERN

SCL

Different π/2-mode structures were compared, namely the Annular Ring Coupled Structure (ACS), the On Axis Coupled Structure (OCS) and the Side Coupled Linac (SCL), in order to validate our choice of using a SCL for Linac4 / SPL. All π/2-mode structures provide similar electrical characteristics. While the OCS is the smallest in size, it can only be used efficiently at low duty cycles when no cooling is required. For the SPL duty cycle of 5% an ACS or SCL structure is needed. In comparison with the ACS, the SCL has slightly higher shunt impedance and a better mode separation. Furthermore, about 40% less copper is needed for an SCL at ~700 MHz frequency.

Further simulations for the SCL were performed. As a result, the design was changed to increase the coupling from k=3% to k=5%. This improves the electrical stability by a factor of nearly 3 while the reduction in shunt impedance is only 3%.

PIMS

An alternative structure, replacing the SCL for the high energy section of Linac4 was thoroughly investigated. This is the PI-Mode Structure (PIMS) at 352 MHz, offering the major advantage that all structures of Linac4 would be operated at the same RF frequency. The PIMS has a phase advance of π between adjacent cells and is very similar to the normal conducting structure that was successfully employed in LEP. The geometry was optimised for the energy range of 100 to 160 MeV, leading to 12 modules composed of 7 cells each. The effective shunt impedance is between 10% (100MeV) to 15% (160MeV) lower than the one of the SCL. The total power consumption per module is about 1 MW. Hence, one 1.3 MW LEP klystron could feed one PIMS module or one new pulsed klystron at 2.6 MW could power two PIMS modules. The coupling between cells should be at least k=3% to guarantee a relative field flatness of better than dV/V0 ≤ ± 2.5% for machining tolerances corresponding to frequency errors of |df| ≤ 25 kHz. Different layouts of coupling slots were studied in detail. Two options, a standard slot with k=3% and a modified slot with k=5% (see Figure 4.2.8) are planned to be tested in a cold prototype later this year. Simulations predict similar shunt impedances but they are difficult to perform as the additional losses of the coupling slots strongly depend on effects of the slot edges.

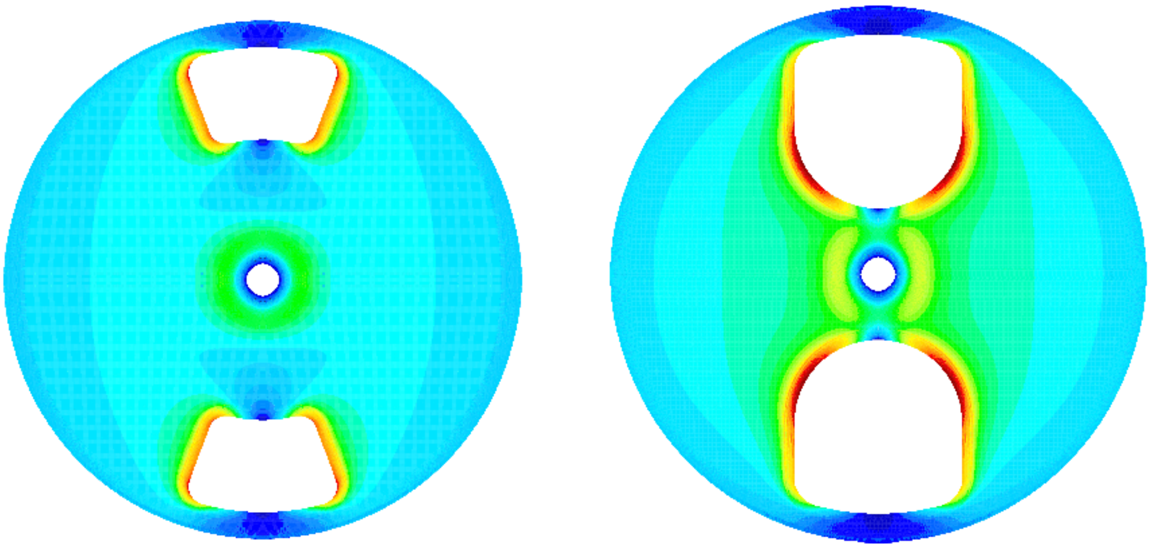


Figure JRA3.2.13: Two different coupling slot geometries for the PIMS. Left, the standard slot design (k=3%); right, a modified slot design (k=5%). The colour scheme indicates magnetic field strength on the surface (blue = weak, green, yellow, red = strong).

Comparison between SCL and PIMS

A fundamental issue was to compare the SCL and the PIMS in order to arrive at the decision which structure to use in Linac4 / SPL. The structural costs for production and tuning are 30% higher for the SCL while 25% more budged is needed for klystrons, low level RF and waveguide distributions in case of the PIMS, leading to similar overall costs. The total length will be 28 m for the SCL compared to 29 m for the PIMS. Tuning during operation as well as the power distribution are less challenging for the PIMS. In summary, both structures can be used for Linac4 / SPL. The PIMS seems to be the more convenient option but further investigations are needed concerning the phase stability during filling time and presents of beam as well as the power splitting from one klystron to feed two PIMS modules.

JRA3.2.6 Overall Progress of Work Package 2

Table 4.2a : Status of the Sub tasks in WP2 which are supposed to have started according to the MS project breakdown in Annex 1

WBS #	Title	Original begin date (Annex 3)	Original end date (Annex 3)	Estimated Status	Revised end date
2.1	**Drift Tube linac**				
2.1.1	DTL Design	July 2004	June 2007	95%	End 2007
2.1.5	DTL Coupler prototype construction	July 2005	June 2007	95%	End 2007
2.1.4	DTL beam dynamics design	January 2004	June 2008	75%	
2.2	**H mode DTL**				
2.2.2	RF cold model design & construction	January 2004	January 2005	100%	
2.2.3	RF model construction	December 2004	June 2005	60%	December 2008
2.3	**Side Coupled Linac**				
2.3.2	RF model mechanical design	July 2004	December 2004	100%	
2.3.3	RF model construction	January 2005	December 2005	100%	
2.3.4	RF model testing	January 2006	June 2006	80%	End 2007
2.3.5	SCL module design	January 2006	June 2007	80%	December 2007
2.4	**Cell Coupled DTL**				
2.4.2	Pre-prototype high power RF tests	July 2004	March 2005	100%	July 2006
2.4.3	Prototype mechanical design	January 2005	December 2005	100%	
2.4.4	Revision of design	October 2005	October 2006	80%	December 2007
2.4.5	Prototype high-power RF tests	August 2006	June 2007	100%	

Table 4.2b: Status with respect to the interim reports and deliverables due in 2007 according to the MS project breakdown

WBS #	Title	Due date in Annex 1	Status	Revised delivery date
2.2.7	CH Prototype design, construction, tests: prototype ready	December 2006	Delayed	Spring 2008
2.4.4	CCDTL Prototype design, construction, test: design report	December 2006	Completed in 2007	
2.1.2	DTL coupler prototype ready	January 2007	Finished, missing supporting document	December 2007
2.3.1	SCL cold model final report	December 2007		
2.1.1	DTL design intermediate report	June 2007	Milestone: delayed	August 2008
2.1.2	DTL coupler prototype int. report	January 2007	Milestone: coupled with deliverable	December 2007

JRA3.3 Work Package 3: Superconducting Accelerating Structures

JRA3.3.1 Activities at INFN-Milano

JRA3.3.1.1 Tuner construction (subtask 3.1.4)

Procurement of 2 driving systems (motor, box, harmonic drive, screw…) to be used at cryogenic temperature and 1 to be used at room temperature for test of components. We are waiting for the last parts, the surface treatments are foreseen before the end of the year. The preliminary test of the blade tuner using a driving system from DESY is done.

In the last year the activities have been mainly addressed to the preparation of the devices needed for the future test of 5 cells cavity in CryHoLab. Cavity A has been stretched from 699.8 to 702.1 MHz, and before the integration in the helium tank we have to stretch up to 702.8 MHz. The leak rate test is passed, the heat treatment has been performed at CERN. The procurements of filters, valve and other components needed to operate with a clean cavity are accomplished.

The preliminary design for an internal magnetic shield is now studied by the company Amuneal for discussion. The analysis of load conditions occurring in the test preparation is performed and we are now arranging for the integration of the cavity in the helium tank in Zanon.

JRA3.3.2 CEA SACLAY

JRA3.3.2.1 Construction of cavity B (subtask 3.1.6)

The cavity has been delivered by ACCEL in March 2007. First measurements of dimensions, RF frequency and field flatness with the cavity as received have been performed. The results are part of the CARE report, corresponding to the deliverable 'cavity B ready'. Subsequently, inner chemical polishing (100 microns), heat treatment (650°C), field flatness checks, light chemical polishing (20 microns), HPR and assembly in clean room with low power antennas have been performed. The cavity is now ready for the RF test in vertical cryostat scheduled for the end of the year.

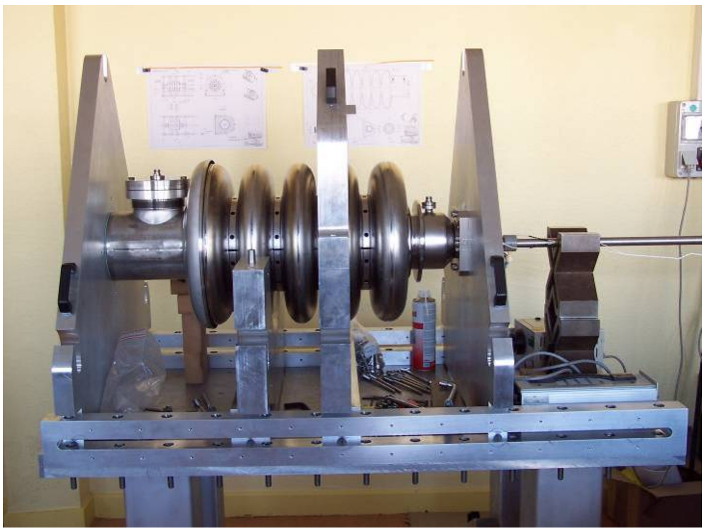


Figure JRA3.3.1: Cavity B

JRA3.3.2.2 Power coupler design and engineering (subtask 3.1.7)

The drawings of the power coupler are validated. Order has been placed for the 704 MHz RF windows with a delivery time of seven months; the windows are now in fabrication and should be delivered in December. The design of the GHe cooled part and the water cooled doorknob is finished and orders are placed for fabrication of the set of pieces. We aim to get all the pieces for assembling a complete coupler in January 2008.

JRA3.3.2.3 RF source order and preparation (subtask 3.1.8)

During 2007, the 704 MHz klystron has been installed at the Saclay test stand.

Figure JRA3.3.2: The klystron installed at the Saclay test stand

JRA3.3.2.4 Modulator preparation for the 700 MHz test stand (subtask 3.1.10)

The new High Voltage power supply, partially tested at factory, has been delivered, connected and tested at Saclay.

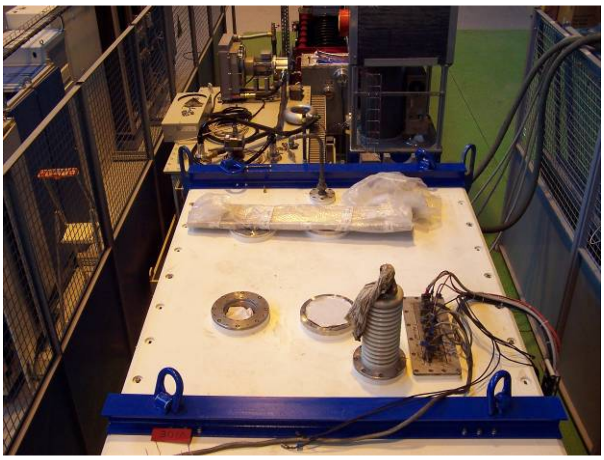


Figure JRA3.3.3: The klystron modulator

RF source testing (subtask 3.1.11)

All the equipments of the 704 MHz-1MW test stand have been installed. The High Voltage Power Supply (330 kVA) is connected to a HV pulsed generator (110 kV, 25 A, 50 Hz, 2ms). Depending on the cavities to be tested, the high voltage pulses are directed to an existing 1300 MHz 2 MW klystron or the new 704 MHz-1MW klystron. Downstream the klystron, about half of the waveguides are connected and the complete connection to CryHolab will have to be finished for the power tests scheduled in 2008.
The cabling (interlocks, diagnostics, sensors) is finished and the local water cooling system is ready. All the components are monitored through a control system, and data, values and warnings/interlocks are stored in an archive.

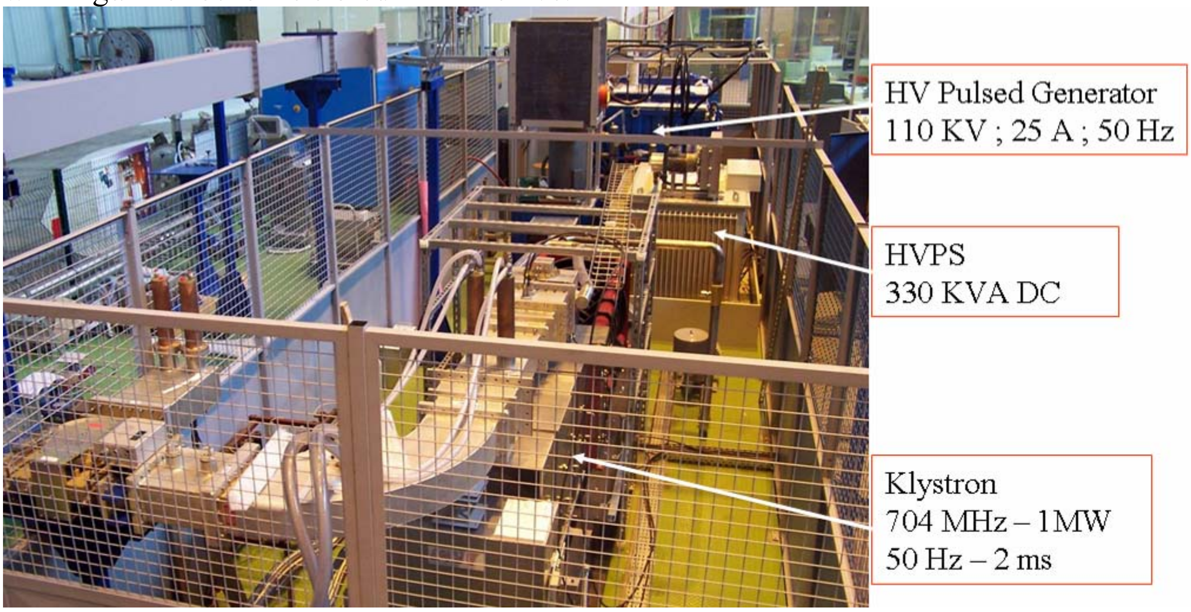


Figure JRA3.3.4: 704 MHz-1MW RF tests stand

In July and August, the first tests of the HV and RF power equipments have been performed, and 1.07 MW of RF power delivered by the klystron output connected to a matched load through a directional coupler. Due to a problem with the main water cooling circuit, the system was operated at a reduced duty cycle (1-2 Hz). It will be increased up to 50 Hz, the nominal duty cycle, when the last major pieces of the cooling system will be repaired.

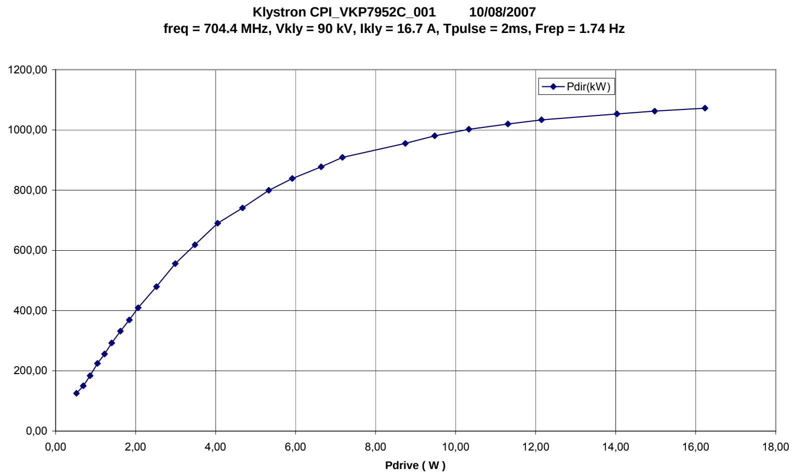


Figure JRA3.3.5: Klystron output power vs. drive power

JRA3.3.3 FZJ Activities

JRA3.3.3.1 Evaluation of 700 MHz resonator (task 3.2.2)

JRA3.3.3.2 RF design of 352 MHz multi-gap resonator (task 3.2.6)

Although the 352 MHz multigap resonator is being built without a He cover for use in a bath cryostat provisions are made to allow a later use in a 'dry' cryostat. Beam ports and coupler ports are equipped with special rings to which a He cover can be welded at a later time. For cavity stiffening the method of copper spraying of the end caps is under evaluation. A backup stiffening scheme (much more time consuming to implement) is available.

JRA3.3.3.3 Final mechanical design of resonator (subtask 3.2.7)
Drawings of the mechanical design of all resonator parts are finished. Little activity remains to account for auxiliary parts for EB welding fixation parts and integration into the FZJ bath cryostat. Activity now concentrates on the end cap stiffening. Copper plasma spraying is being evaluated in co-operation with Ecole des Mines, Evry, Paris (C2P). With respect to fabrication this is the most attractive solution. However, the suitability at low temperatures will be checked after the completion of the first sample (~Oct/Nov 2007). Alternative stiffening scenarios have been worked out.

JRA3.3.3.4 Integration of coupler. Tuning options (subtask 3.2.8)
Coupler is contributed by IPN-Orsay. Integration of the coupler is in progress. Tuning option and coupling scenarios are discussed in the Design Report. The cavity is prepared to take the coupler as developed by the Orsay colleagues.

JRA3.3.3.5. Preparations for electron beam welding (subtask 3.2.9 – new sub task)
a) EB welding quality assurance: Welding parameters are fully developed for all required welding tasks. Handling a wall thickness of 4 mm for nearly all cavity welds and assuring the proper quality concerning to the superconducting HF requirements was the main challenge. As the result the upper and the lower welding bead is smooth and without significant seam sags or grooves at the border for all different working heights in the EB chamber.

b) RRR measurements and consequences for the processing of the cavity: Various RRR measurements were performed to check the RRR value of the EB seam and the heat affected zone and to compare them with the RRR values of the delivered sheets. All RRR values are in the same range as the reference material (RRR = 320 – 380, see next figure), even if alumina fixation components are placed nearby the hot weld region. RRR do not decrease below the initial values by the required welding tasks.

JRA3.3.3.6 Manufacturing of 352 MHz Multi-gap Resonator (subtask 3.2.10)
All parts of the cavity are fabricated now. The cavity body half shells are rolled and prepared for welding to the coupler ports. End caps are formed by deep drawing and prepared for welding to the beam ports. The spoke half shells were welded together after deep drawing. The two body half shells are joined with the coupler port and will be welded together in December 2007. If no severe failures occur the scheduled work allows testing the cavity starting in May 2008.

Figure JRA3.3.6: Rolled half shell of the cavity body (left) and coupler port with hot brazed SS flange (right)

Figure JRA3.3.7: Formed niobium end cap (left) and welded niobium spoke (right)

Figure JRA3.3.8: half shell of cavity body with coupler port (left),
end cap prepared for copper spraying (right, top), welded spoke (right, bottom

JRA3.3.4 CNRS-Orsay Activities

JRA3.3.4.1 Evaluation of 352 MHz 2-gap prototypes (task 3.2.3)

In parallel of the multigaps Spoke cavity stiffening studies, the developed programs have been used to evaluate the Lorentz forces factor for the 2-gaps Spoke cavity. The interest resides on the possible comparison between calculations and experiments since the prototypes (without stiffening system for Lorentz forces) were tested in 2006 with a horizontal cryostat.
The first test of the beta 0.15 spoke cavity at 4.2K has been done in the horizontal cryostat CM0. The goals of the experiment were:

- To test all the cryogenics parts (valves box, Helium circuit, Nitrogen thermal shielding)
- To test the Cold Tuning System (CTS) for slow tuning process.
- *And finally to test the LLRF digital system (NB: not within the HIPPI contract)*

Remark: This test has been done at very low power (a few tens of Watts of forward power) with an external coupling of 10^6. Thus, the maximum accelerating gradient obtained was ~300 kV/m. Indeed, no Qo=f(Eacc) curve was measured.

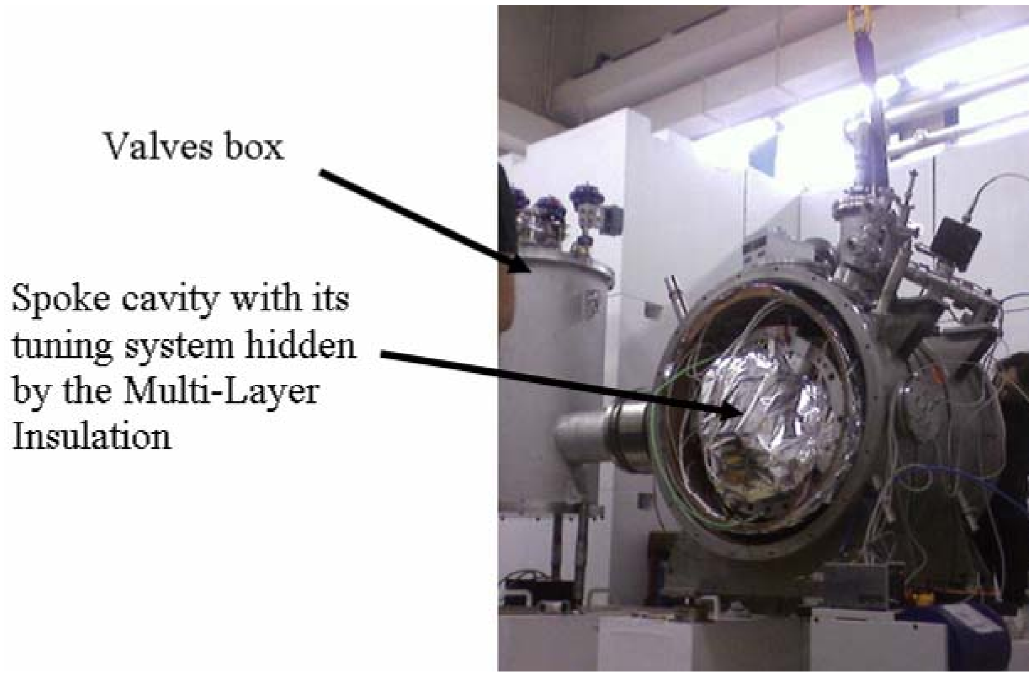


Figure JRA3.3.9: Horizontal cryostat with beta 0.15 spoke cavity

The test took 2 weeks and 1350 liters of liquid Helium have been used, and the results were excellent:

1/ No leak detected in the liquid Helium circuit.

2/ The first measurements with the LLRF digital system showed very encouraging preliminary results: a stability of the phase ~ 0.5° and a stability of the amplitude ~1%.

3/ The tuning system worked very well. The frequency has been stabilized currently within a +/- 25 Hz bandwidth. NB: Best regulation obtained: +/- 10 Hz by choosing good PID parameters coupled with the LLRF digital system. The sensitivity of the tuning system was about 0.95 Hz/motor step and no mechanical hysteresis was observed.

Some points have to be optimized however: the thermalisation of the handling frame (still at 140 K after 2 weeks) and the tuning system (at 30 K after 2 weeks). These 2 points are important because we had difficulties to keep the Helium buffer full during operation. The total consumption was around 12 Watts (static losses).

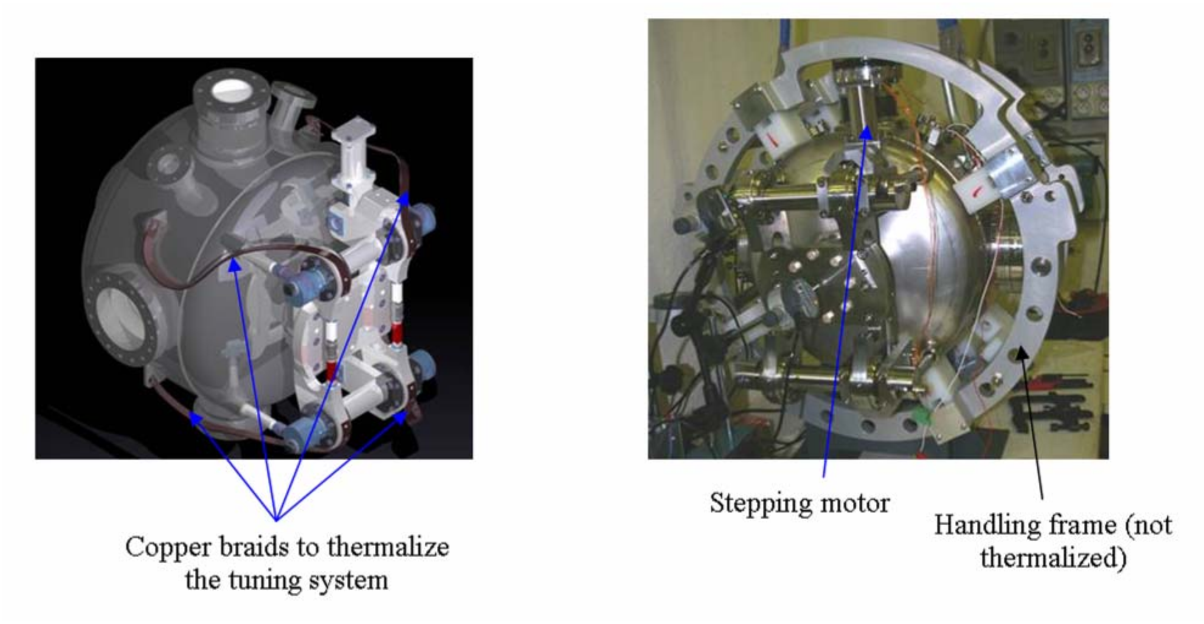


Figure JRA3.3.10: Sketch of the cavity (left) and photograph of the cavity with its handling frame (right)

JRA3.3.4.2 Construction of coupler prototype (task 3.2.4)

Alumina windows for the coupler are fabricated and have been tested at Orsay. We have measured the S_{11} parameter of the 2 windows: -30 dB and -42 dB (min -30 dB specified). The welding of the antenna of the couplers will be done before end of October.

The test bench installation is not yet finished because of the missing water cooling circuit and the 10-kW amplifier. This solid-state amplifier was tested at INFN-Legnaro up to 10 kW (CW operation) and is now ready. The delivery is foreseen in November 2007. The conditioning of the couplers should start in December 2007.

Figure JRA3.3.11: 352 MHz RF windows (fabricated by the French company SCT)

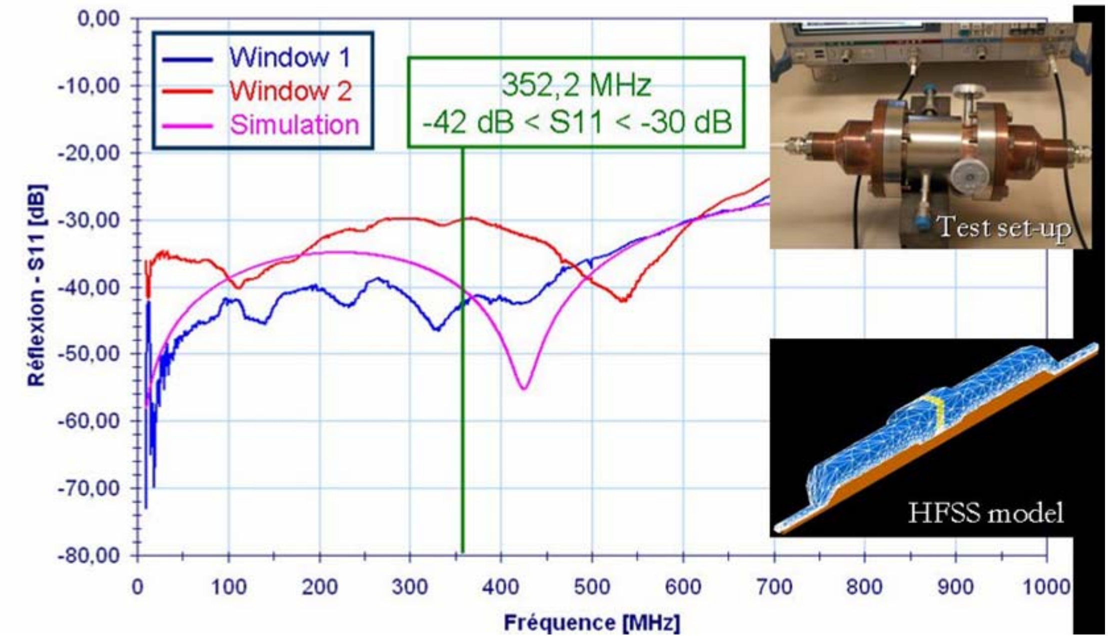


Figure JRA3.3.12: S_{11} parameter [dB] vs. frequency [MHz]

JRA3.3.4.3 RF design of 352 MHz multi-gap resonator (subtask 3.2.6)

In order to reduce the frequency shift due to Lorentz forces, stiffening systems have been proposed for the 352 MHz multi-gap spoke resonator by the Jülich group. The cavity is planned to be built without He cover for use in a bath cryostat.

At IPN Orsay, in addition to the created platform which assumes the linkage from CAD code Catia to mechanical code Cast3m and the electromagnetic code Soprano, some new programs have been developed to take into account the stiffening system at the outside surface of the cavity wall.

Without stiffening system, to avoid the errors dues to interpolation of the electromagnetic field simulated from Soprano on the mechanical model in Cast3m, the mechanical simulations were performed on the shell elements, exactly taken out of the envelop of the vacuum volume used by Soprano. With the stiffening system, we should use the volumes' elements to construct model of the cavity wall: the cavity wall has an inner surface different to the outer surface in which the stiffening system has been added.

The new programs allow to import the volume elements model of the cavity wall from Catia to Cast3m and to extract the inner surface elements from the cavity wall's model. As the inner surface of the cavity wall must coincide with envelop of the vacuum space for electromagnetic simulation, this vacuum space model is performed by Cast3m from inner surface of the cavity wall. Then the FE vacuum space model is exported to Soprano which simulated the resonance frequency and the electromagnetic fields. The fields distribution at the inner surface of the cavity wall is transferred back to Cast3m to determinate the radiation pressure and to perform the mechanical deformations on the volume elements model of the cavity wall. Then the interfaces programs modify the vacuum space model in Soprano according the displacements calculated by Cast3m at the nodes of the inner surface, and the new resonance frequency is simulated by Soprano and finally the frequency shift is obtained.

The evaluated stiffening system is shown in the left figure below, the cavity is supposed to be 4 mm thick. The right figure below shows the axial displacement distribution on the volume elements model of the cavity wall. The Lorentz forces factor, which means the frequency shift over the square of the accelerating field, has been reduced to about 1 $Hz/(MV/m)^2$, this value is 4 times less then the Lorentz forces factor calculated without stiffening system.

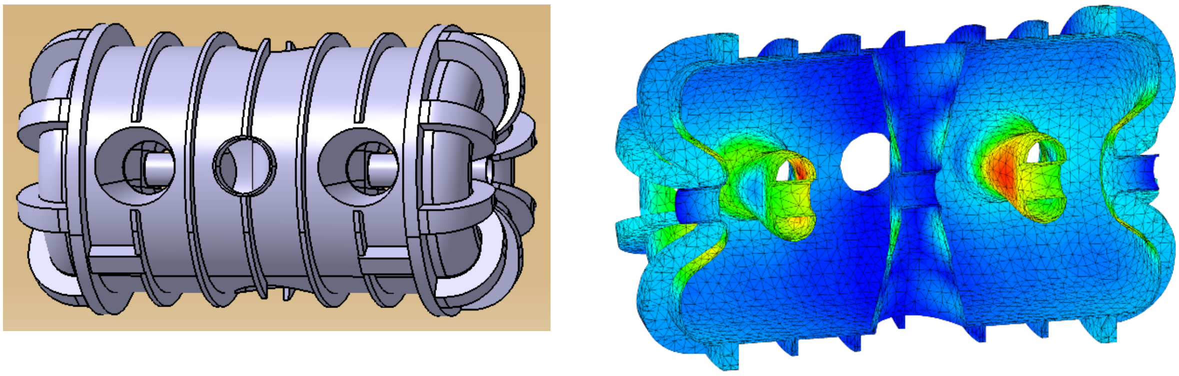


Figure JRA3.3.13: Cavity stiffening ribs designed under Catia and displacement due to Lorentz forces (Cast3m)

In order to reduce the frequency shift due to Lorentz forces, three stiffening options have been proposed by the Jülich group. The choice of the stiffening system remains an important aspect for SC linac architecture. The three stiffening systems are shown in the Figure 1, the cavity wall is supposed to be 4 mm thick. On the left side, the first option consists in stiffening the triple Spoke cavity's end cup by eight niobium ribs which are 4 cm large and 2.5 cm thick. In the middle, the second option suggests to realize a layer of about 10 mm copper coating by thermal spray technique. On the right side, additional rings (1cm x 2.5cm) are placed on the cavity's cylindrical body in addition to the ribs on the end-cups.

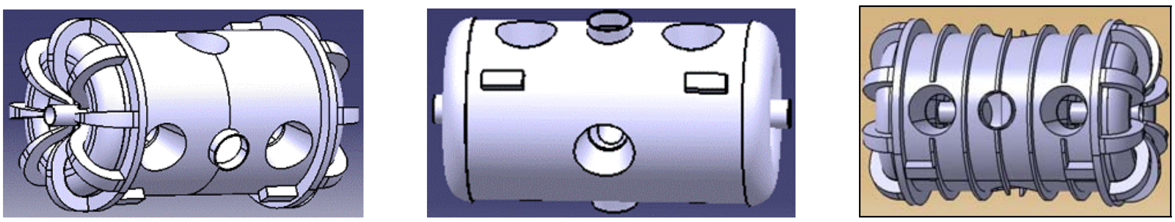


Figure JRA3.3.14: Proposed options for triple Spoke cavity's stiffening (FJZ)

The Lorentz forces factor, which means the frequency shift over the square of the accelerating field is -5.5 $Hz/(MV/m)^2$ without any stiffener, this value is reduced to -1.3 $Hz/(MV/m)^2$ if one of the two first stiffing systems is used, the last option reduces the Lorentz forces factor to about -1 $Hz/(MV/m)^2$.

With regards to mechanics, the two first stiffening systems, which consist in rigidifying the end-cups, reduce the deformations in the axial direction, while the last solution with also the additional rings on the cavity body reduces both the axial deformation and the radial deformation.

design	maxi axial displacement	maxi radial displacement
Without stiffening	0,23µm	0,09µm
Ribs at end cup	0,04µm	0,07µm
Cu coating at end cup	0,03µm	0,07µm
ribs and rings	0,02µm	0,03µm

Table 4.3.1: Reduction of the mechanical deformations with different stiffening systems

These results were obtained in ideal conditions, supposing that the beam pipes are fixed. In reality, the beam pipes couldn't be completely fixed; it depends essentially on how the cavity is hold and the existence or not of its tank. Of course, the final choice depends also on the cost and technical possibility to realize the stiffeners.

JRA3.3.5 IAP-FU Activities

JRA3.3.5.1 Conceptual study of tuning system (subtask 3.3.1)

The rf-tuning concept for the super conducting CH-structure in Frankfurt provides two tuning stages: a slow but effective mechanical axial tuner drive with a maximum applied tuning force of F_{max} = 5 kN corresponding to a compression of Δs_{max} = 1 mm, which results in a measured frequency shift of Δf = 400 kHz and the piezo tuner for a fast tuning in the 0.01 mm range corresponding to Δf_p = 4 kHz. The frequency shift as a result of applying a squeezing force at the end flanges of the tank from outside has now experimentally been determined. In the course of that the changes regarding field distribution along the structure has also been investigated in detail by means of a bead pull measuring system. These experiments have both been carried out at room temperature. The experimental result comes up with only half of the frequency shift we had expected from simulations, but is still sufficient. The piezo actors and sensors will be tested in the near future on a specially designed test stand with special respect on their performance at cold temperatures.

JRA3.3.5.2 Construction of tuning system (subtask 3.3.2)

First parts of the piezo tuning system have been made at the IAP workshop. They have been designed with special respect to the requirements of the piezo actors as they should be prestressed at operation to extent their durability. This is automatically realized by transmitting the force of the slow mechanical axial tuner drive (F_{max} = 5 kN) over the piezos. In addition to that we have to avoid shearing and twisting forces, which could cause a damaging of the piezos. Therefore we introduced a mechanical guidance, tolerated strong enough to guide the movement on the one hand but giving enough space to avoid canting of the parts.

JRA3.3.5.3 Measurements of of tuning system (subtask 3.3.3)

For a preliminary performance check, the piezos have been tested at room temperature and at 77 K within a specially designed test set up. The stroke of the piezos was measured by means of an altimeter with a nominal resolution of 1 µm on a measuring bench. All available 5 piezos have the same stroke within the accuracy of the measuring system. At 77 K the stroke is reduced by a factor of 2, which corresponds very well to other comparable piezo types of which measurements can be found in literature. Going down to 4 K normally reduces

the stroke again about a factor of 5. Up to 1750 N compressive load no evident change in performance was observed.
Since the piezos will operate somewhere between the inner cold mass at 4 K and a cooling loop flown by liquid nitrogen at 77 K we suspect maximum stroke of at least 5 μm corresponding to the above mentioned $\Delta f_{piezo} = \pm 1$ kH.

To avoid instabilities in the control system it is important to care about mechanical resonances of the cavity and their impact on the resonance frequency. Very low resonances can then be damped or pushed to higher frequencies if necessary. We have measured the resonances by using one of the piezos as an actuator exciting the cavity with either a sinusoidal signal from an acoustic wave generator or with white noise comprising all frequencies between 0 and 100 kHz alternatively. The response of the cavity was then detected by microphone or a second piezo used as a detector and digitally recorded. These wave data was Fourier analyzed subsequently. The first measurement was taken in the environment of our cryo-lab, showing clearly a resonance around 250 Hz which also was predicted by Ansys simulations and a second one at 450 Hz. This measurement has been taken by sweeping over a frequency range between 0 and 500 Hz. We found that sweeping time has an effect on the spectra we obtained. Sweeping too fast gives not enough time to stimulate high quality resonances, sweeping too slow causes interferences between decaying resonance and altered stimulating frequency. Good results were obtained using 30 seconds sweeping time for the above frequency range.

Because of the dependency on sweeping time it was desired to have a second method to confirm the results, which we found by using a white noise signal. Meanwhile the setup had moved into an anechoic chamber to avoid perturbing background noise. Here we found a good agreement between sweep and noise measurements, although the resonance spectrum was not exactly the same as before in the cryo-lab; since the cavity had moved the mechanical sate had changed a little affecting the resonances. Exploring deep resonances below 100 Hz by using larger exciting amplitudes for sweeping, which could be applied at low frequencies without having distortions, we found another predicted resonance at 83 Hz, but with quite low amplitude, which is considered to be harmless.

Last measurements within the anechoic chamber have been done by using a second piezo as an impact sound microphone at the opposite side of the tank. These spectra differed in detail a little from the ones that had been taken with the microphone since the piezo is only sensitive to vibrations of the area of contact, but they are generally in good agreement. It could quite impressively be shown that especially resonance between 200 and 300 Hz can be attenuated by introducing additional fix points at the longish thread rods of the corset. - An estimation of the Q-values for the main resonances was done following the 3 dB method.

These measurements were repeated during our last cryo-test that was scheduled after a intensive cleaning procedure (HPR, BCP) of the cavity. An accelerating gradient of 7 MV/m was measured after the treatment instead of the former 4.7 MV/m. Resonances were again observed and analyzed at cryogenic temperatures and in addition to that, the tuning of the cavity by means of the piezos was observed for the first time.

JRA3.3.6 Overall Progress of Work Package 3

Table 4.3a : Status of the Sub tasks in WP3 which are supposed to have started according to the MS project breakdown in Annex 1

WBS	Title	Participants	Original begin date	Original end date
3.1	**Elliptical cavities**			
3.1.2	Tuner design	INFN	07 / 2004	12 / 2005
3.1.3	Integration of piezo design	INFN	07 / 2004	12 / 2005
3.1.4	Tuner construction	INFN	01 / 2006	06/2006
3.1.6	Construction cavity B	CEA	11 / 2005	06/2006
3.1.7	Power coupler design & engineering	CEA	01 / 2005	04/2006
3.1.9	RF coupler construction	CEA	05 / 2006	05/2007
3.1.8	RF source order and preparation	CEA	07 / 2004	12/2006
3.1.10	Modulator preparation for test stand	CEA	01 / 2005	12/2006
3.1.11	RF source testing	CEA	01 / 2007	04 / 2007
3.1.12	High power pulsed tests	CEA	05/2007	06/2007
3.1.13	Cavity A assembly with tuner	INFN	06/2006	03/2007
3.1.14	Vert. test & final welding of cavity B	CEA	07/2006	03/2007
3.2	**Spoke cavities**			
3.2.2	Evaluation of 700 MHz prototype	FZJ	09 / 2004	09 / 2005
3.2.4	Design of coupler prototype	IPNO	01 / 2004	12 / 2005
3.2.5	Construction of coupler prototype	IPNO	01 / 2006	06 / 2006
3.2.8	Final design of 352 MHz multigap res.	FZJ-IPNO	07 / 2005	06 / 2006
3.2.9	Test of coupler prototype	FZJ-IPNO	07/2006	07/2007
3.2.10	Manufacturing of 352 MHz multigap res	FZJ-IPNO	04/2006	09/2007
3.3	**CH resonators**			
3.3.1	Design of tuning system	IAP-FU	01 / 2004	06 / 2006
3.3.2	Construction of tuning system	IAP-FU	01/2006	12/2006
3.3.1	Measurements of tuning system	IAP-FU	01/2007	06/2007

Status with respect to the interim reports and deliverables due in 2006 according to the MS project breakdown

WBS #	Title	Due date in Annex 1	Status	Revised delivery date
3.1.6	Cavity B ready (deliverable)	June 2006	Completed in 2007	
3.3.1	Report on CH tuners (milestone)	June 2005	Completed in 2007	
3.1.4	Cavity A ready (milestone)	March 2007	Delayed	March 2008
3.1.9	Test Stand ready (deliverable)	March 2007	Completed in 2007	
3.2.6	Spoke prototype ready	October 2007	Delayed	April 2008

JRA3.4 Work Package 4: Beam Chopping

The web-site, http://lombarda.home.cern.ch/lombarda/WP4/WP4main.htm, is used for exchanging useful information within the work-package. It contains the link to the presentations of the work-package yearly meetings.

The working package annual meeting took place at CERN on June 11 with 13 participants. This year two people from SPIRAL2-GANIL participated in the event, also if they are formally not part of the working package. They are interested in a chopper for their facility. The topics for this workshop were the discussion on a chopper structure offering a higher field coverage factor at the centre but a rapidly decreasing field towards the edge. Beam dynamics simulations were presented to show the use of such type of structure in case of limited available driver voltage.

The work has again progressed steadily in both laboratories and most of the hardware has been tested. Some key pieces have not been manufactured yet at RAL, but there should be no surprise in those parts. The main issue for the future of the working package activities is devising a strategy on how to access the chopper performance in case the Saclay test stand (back-up solution of the CERN 3-MeV test stand) will not be ready in time for the tests, due to the delay in the preparation of the IPHI RFQ. Discussion has started at HIPPI07 and the possibility of testing the chopper line with a beam from the Tandem has been discussed. After discussion with the member of ESAC, the conclusion was reached that this option wouldn't give sound answers for the chopper testing. Infact due to the low current of the tandem beam one would not be able to observe unforeseen space charge effects, which could be very important for a 3 MeV 70mA beams. In addition, the continuous longitudinal structure would not allow a clear characterization of the chopper efficiency, also if one tried to bunch the beam with a 352 MHz buncher just after the tandem. This rudimentary bunching would leave a halo of particles that is of the order of magnitude of the possibly un-chopped beam and therefore measurements couldn't be conclusive. .
All the three WP4 deliverables due in 2007 have been postponed to next year. Two of them are delayed because of the delay in the assembling of the IPHI RFQ; the third one, which should be coming in the next months, is a general lack of manpower and the disturbance caused by the laboratory move at RAL. For completeness we report the table with the chopper characteristics

Table 4.4.1: Chopper characteristics

	Chopper A (CERN)	Chopper B (RAL)	
	Fast	Fast	Slow†
Rise/fall time	< 2 nsec	≤ 2 nsec	≤ 12 ns
Max. rep rate	50 MHz	2.6 MHz	1.3 MHz
Max. voltage/target	± 0.5 - 0.75	± 1.4	± 2.0
Flexibility	8 ns (min.)	7 - 15 ns	0.1 - 100 µs
Chopping effectiveness (calculated)	99.7%	99.9 %	
Emittance growth ‡ of the un-chopped beam	8%	8%	

† Simulation only. ‡ Effect of residual chopper fields not included

JRA3.4.1 CERN Activities

In general the woks advanced steadily and low power measurements have been completed on the chopper plates. The chosen solution for the chopper driver is sound and preliminary measurements for quality assurance have been done. In details for each subsystem:

1. Chopper structure (subtask 4.1.4): A problem has been found after dismantling the plates of one of the chopper systems. The thermal stress between ceramic and cooling plate produced cracking of two (old) ceramic plates and the aluminum plates were found bent due to internal stress. It was then decided that new cooling plates made of stainless steel will replace the aluminum ones. The plates will undergo a thermal treatment at 900 to eliminate all internal stress/strain factors. Besides, the stainless steel thermal expansion coefficient (12 ppm/deg) better matches that of alumina (7 ppm/deg) with respect to the one of aluminum (23 /deg) . Both assemblies will be ready at the end of 2007.

Chopper driver (subtask 4.1.3): The order of four pulse amplifiers placed at the beginning of 2006, scheduled the delivery of the 1st unit for mid 2006 and the remaining units for the end of same year. Prototype measurements provided in May 2006 showed encouraging results but difficulties of various orders imposed to reschedule the delivery later in the year. Additional measurements provided in October showed considerable progress and email exchanges suggested that the evolutions would have led to the achievement of the specified parameters. A visit took then place end of 2006 for a general verification of the amplifier status in view of the delivery of the first unit at the beginning of 2007. Unfortunately the prototype that could be measured did not achieve the specified performance. The fast switching power devices, manufactured by the company, provided fast enough fronts with the expected amplitude but no prove of their ability to handle the required average power could be given. Moreover, the use of an excessively complex driver stage based on paralleled and cascaded commercial devices, brought along considerable timing problems. The solution proposed by FID Technology was an alternative, homemade driver stage based on their own technology that they had already designed and built. At that time it could only work at half the repetition rate (20 MHz instead of 40 MHz) but considering the cumulated delays and the need of performing beam tests in 2008 in Saclay, this limitation was not considered as crucial and a new pulser prototype was then assembled in two weeks. A detailed set of measurements proved the achievement of most of the specifications and, based on these results, a first pulse amplifier unit has then been manufactured. The unit was delivered at CERN at the end of May 2007. The measurements made at CERN on the first (of four) driver coming from FID technology have shown that the achieved output voltage (650 V) is lower than specified but compatible with the foreseen operation. Both 10% to 90% and 3% to 90% rise times are compatible with the foreseen operation. The 90% to 10% and 90% to 3% fall times are not compatible with operation. A 1 μs pulse length and 1 ms burst length are achieved. Pulse distortion and the propagation delay time have variations wider then specified. The maximum repetition frequency is now limited to 12 MHz (vs. 40 MHz). The 50 Hz burst repetition frequency is presently limited by the average power (200W). Multiple problems were found (and now solved) with the integrated power supply. The negative polarity chopper from Russia has arrived and first measurement show that it performs well. Some measurement results are shown in Figure JRA3.4.1 and JRA3.4.2.

2. Dump (subtask 4.2.1): task finished

1. A test has been made in June 2007 to confirm that the fast-switching pulse of the chopper driver would not interfere with the functioning of the Bunch Shape and Halo Monitor. The chopper pulse amplifier/generator was installed in the AD hall where the BSHM detector is located for a short (1-2 days) test. The output signal went via some flexible coax cable into a 6 dB attenuator followed by a single turn wire loop .With the magnetic field from this wire loop one tried to influence the BSHM detector. No perturbation whatsoever was seen during the 5 s readout period. From this test we can conclude that there is no EMI coming from the chopper driver that could affect the behavior of the BSHM.

2. The BSHM has been at the Orsay Tandem with a 3 MeV proton beam. The proton beam from the tandem had a lower intensity and didn't have the correct time structure. Nevertheless this test validated the space resolution of the detector (1 mm). More important they allowed testing ahead the behavior of the detector under the influence of a particle beam. There were no surprises during this test and the detector behaved according to expectations. The time resolution has been already tested at CERN with a laser beam.

3. Simulations have been done to explore the possibility of increasing the field coverage factor on axis, at the expenses of a lower field coverage factor off axis. This new geometry could be implemented in a future chopper plate, should the amplifier voltage be a limiting factor on the chopper effectiveness. A of the new geometry is shown in **Erreur ! Source du renvoi introuvable.**. The deflecting field of the ideal, CERN reference and new geometry are shown in **Erreur ! Source du renvoi introuvable.**. The effect of the three different fields on the beam is equivalent.

4. Simulations have been done to confirm the alignment tolerances of the elements o the chopper line. It was found that the foreseen alignment tolerances of ±0.1 mm for the active elements and ±0.3 mm for the passive elements allows sufficient transmission and do not cause any beam quality degradation. In view of operation as injector to the LINAC4 DTL one (or two) steerers should be added to the line in order to avoid loss of transmission through DTL tank1.

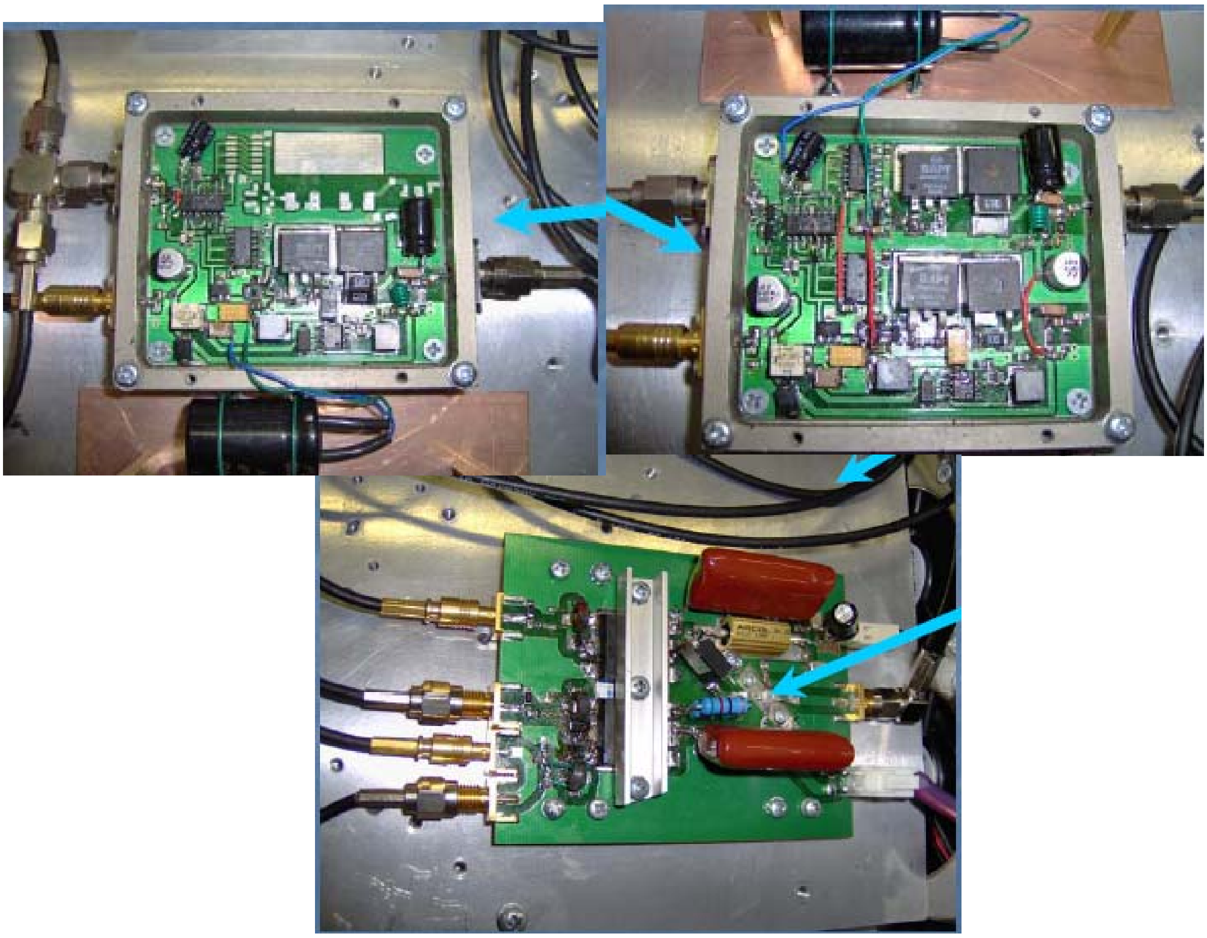


Figure JRA3.4.1. Drivers (top) and final stage (bottom) of the FID CERN driver. '

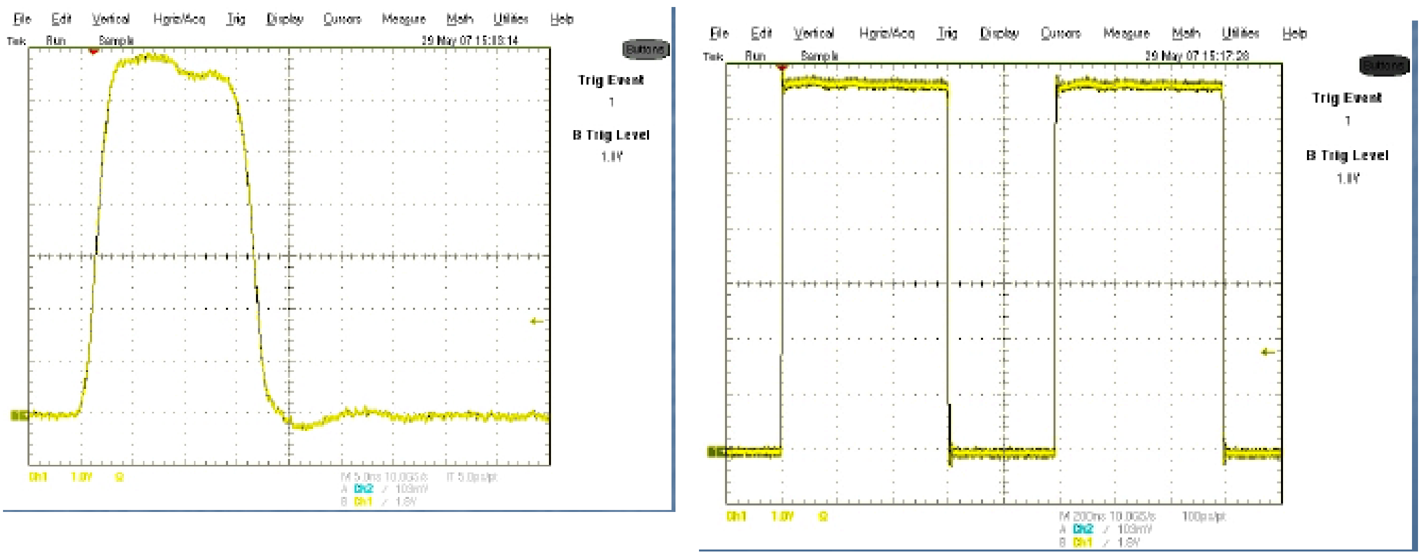


Figure JRA3.4.2. Pulse Amplifier's output signal.

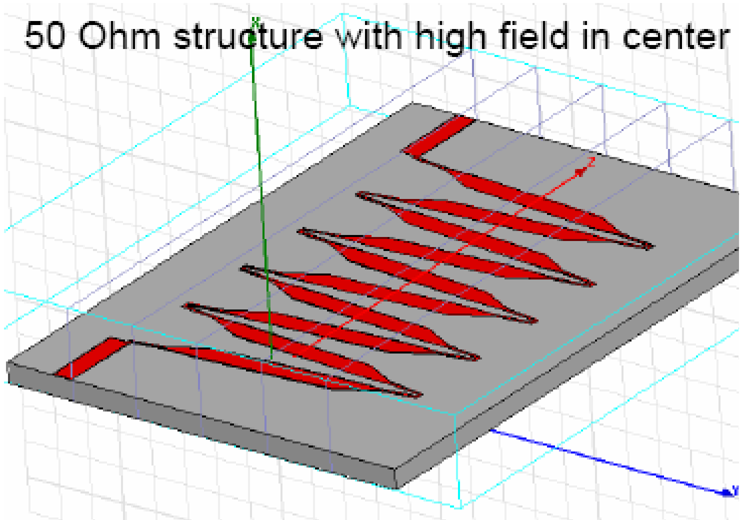


Figure JRA3.4.3. Meander structure with high field coverage factor in the centre

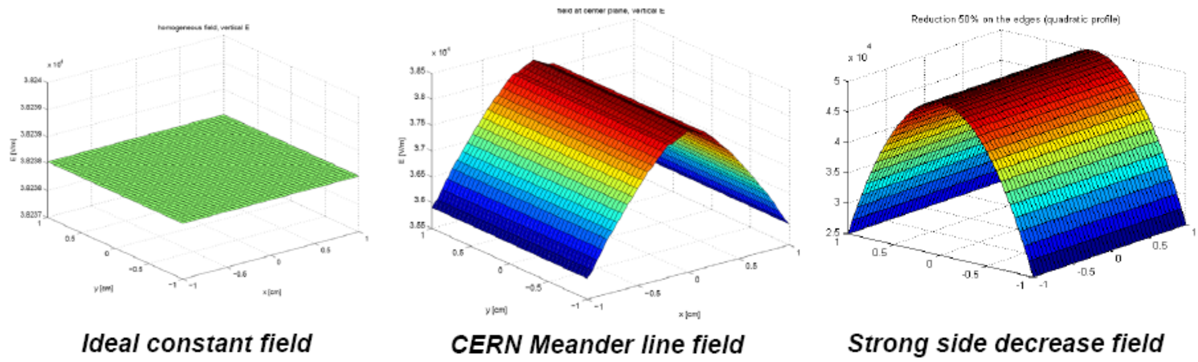


Figure JRA3.4.4. Deflecting fields for different meander geometries

JRA3.4.2 RAL Activities

Important aspects of the RAL HIPPI activity for this quarter are as follows:

1. RAL Chopping Schemes : Ciprian Plostinar continues development of the RAL FETS chopping schemes A, B, C1 and C2, using the TraceWin code. An 'SNS' type PM quadrupole, has been purchased from Aster Enterprises Inc. (USA), and will be used to conduct proof of principle testing on the proposed hybrid quadrupole designs. . A comparative ‘end to end’ study of the CERN Linac 4 beam dynamics using the CERN and RAL MEBT designs was performed during this quarter. The results indicate that the RAL type chopper line generates less emittance increase at the end of the 160 MeV LINAC. The explanation is that the lattice is more regular and it contains 4 instead of 3 bunchers.

2. Fast chopper electrodes - slow-wave structures: High frequency analysis, and the mechanical design of prototype modules for the RAL planar A, and helical B2, slow-wave electrode structures are progressing. However, effort for this task was temporarily re-directed to a higher priority FETS design task, resulting in a slower than expected rate of progress during the first part of the year.

3. RAL fast pulse generator (FPG): The RAL FPG has been relocated to the new laboratory area (G17, R2), and will be set up to test new slow-wave electrode structures. The range of available pulse amplitudes, and durations are +/- 200 to +/- 1400 V, and 8 to 15 ns, respectively.

4. RAL slow pulse generator (SPG): The RAL SPG test set-up (bread-board) has been relocated to the new laboratory area (G17, R2), and has been set up to continue testing of the 4kV rated MOSFET switches. A power supply upgrade, and improved cooling have enabled testing at high duty cycle and measurements of transition time and trigger jitter show important improvements when compared to the previous 8 kV rated switches. Modification of the existing 8 kV euro-cassette module for 4 kV operation will enable full power testing to be carried out. A photo of part of the set-up and the results of the first measurements are shown in Figure JRA3.4.5., figure 3.4.6. Figure 3.4.7.

5. Laboratory and office relocation at RAL: The relocation of laboratory and office space was completed during the quarter, and has, inevitably, slowed progress in some areas.

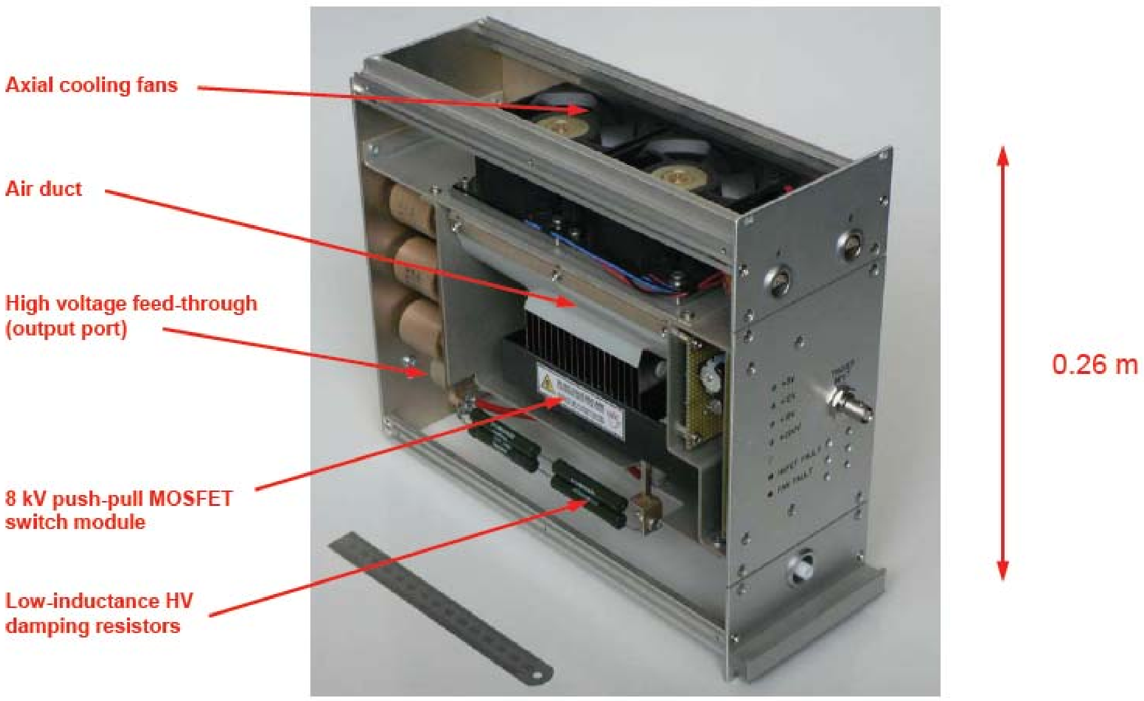


Figure JRA3.4.5. Prototype 8kV SPG euro-cassette module. Side View.

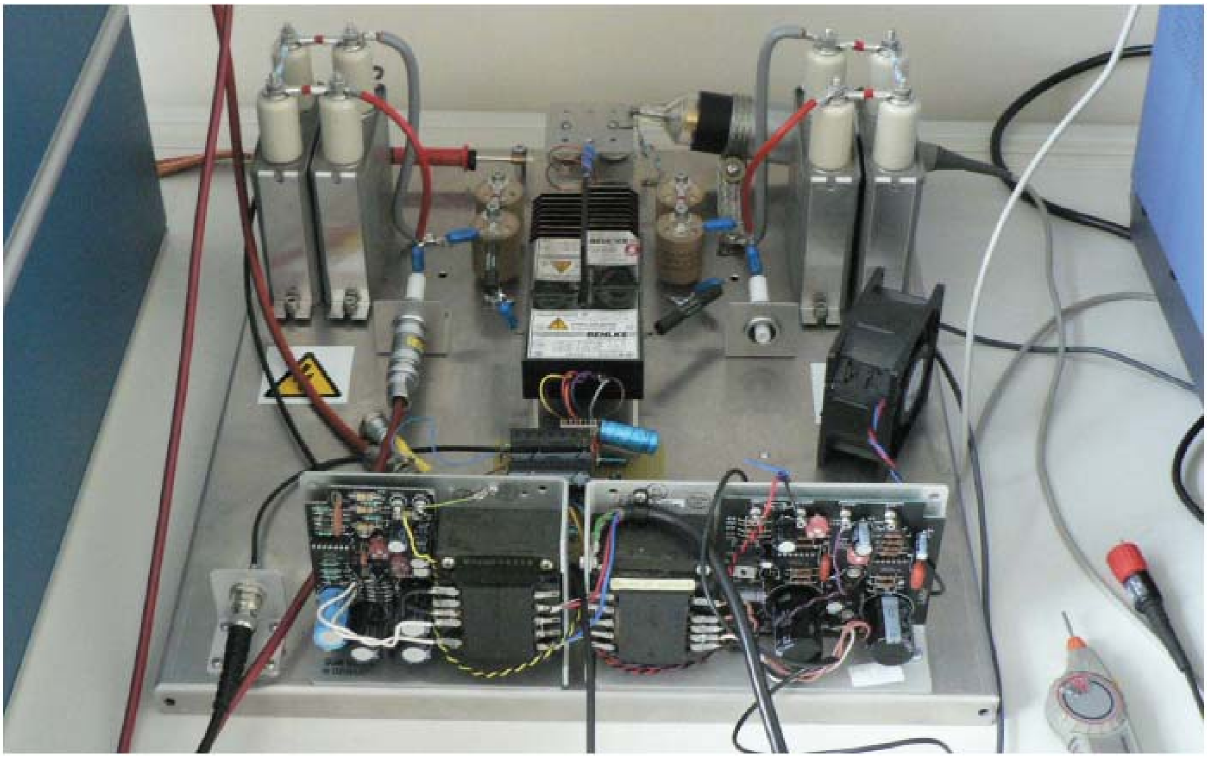


Figure JRA3.4.6. 4kV MOSFET switch (BEHLKE HTS 41-06-GSM-CF-HSB) / Test Set-Up.

Pulse Parameter	FETS Requirement	Measured	Compliancy	Comment
Amplitude (kV into 50 Ohms)	± 1.5	± 4.0	Yes	± 4 kV rated
Transition time (ns)	~ 12.0	T_{rise} ~ 12, T_{fall} ~ 11	Yes	500 pulses
Duration (µs)	0.23 – 100	0.17 – 100	Yes	FWHM
Droop (%)	0	0	Yes	DC coupled
Repetition frequency (MHz)	1.3	1.3	Yes	
Burst duration @ 1.2 MHz	0.3 – 1.5 ms	1 ms	Limited	Scalable
Burst repetition frequency (Hz)	50	25	Limited	Scalable
Post pulse aberration (%)	± 5	≤ ± 5	Yes	Adjustable
Pulse width stability (ns)	± 0.1	8.2 ns (n=1 to 2)	Limited	Can be corrected
Timing stability (ns over 1 hour)	± 0.5	± 0.3	Yes	Over temperature
Burst amplitude stability (%)	+ 10, - 5	< + 10, -5	Yes	0.4 ms burst

Figure JRA3.4.7. Measured performance parameters / HTS 41-06-GSM-CF-HSB (4kV) SPG

JRA3.4.3 Overall Progress of Work Package 4

Table 4.4a: Status of the Sub tasks in WP4 which are supposed to have started according to the MS project breakdown in Annex 1

WBS #	Title	Original begin date (Annex 1)	Original end date (annex1)	Estimated Status	Revised end date
4.1	Chopper structure A (CERN)				
4.1.3	Driver construction, testing.	January 2004	June 2005	100%	June2007
4.1.6	Prototype testing w/o beam	January 2006	December 2007	finished	
4.2	Chopper Line				
4.2.3	Beam line assembling	June 2005	December 2007	20%	March 2008
4.3	Chopper structure B (RAL)				
4.3.3	Prototype construction	January 2006	June2007	70%	March 2008
4.3.4	Prototype testing	November 2007	June2008		

Status with respect to the interim reports and deliverables due in 2006 according to the MS project breakdown

WBS #	Title	Due date in Annex 1	Status	Revised delivery date
4.1.4	Chopper A prototype testing w/o beam	August 2007	100%	finished
4.2.3	Chopper A beam line assembling and meas	Decembre 2007	20%	December 2008
4.3.3	Prototype ready	June 2007	80%	March 2008

JRA3.5 Work Package 5: Beam Dynamics

<u>Exchange between WP5 and WP3:</u>

JRA3.5.2 CEA Activities

1. *Neutralization studies:* Recent results indicate that the neutralization in the LEBT is a major source of nonlinearities. The RFQ doesn't seem to filter this extra emittance. Different LEBTs (solenoid type, quads ...) need to be investigated to minimize the emittance growth as well as transient effects (the propagation of the mismatch).

JRA3.5.3 CERN Activities

1. A detailed campaign of error studies has been run on the LINAC4-vs1. Series of runs (1000-2000) with PATH or TRACEWIN were carried out for statistical evaluation of beam losses, emittance growth and trajectory errors.
2. The correction system was turned on for the worst cases (steering procedure as with a real accelerator) and correcting elements were added to reduce the allowed errors.
3. A maximum average loss of 1 W/m at SPL duty cycle, 5% is dictated by shielding requirements.
   a. Maximum localized losses (within 10 cm) of 0.1 W at SPL duty cycle, 5% allow hands-on maintenance.
   b. emittance growth of 15-20% (at 2 sigma) with respect to the nominal case. This value is well within the emittance budget of the PS-Booster.
4. This work has allowed fixing the alignment tolerances, to give input to the radioprotection and to highlight the hot-spots where a new dynamics should be implemented.
5. *Comparison of beam dynamics in SC triple-spoke cavities, SCL and PIMS:* Both triple-spoke cavity linac and PIMS are competitive options ('on paper') for 90 to 160 MeV energy range in Linac4/SPL from beam dynamics point of view and Spoke cavities have the biggest transverse and longitudinal acceptance.

JRA3.5.4 FZJ Diagnostics

1. *Beam Profile Measurements Based on Light Radiation of Atoms Excited by the Particle Beam:* This non- destructive method has a simple mechanics with no installations in the vacuum, high resolution possible (limited by optics) and is insensitive to magnetic and electric fields. Data acquisition with 32 channels is still pending.

JRA3.5.5 GSI Activities

Work at GSI/Beam Bynamics

1. *Experiments:* The measurement program for high intensity40Ar10+beam was continued with a procedure for varying the phase advance. Results showed excellent reproducibility of emittance measurements. The minimum transverse emittance growth was at about 60 degrees phase advance, the maximum at 45 degrees. Further investigations on the longitudinal emittance measurement device were started.
2. *Simulation:* The reconstruction of the initial distribution was found to be complicated by an incomplete longitudinal emittance measurement (only rms-bunch size available). The agreement between codes is good to excellent on rms-level. Simulation & experiment show "jumpy" behavior of x,y-emittances. Simulated 100%-rms-emittances are too low with respect to experimental data; also they do not depend on initial longitudinal emittances. Good agreement found between experimental 90%-rms-emittances and simulated 95%-rms-emittances.

Work at GSI/Diagnostics

1. *Status of Dynamic Transmission Control Electronics:* Development of an *active* transmission control between consecutive transformers with beam pulses down to 10 µs with fast readout and very large dynamic range!→necessary discrete design to improve fmax=1 MHz standard→high stability design (e.g. linearity better 0.3 %, offset-drift better than 10-4 K-1) with reaction time of electronics below 1 µs and total system reaction up to 10 µs by delay of ≈ 300 m long LINAC + transport line. FPGA digital electronics and interface to control system is presently under development.
2. *Beam induced fluorescence:* This device for non-destructive measurement based on single photon counting has been completed with an integrated data acquisition system. The R&D is finished and nearly ready for usage by the operators.
3. *Non-intercepting bunch shape measurement:* The proof-of-principle is performed, with a resolution lower than 50 ps. The device is in experimental condition with engineering design for operation required.

JRA3.5.6 IAP-FU Activities

1. *Code development:* Machine error setting routines (quad. misalignment, gap voltage error, tank phase error) were implemented to LORASR. A "batch"operation mode (many runs) and development of adequate data analysis tools were completed. The new LORASR tools were applied for error studies for the FAIR Facility Proton Linac beam dynamics design. Additional error types could be implemented (quad rotation, gradient, …).
2. *Error Study on the FAIR Facility Proton Linac:* Quadrupole displacement in X and Y is the main source of particle losses. Losses are well localized in the central part of the linac(extended area for diagnostics). This is why a redesign of the affected section will improve the overall error study outcome. The tolerance limits for manufacturing and alignment of the quadrupole lenses areΔX, ΔY < = 0.1 mm, but the machine error

study does not include any orbit corrections (e.g. by steerer) and should therefore be regarded as worst case scenario.

JRA3.5.7 Overall Progress of Work Package

Table 4.5a : Status of the lowest Sub tasks level in the WP which are supposed to have started according to the MS project breakdown in Annex 1

WBS #	Title	Original begin date (Annex 3)	Original end date (Annex 3)	Estimated Status	Revised end date
5.1	Code development				
5.1.1	Preparation, Dev. of 3D space charge routines, Testing	January 2004	June 2006	90%	December 2007
5.1.3	Neutralization and ECR source model.	January 2004	December 2005	80%	December 2008
5.1.6	Codes preparation for SC linacs	January 2004	December 2006	100%	June 2007
5.1.7	Code comparison and benchmarking	January 2005	September 2008	90%	
5.2.2,3	Measurement campaigns	June and Oct. 2006		100%	July 2007
5.3	Diagnostics and collimation				
5.3.4	Non-interceptive bunch measurement construction (GSI)	January 2005	December 2006	100%	April 2007
5.3.9	Halo monitor tests and improvement (CERN)	January 2004	June 2005	100 %	March 2007
5.3.7	Beam profile monitor design (FZJ)	January 2005	June 07	100%	
5.3.6	On-line transmission control (GSI)	October 2005	September 2007	90%	

Status with respect to the interim reports and deliverables due in 2006 according to the MS project breakdown

WBS #	Title	Due date in Annex 1	Status	Revised delivery date
5.3	**Simulations and experiment at UNILAC Final Report**	December 2006	Delivered in 2007	
5.5.1	**Profile measurement by fluorescence Final Report**	July 2006	Delivered in 2007	
5.5.2	**Non-interceptive bunch measurement Final report**	December 2006	Delivered in 2007	
5.1.1	**3D code development intermediate report**	December 2007	Delayed	June 2008
5.5.3	**Online transmission control final report**	October 2007	Completed in 2007	
5.5.5	**Beam profile monitor final report**	June 2007	Completed in 2007	

JRA3.6 Significant Achievements

- CCDTL Pre-prototype and Prototype successfully tested with full RF power (WP2).
- Cavity "B" delivered and low-power tested (WP3).
- High-power test stand for superconducting cavities at CEA-Saclay completed (WP3).
- Driver for chopper "A" delivered and tested (WP4).
- Error study completed for GSI and CERN linacs (WP5).
- Beam experiments at GSI linac completed, showing good agreement with simulated parameters (WP5).

JRA3.8 List of major meetings organized under HIPPI during the reporting period

The list of events concerning HIPPI during the year 2007 is shown in Table 1.1.1a. More details are given in Table 1.1.1b (web-site or address of the minutes).

Overview of meeting, workshop and event (co)organized by the Activity or with Activity contributions

	Jan	Feb	March	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
CARE & HIPPI												
CSC Meeting				17-18 Paris					12 CERN			
WP2 Meeting					24-25 CERN							
WP3 Meeting				28 Orsay								
WP4 Meeting						11 CERN						
WP5 Meeting					21 Saclay							
HIPPI Annual Meeting									26-28 Orsay			
CARE Meeting										29-31 CERN		
Collaboration meetings												
IPHI-SPL meetings						7-8 CERN						
ISTC meetings		19-20 Mosco w	.	18-20 Mosco w		25-29 CERN				9-10 Moscow		
Conferences, workshops												

APAC 2007	29– 2.2 Indore											
PAC 2007						25-29 Albuquerqu e						

List of meeting, workshop and event (co)organized by the Activity

Date	Title/subject	Location	Main organizer	Number of participants	Comments and Web site
28 April 2007	WP3 meeting	Orsay (F)	IPNO	10	http://hippiwp3.in2p3.fr/
24-25 May 2007	WP2 meeting	Geneva (CH)	CERN	15	Joined with LINAC4 structure review
13 June 2007	WP4 meeting	Geneva (CH)	CERN	13	http://lombarda.home.cern.ch/lombarda/WP4/WP4main.htm
May 21 2007	WP5 meeting	Saclay (F)	CEA	7	http://www-dapnia.cea.fr/Sacm/seminaire/index.php
26-28 September 2007	HIPPI Annual Meeting	Orsay (F)	IPNO, CEA	32	http://www.fz-juelich.de/ikp/hippi/autumn2007/
29-31 October 2007	CARE Annual Meeting	Geneva (CH)	CERN		http://care07.web.cern.ch/CARE07/Index.htm

1.1.1 General meetings

The HIPPI Annual Meeting was jointly organised by IPN and CEA, with the web site prepared and maintained by FZJ. The programme included three presentations on the status of the local accelerator projects supported by HIPPI (Linac4 at CERN, FAIR Injector at GSI and various programmes at RAL), four 3-hour sessions for each of the Work Packages, some discussion sessions and an administrative session on the status of deliverables, on the planning and on the programmes for FP7. The speakers were required to make their presentations available on the Meeting web site one week in advance, to leave preparation time to the ESAC, and apart from few justified exceptions all the speakers have respected this requirement. The meeting was attended by 32 participants, and with one exception (INFN Naples), all the HIPPI Laboratories were represented. The three members of the External Scientific Advisory Committee were present. During the meeting, the debate, often stimulated by the ESAC, was passionate and in some cases the sessions continued well over their schedule. The administrative session has allowed sorting out some problems in the production of the deliverables and to define the detailed planning for the last year of the JRA.

A summary of the HIPPI Annual meeting is given in Annex 1, and the transparencies of all talks are available on the HIPPI07 web-site: http://www.fz-juelich.de/ikp/hippi/autumn2007/

1.4.4 JRA4: Next European Dipole (NED)

The list of participants and of their implication in the NED Work Packages (**C**: Coordination, X: Participation) is given in the table bellow. The overall management is done by CEA and TEU.

Number	Participant	WP1 M&C	WP2 TSQP	WP3 CD	WP4 IDI	WG MDO$^{a)}$	Person-months
1	**CEA**	**C**	X	X	X	X	19,93
10	**INFN**	X	**C**	X			
	INFN-Ge	X		X			
	INFN-Mi	X	**C**	X			
11	**TEU**	X		X			8
15	**WUT**	X	X				
16	**CSIC**	X				**C**	
	CIEMAT	X				X	
17	**CERN**	X		**C**		X	1,80
20	**CCLRC/STFC**	X	X		**C**	X	
	RAL	X	X		**C**	X	

JRA4.1 Work Package 1: Management and Communication (M&C)

JRA4.1.1 Overall Coordination

JRA4.1.2 Meetings

JRA4.1.2.1 Steering Committee Meetings

JRA4.1.2.2 External Scientific Advisory Committee Meetings

JRA4.1.3 Overall Progress of the Activity

JRA4.2 Work Package 2: Thermal Studies and Quench Protection (TSQP)

JRA4.2.1. Heat transfer results for the coil configuration

The stack experimental models

To study heat transfer in superconducting coils of accelerator magnets, it is necessary to reproduce the geometrical, mechanical, electrical and thermal configuration of such a system. Experimental models have been designed to reproduce such a complicated environment and are called “stack” experiments since they reproduce the stack of superconducting cable, insulated and under mechanical constraint as in magnets. Figure 1 shows the two setups used in the NED program to study heat transfer.

These two experimental models are very similar, only the dummy conductor, representing the superconducting cable, is different. Both are composed of a mechanical mould that creates mechanical constraints. The stack is composed of five conductors instrumented with heaters and a central one, which is also instrumented with two thermometers. One, three or five conductors can be heated by Joule effect [1, 2]. The experimental method consists of measuring the increase of the conductor temperature when heat is dissipated in it. We established heat transfer curve $\Delta T=f(Q)$ as a function of the bath temperature.

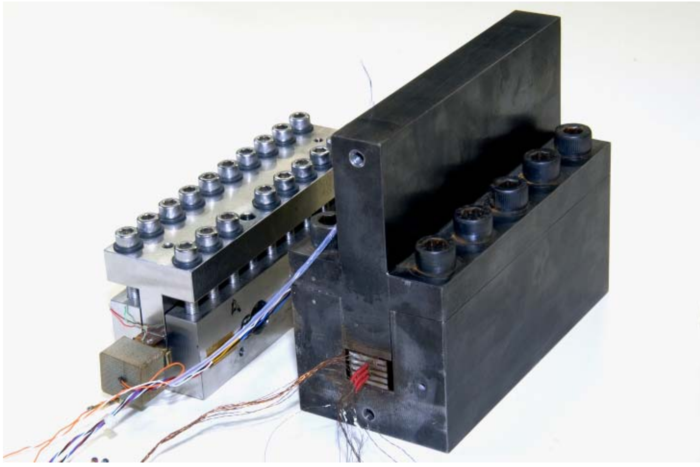


Figure JRA4.2.1. The “stack” experimental models from KEK (left) and Saclay (right).

Technical solution test

This series of tests is aimed to acquire general understating and to validate some technical solutions that have been made for the design of the LHC magnets. We used the Saclay stack experiment to compare these different magnet configurations. The electrical insulation tested has a 1st layer of Kapton 200 HN (50 μm×11 mm) in 2 wrappings (no overlap) and a 2nd layer of Kapton 270 LCI (71 μm×11 mm) with a 2 mm gap. The polymerization was performed at 60 MPa [1]. The tests were performed with the central heated conductor.

In the real magnet configuration, there is only one side of the coil, which is in direct contact with the pressurized helium at 1.9 K, which is located around the beam tube, as depicted in Figure 2. The other side of the coil is in contact with the collars of the magnet. Therefore, the privileged heat path to cool the magnet is through the side that is in contact with the helium. The general idea behind these tests is to investigate the influence of the coil surface that is in contact with the pressurized helium and to compare the experimental results regarding the technical solutions that had been used at CERN.

We have performed three experiments with different configurations for one of the small faces of the stack, as presented in the Figure 3. The first experiment, which constitutes our reference, is the experiment with both small faces opened to helium. This configuration corresponds to the results in blue squares, which shows the effect of helium in the insulation since the evolution of the temperature difference between the central conductor and the helium bath (ΔT) is not linear. With a “dry” insulation, i.e. without any helium, the curve would have been linear representing a conductive behaviour. This Q-ΔT curve shows a low overall thermal resistance where at 60 mW (corresponding to the LHC heat deposition due to beam losses) the ΔT is around 50 mK below the temperature margin for the LHC magnets.

The second test was performed with one face thermally insulated (red squares). The overall thermal resistance is higher since the heat has to travel through the entire stack to the cold source. The results show roughly that the thermal resistance is two times higher than in the first configuration. This is somehow expected and the technical solution chosen in the design by CERN is to use an inner layer spacer made of G10 with some porosity as shown in Figure JRA4.2.4. The insulating piece creates channels for the helium and it improves the overall thermal resistance compared to the case where the one small face is thermally insulated. This is shown in the Figure JRA4.2.2. with the green circle curve.

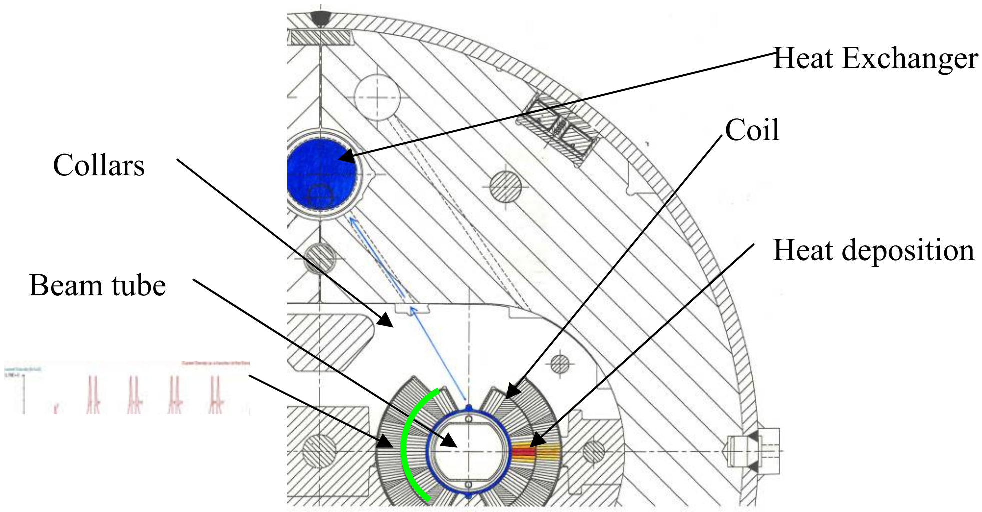


Figure JRA4.2.2. Schematic of the LHC magnet-cooling configuration

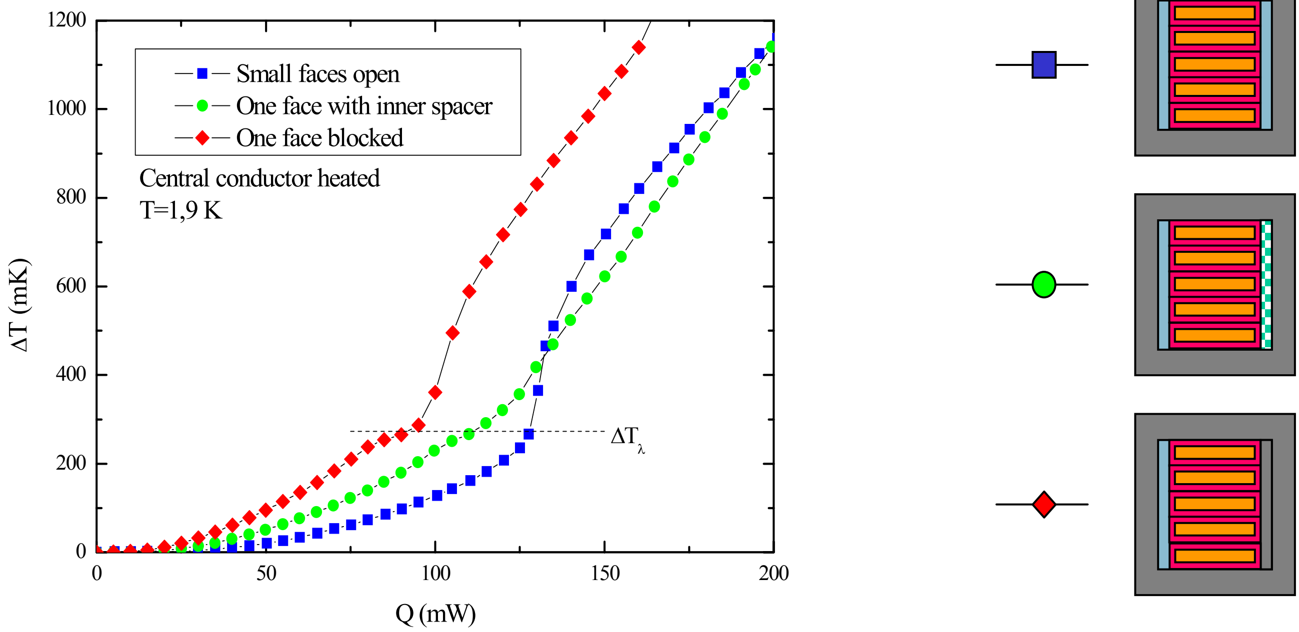


Figure JRA4.2.3. Experimental results with different small face configurations

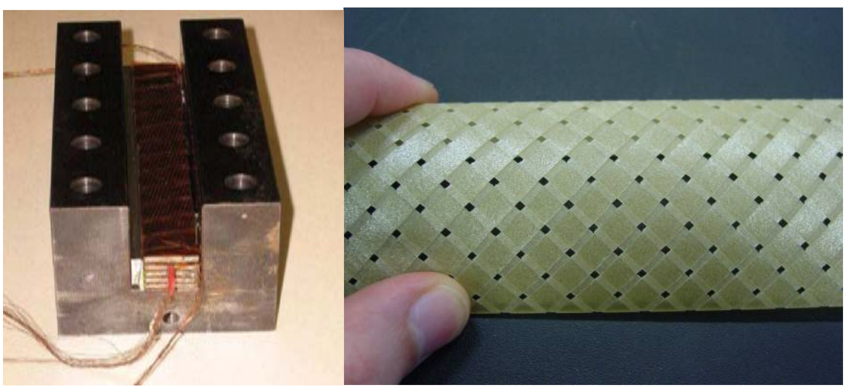


Figure JRA4.2.4. Stack experiment with sample. On the left picture, the sample with the thermally insulated face and on the right picture the inter layer spacer.

The general understanding of the differences between the heat transfer curves can be explained by the fact that when one face is thermally insulated, the heat path is longer, i.e. the heat dissipated in the half (insulated) side of the conductor has to travel through the cable and the insulation of large face to reach the helium. That is the proof that the quantity of helium and the "porosity" of the cable (conductor + insulation) is an important parameter in the heat transfer process for the cooling of the cable in an accelerator magnet. Finally, we can conclude that the more helium paths exist, the larger quantity of helium in the cable is, the larger the heat transfer is and the better the cooling is. Obviously, in the construction of accelerator magnets this is a parameter that is hard to control and moreover increasing helium content in the cable probably goes against the magnetic design of such magnets.

Tests of the innovative insulation

The innovative insulation developed at CEA Saclay [3] was tested with a stack of five cables heat treated for 50 hours at 666 °C at 10 MPa in order to activate the porous precursor and to create the porosity in the innovative insulation (cf; Figure JRA4.2.5.).

The Figure 6 shows the temperature difference between the central conductor and the bath as a function of the heat dissipated in the cable. It is represented in W/m^3 and the volume represents the volume of the five conductors. The temperature increase is low and when compared to the results obtained during the R&D for the LHC magnet insulation [1], the ΔT is an order of magnitude lower. The beam losses in the current LHC configuration correspond to 10 mW/cm^3 and the ΔT measured is around 5 mK whereas for the expected beam losses for the upgrade of LHC (between 50 to 80 mW/cm^3) the ΔT is around 20 mK. These results constitute the first thermal test of a ceramic innovative insulation and show that this solution is suited to cool accelerator magnets subjected to beam losses as high as expected for the upgrade of the LHC. Nevertheless, measurements at higher mechanical loads close to the magnet constraint (100 MPa) are needed to confirm this positive result.

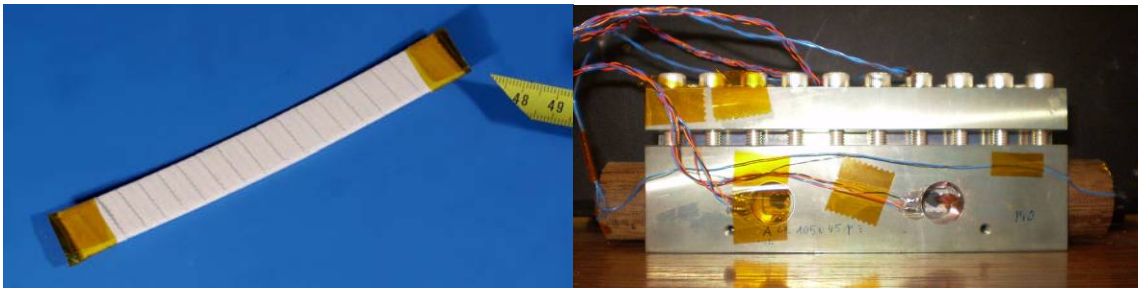


Figure JRA4.2.5. Dummy cable wrapped with the non-reacted innovative insulation on the left picture and the fully instrumented stack experiment on the right picture.

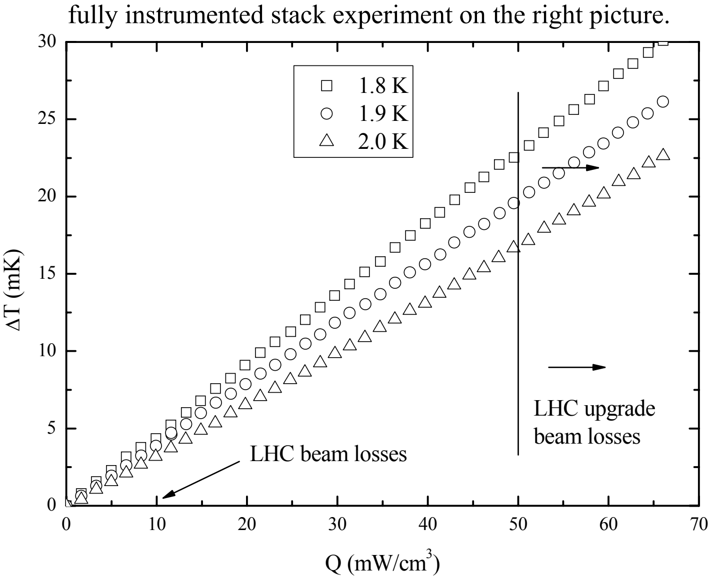


Figure JRA4.2.6. Central conductor temperature increase as a function of the heat dissipated in the five conductors for the innovative insulation

JRA4.2.2 TSQP Work Package coordination

JRA4.2.3 Heat Transfer results for the insulation

The drum experimental model

The goals of the measurements are to determine the thermal conductivity and the Kapitza resistance at the interface of the electrical insulation with He II. The total thermal resistance of a sample, R_s, is the sum of the two Kapitza resistances at the helium boundary and the resistance due to thermal conduction in the sheet,

$$R_s = \frac{2}{n\alpha} T_b^{1-n} + \frac{\ell}{\kappa}. \qquad \textbf{(1)}$$

where κ is the thermal conductivity, ℓ is the thickness and the first term is the Kapitza resistance. To determine simultaneously the thermal conductivity and the Kapitza resistance, measurements of the same type of samples with different thicknesses have to be performed. The experimental set-up is composed of two support flanges and two sample holder flanges all made of stainless steel (see Figure JRA4.2.7). The tested material sample sheet has about 80 mm diameter and it is glued with epoxy resin to one of the holder flanges (see Figure JRA4.2.8.). The second holder flange pressures the glued area to ensure leak tightness of the connection.

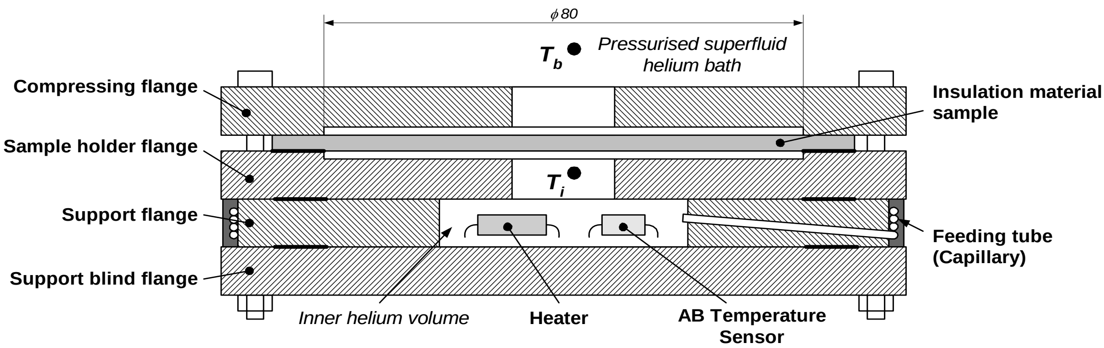


Figure JRA4.2.7: Schematic drawing of the drum experimental set-up

One of the support flanges comprises an open space, where a 1 Ω resistor (heater) and an Allen Bradley (AB) type temperature sensor are located. The inner volume is fed with liquid helium and the wiring to the set-up instrumentation is introduced by a 0.5 mm inner diameter and 0.4 m long capillary tube, which is wrapped around the outside surface of the support flange and insulated in a epoxy resin block. The second support flange is blind and closes the inner helium volume.

Tests of the Conventional insulation

The conventional insulation made of fibreglass tape and epoxy resin developed by RAL [4] has been only tested in the drum experiment since this type of insulation is impermeable to helium [5]. Indeed a test in the coil configuration with the stack experiment would have given a thermal result driven by the thermal conductivity and the Kapitza resistance of the electrical insulation.

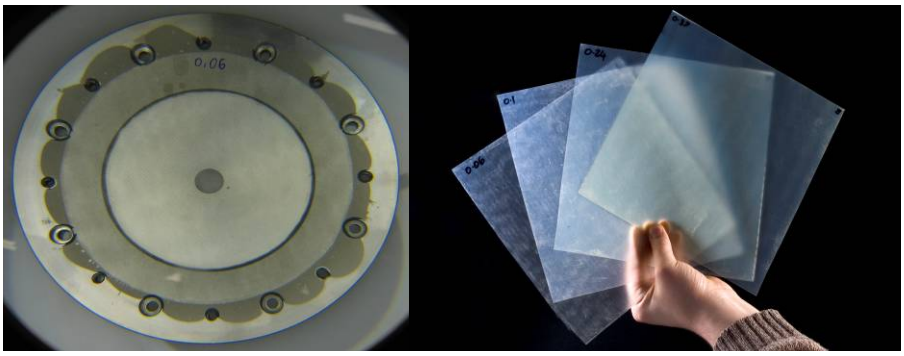


Figure JRA4.2.8. Pictures of the different samples tested.

In Figure JRA4.2.9. the thermal conductivity of the conventional insulation and of some other materials is presented. The thermal conductivity value for the innovative insulation is very close to the value for G10 and epoxy resin; moreover the temperature dependency is also similar.

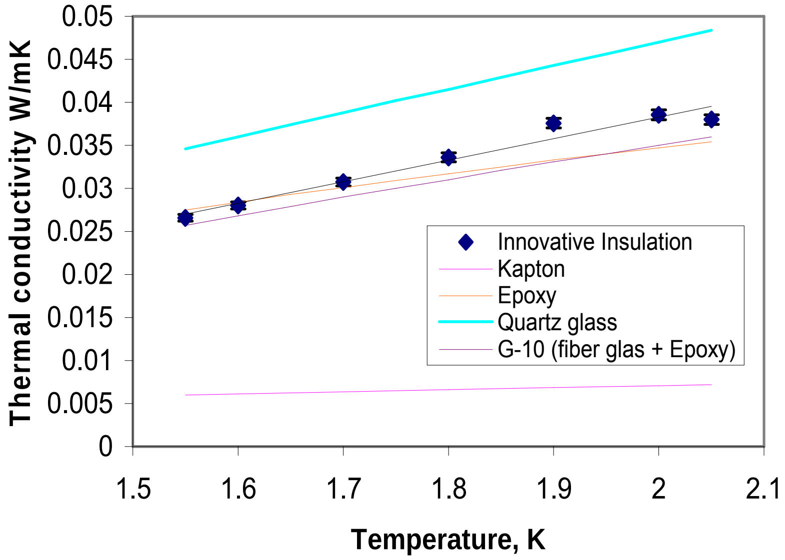


Figure JRA4.2.9. Thermal conductivity of the conventional insulation

This gives us good confidence in these results. The evolution of the thermal conductivity is,

$$k(T) = 0.00251.T + 0.00118 \text{ W/mK} \tag{2}$$

The Kapitza resistance is presented in Figure 10. To the best of our knowledge, these are the first results on Kapitza resistance on such materials. In figure 16 the results are compared to the Kapitza resistance of Kapton [6], which is also a polymer and the results are similar.

$$Rk(T) = 0.0051.T^{-1.57} \text{ Km}^2\text{/W} \tag{3}$$

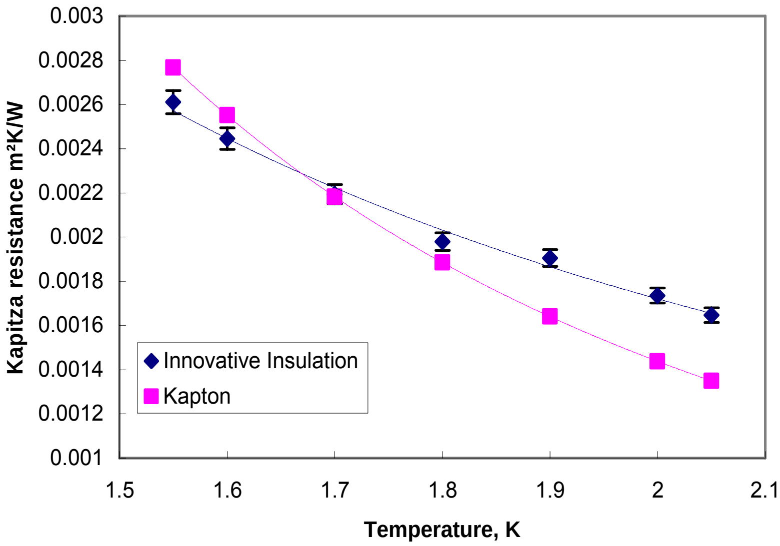


Figure JRA4.2.10. Kapitza resistance of the conventional insulation

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4. S. Canfer, G. Ellwood, D.E. Baynham, F. Rondeaux, and B. Baudouy, Insulation Development for the Next European Dipole, IEEE Trans. on Magnetics, (2007) to be published
5. J. Polinski and B. Baudouy, Low temperature heat transfer properties of conventional electrical insulation for the Next European Dipole, presented and accepted for publication at the Cryogenics Engineering Conference 2007 in Chatanooga, AIP, Ed. J. G. Weisend, (2007)
6. B. Baudouy, Kapitza resistance and thermal conductivity of Kapton in superfluid helium, Cryogenics, (2003) 43 667-672

JRA4.3 Work Package 3: Conductor Development (CD)

Introduction

The NED conductor development is carried out through two industrial contracts awarded to ShapeMetal Innovation (SMI) in the Netherlands, which has now been acquired by European Advanced Superconductors (EAS) in Germany and to Alstom/MSA. The firm SMI completed successfully the second step of the development plan with the cabling trials carried out at Lawrence Berkeley National Laboratory. A reasonable degradation between 4% and 8% was measured on strands extracted from the cable. The firm Alstom/MSA has concentrated the effort in resolving workability issues to produce sub-elements of the desired geometry. Two roads for the manufacturing processes of the sub-elements, either by cold working or by extrusion, have been investigated by Alstom/MSA, during the second step. Alstom/MSA was successful to manufacture a sub-element suitable for NED conductor by both processing roads. The sub-elements are being used in few final stage billets to get a conductor fulfilling the NED specification. At the end of the second step foreseen for beginning of 2008, one road will be chosen for the final production of the NED conductor.

Activities

Conductor development: status of SMI

SMI has succeeded in producing a 1.257 mm strand, including 288 tubes with a diameter of 50 μm as shown in Figure 11(a), which achieved a critical current of ~ 1400 A at 4.2 K and 12 T (corresponding to a non-copper critical current density of ~ 2500 A/mm^2), thus 15% below NED specified value. Critical current measurements were also performed at higher magnetic field and the critical current value measured at 15 T was 760 A, i.e. only 8% below NED target. Furthermore, magnetization measurements performed at a function of temperature and of field have confirmed that the effective filament diameter was ~ 50 μm diameter. Finally the stability current was measured at CERN. The stability current is the maximal current a strand can sustain without quenching when sweeping the magnetic field at low values. It was verified that the stability current at 4.3 K was in excess of 2000 A for field ramps between 0 and 4 T at 0.3 T/minute. This high stability current and the limited number of flux jumps observed during the magnetization measurements demonstrated the strand stability against flux jumps. A program was launched at CERN to achieve a higher critical current or at least the same value by keeping a thicker unreacted Nb layer after Nb_3Sn reaction in order to protect better the Cu matrix from Sn diffusion. After cabling the strands are severely deformed near the thin edge of the cable, the filaments are flattened and thus the thickness of the Nb tube is not anymore uniform. Starting from the standard heat treatment for a PIT strand (84 hours at 675 ^oC), the temperature of the reaction was decreased to 650 ^oC with the aim to get smaller Nb_3Sn grains. Not only slightly higher critical current were measured at CERN with the reaction heat treatment at 650 ^oC but mostly higher RRR values were obtained indicating less Sn contamination of the Cu matrix. The RRR values were generally larger than 100 with the new heat treatment as compared to the standard heat treatment generally in the range between 60 and 80. This reaction heat treatment at 650 ^oC was applied to the cable samples produced to qualify the NED/PIT strand for the final strand production. Cabling trials were carried out at Lawrence Berkeley National Laboratory to assess the level of cable degradation. The cabling tests proved the suitability of the SMI-NED strand for cabling, a moderate degradation between 4% and 8% was measured on strands extracted from the cable. After this successful result, the go-ahead for final strand production was given to EAS/SMI.

Conductor development: status of Alstom/MSA

Alstom/MSA is developing the NED strand by the internal tin technology. The first step was devoted to the qualification of the sub-element. Alstom encountered many problems with the workability of the sub-elements produced by cold drawing only, due to a lack of cohesion between the different components. For the second step, the decision was taken to continue the development following two different roads for the sub-elements by cold drawing and by warm extrusion. A sub-element billet was assembled beginning of 2007 and successfully extruded in April. The sub-element billet was drawn without any problem and stacked in two final stage billets with 78 and 240 sub-elements. The result on these two final stage billets is expected for January 2008. Alstom/MSA has continued during step 2 the development of the NED conductor with sub-elements produced by cold drawing only, as in the first step. A first final stage billet was produced with 78 sub-elements with a diameter of 85 μm, as shown in Figure 11(b). This wire achieved a critical current of 904 A at 4.3 K and 12 T, corresponding to a non copper critical current density of ~ 1930 A/mm^2, a value lower than expected. Scanning Electron Microscopy analysis was performed at CERN to find an explanation. A significant amount of Nb filaments was not completely reacted contributing to the low critical current density. A second final stage billet was produced with 114 sub-elements in order to reach step by step a sub-element diameter of 50 μm. Alstom/MSA encountered drawing problems with this billet starting already at large diameter. The reason for the breakages was identified. The layout of the sub-elements in the final stage billet is the main cause for the breakages. For the future billets, Alstom/MSA will implement a new layout of the sub-elements. The wire drawn from the second final stage billet reached a critical current of 820 A at 4.3 K and 12 T, a value which is even lower than the value obtained previously. The Nb barriers were severely damaged by the first drawing steps and the Nb filaments were even less reacted than those of the first final stage billet due to more Sn leak through the Nb barrier damaged by the first drawing steps. A third final stage billet with sub-elements obtained by cold drawing only was launched in fabrication in July 2007. The result is foreseen in January 2008. Based on the results obtained with the final stage billets produced for the second step, one of the two roads for the sub-element fabrication will be selected for the final strand production.

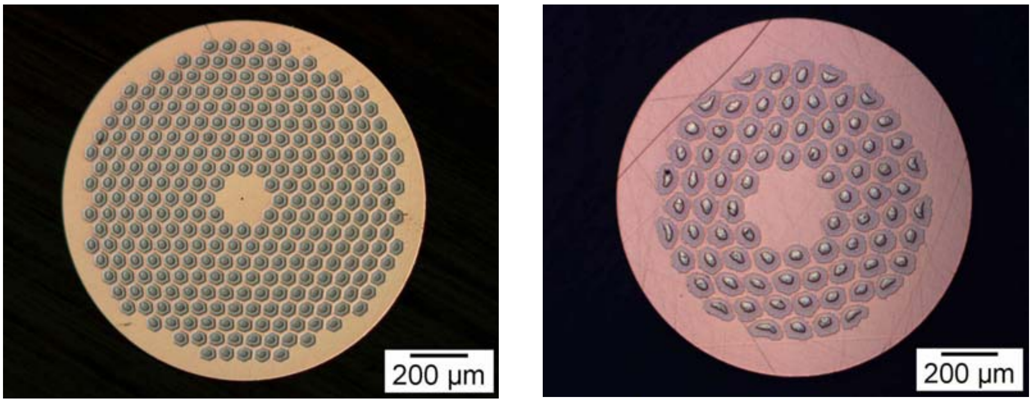

Figure JRA4.3.1. Cross-sectional views of wires developed within the framework of the CARE/NED activity: (a) Powder-In-Tube wire developed by SMI (left) and (b) Internal Tin wire produced by Alstom/MSA (right).

Achievements

The two Nb_3Sn wire manufacturers contracted by CERN to develop NED conductors have achieved significant progresses. The main result so far has been the production by SMI of the first NED cable with a moderate critical current degradation between 45 and 8% measured on strands extracted from the cable. This result concluded the R&D phase of SMI. Vigorous efforts were carried out by Alstom/MSA to develop the NED strand. Alstom should complete the R&D phase for beginning of 2008.

Publications

1. S. Farinon, T. Boutboul, A. Devred, D. Leroy, L. Oberli, Nb_3Sn wire layout optimization to reduce cabling degradation, MT20.
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3. M. Di Michiel, C. Scheuerlein, Phase transformations during the reaction heat treatment of powder-in-tube Nb_3Sn superconductors, Supercond. Sci. Technol. 20, (2007) L55-L58.
4. C. Scheuerlein, M. Di Michiel, A. Haibel, On the formation of voids in Nb_3Sn superconductors", Appl. Phys. Lett., 90, 132510, (2007).
5. Polinski J., Canfer S., Ellwood G., Baudouy B., Low Temperature Heat Transfer Properties of Conventional Electrical Insulation For The Next European Dipole, CEC-ICMC 2007.

JRA4.4 Work Package 4: Insulation Development & Implementation (IDI)

JRA4.4.1 Work Package Coordination

JRA4.4.2 Specification Drafting

JRA4.4.3 Conventional Insulation

JRA4.4.4 Innovative Insulation

The test program was focused on the mechanical characterization of insulated cable stacks representative of magnet coils.
The used method is derivate from the classical technique used to qualify the quadrupoles: perform compression tests on stacks of conductors prepared with electrical insulation.

As NED specifications indicate a maximum pressure of 200 MPa in normal use, we have had to introduce some modification to allow the samples to be tested at this rate of compression with our press. The measurement cell allows a maximum charge of 150 kN, so the length of the stacks has been adapted and defined at 50 mm (about half the length of the twist pitch of the cable).

The tests have been carried out with an Instron screw-driven machine, which allows tests at room temperature and in cryogenic conditions. The load is measured with a 150 kN cell. The direction of the applied stress is perpendicular to the cables.
The first tests have been performed on stacks of eight Rutherford type Nb_3Sn cables wrapped with innovative insulation and reacted, without additional solution around the cables. During the heat treatment, compression of 13 to 55 MPa was applied to the samples.

In a first step, the samples were submitted to 3 cycles of uniaxial compression from 0 up to a stress level of 75 MPa at room temperature. The results are presented in Figure JRA4.4.1.

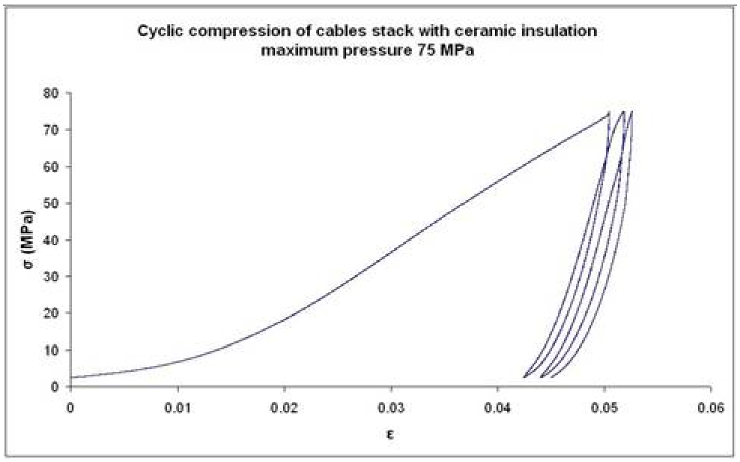


Figure JRA4.4.1. Compression cycles on cable stacks insulated with the innovative insulation

As some fissure lines have been observed on the sides on the samples, the tests have been stopped. In fact, some of these fissures have been already observed when the samples are extracted from the reaction mould before the mechanical test itself. At this moment, the compression stress imposed during the heat treatment is released and what is observed is the relaxation and rearrangement of the cables. If the compression tests are performed on stacks of cables without insulation, a similar behaviour can be observed.

Conclusion

The retained method, compression tests on stacks of insulated conductors, seems not to be adapted to qualify the mechanical performances of the innovative insulation. So we will have to reflect upon the right way to extract the required parameters and probably define a new sample design.

To complete the qualification program of the insulation, some tests have to be performed:

- Thermal characterisations will be performed in framework of the EU contract *FP7-IA HFM JRA proposal WP2: Support studies.*
- The electrical tests will be completed with dielectric measurements on the insulation.
- The radiation hardness, expected good, will be verified.

In parallel of this study, we are working in the NED SMC (Short Model Coil) program on the design and the manufacture of first a prototype and then, 2 coils with ceramic insulation which will be tested in the SMC test setup.

JRA4.6 Significant Achievements

The completion of the Thermal studies of WP2 (TSQP) with as key result a first indication that the new innovative insulation types can have an order of magnitude better heat removal that the classical types employed up to now.

2. Use and dissemination of knowledge

The CARE dissemination board includes the seven activity deputy coordinators and is chaired by the CARE deputy coordinator. The dissemination of knowledge activity focused on the publication of scientific articles presenting work partially funded by the CARE activity, on establishing Web sites and on promoting the CARE results at accelerator conferences.

3.1 Web Sites

The central CARE Web site http://care.lal.in2p3.fr/ , has been regularly updated. It includes:

- Links to the seven activity (NA and JRA) Web sites
- CARE official documents (Consortium agreement, Annex I, etc…)
- The table of CARE deliverables
- The CARE management network and directory
- The calendar of CARE meetings
- A link to the Publication repository
- Advertisements for vacant CARE funded temporary positions.

All seven activity Web sites are active and regularly updated by the corresponding activity management. Most of these Web sites provide access to informative Work Package Web pages.

3.2 Publications

As anticipated last year, four PhD thesis initiated by CARE have been successfully defended and their write up included in the CARE publications.

The five categories of CARE publications are defined by the following table:

Publication category	Type of publication and Responsibility	Reviewing	Storage and numbering
CARE/Activ Document-year-number	Technical documents Responsibility of the authors	No review	Stored locally in NA/JRA web sites Numbering by NA/JRA coordinators
CARE-Pub-year-number	Journal publications CARE responsibility	Internal review	Stored in CARE web site Central numbering
CARE-Report-year-number	Yearly reports, and final deliverables to EC CARE responsibility	Submitted to EU commission	Stored in CARE web site Central numbering
CARE-Conf-year-number-Activ	Conference proceedings NA/JRA responsibility	Abstract approved by NA/JRA coordinators Internal review	Stored in CARE web site Central numbering
CARE-Note-year-number-Activ	CARE workshops and reviewed papers not aimed at publication CARE responsibility	Internal review	Stored in CARE web site Central numbering
CARE-Thesis-year-number-Activ	PhD thesis partly funed by CARE CARE responsibility	Internal review	Stored in CARE web site Central numbering

Publication Web Repository

All CARE papers belonging to the last five categories are stored and are publicly available on Web-based publication repository http://www-dapnia.cea.fr/Documentation/Care/index.php. This Web repository is linked to the central CARE Web site from a new Web page http://care.lal.in2p3.fr/Publications/ which includes straightforwardly the following requested acknowledgement to the EC support:

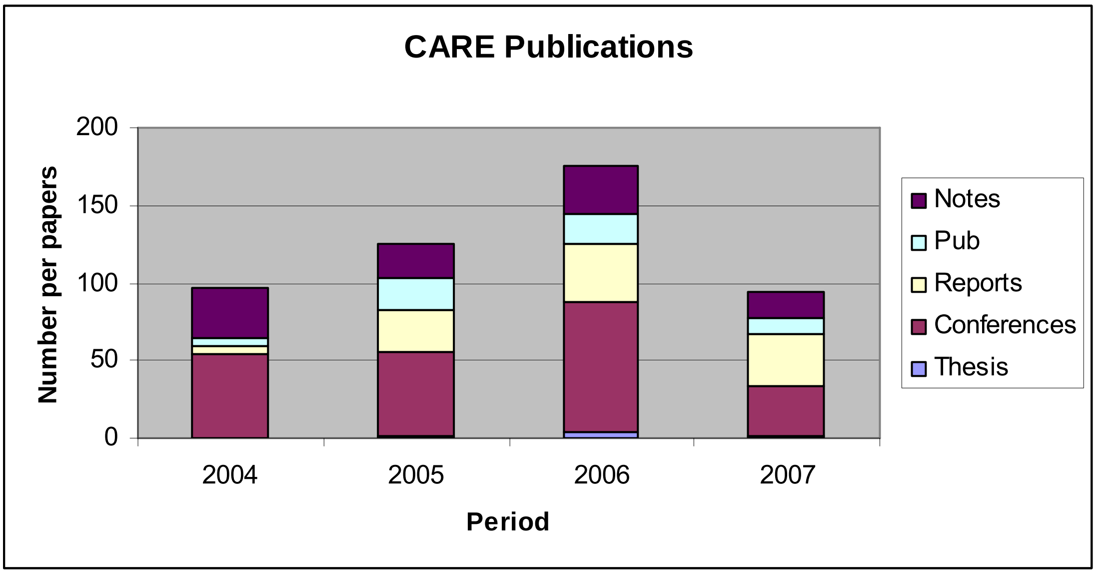
We acknowledge the support of the European Community-Research Infrastructure Activity under the FP6 "Structuring the European Research Area" programme (CARE, contract number RII3-CT-2003-506395).

The following table records the number of CARE scientific articles issued by the different activities (NA and JRA) in each category.

2007 CARE Publications

	Publications	Conférences	Notes	Reports	Thesis
ELAN			6	1	
BENE				1	
HHH		12	4	2	
SRF		11	2	9	1
PHIN				9	
HIPPI		6	4	9	
NED		3		3	
ALL	11				
TOTAL	**11**	**32**	**16**	**34**	**1**

The evolution of the number of publications over the first 4 years of CARE activities is shown in the histogram below :



Publication lists for 2006:

The list of CARE papers can be directly uploaded from the following Web pages:

- CARE Journal Publications: http://www-dapnia.cea.fr/Documentation/Care/care-pub-index-2007.php

- CARE Reports:
  http://www-dapnia.cea.fr/Documentation/Care/care-rapport-index-2007.php
- CARE Conference Proceedings:
  http://www-dapnia.cea.fr/Documentation/Care/care-conf-index-2007.php
- CARE Notes:
  - ELAN: http://www-dapnia.cea.fr/Documentation/Care/care-note-elan-index-2007.php
  - HHH: http://www-dapnia.cea.fr/Documentation/Care/care-note-hhh-index-2007.php
  - SRF: http://www-dapnia.cea.fr/Documentation/Care/care-note-srf-index-2007.php
  - HIPPI: http://www-dapnia.cea.fr/Documentation/Care/care-note-hippi-index-2007.php
  - NED: http://www-dapnia.cea.fr/Documentation/Care/care-note-ned-index-2007.php

Annexes

Annex 1 – Summaries and main conclusions of the General Meeting

The CARE general meeting, CARE07, took place at CERN Geneva, (Switzerland) on October 29-31, 2007. The meeting Web site http://indico.cern.ch/conferenceDisplay.py?confId=15901 provides the information concerning the participation (108 participants), the scientific program and the presentations. An overview of the program is given on the next page.

The general meeting included one day of plenary session devoted to 12 highlight talks invited by the seven CARE activities to report on the most significant developments in their field of research. It also included one day of parallel of sessions dedicated to the CARE activity workshops and internal meetings to prepare for their annual report.

An important part of the program was the plenary session on October 31 dedicated to the summary talks of the seven CARE activity coordinators. They all reported on the continued commitment of the institutes and their scientists towards the CARE programme and the objectives of the CARE activities. They also reported on the impressive amount of scientific and technical work already accomplished. Significant results have already been obtained, outlined elsewhere in this document, and no significant delays or difficulties appeared in their respective programme. In general, the progress of the fourth year of the CARE project has been quite satisfactory.

The continuation of the CARE project in FP7 Integrated Activities including accelerator R&D programs has been discussed during the Wednesday afternoon session dedicated to the reports from the three working groups set up by ESGARD.

B. Management Report (financial information)

1. Justification of the resources deployed

Contract N°	RII3-CT-2003-506395	Project acronym	CARE
Participant N°	1	Participant short name	CEA

		Management	
		Total effort in person-months (1)	15,57
Cost category	Actual direct eligible costs (€)	Justification of costs description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)	
Personnel cost (2)	124 386,14	Permanent personnel for CARE management: CARE coordinator and deputy coordinator, financial assistant, secretary, accounting office.	
Durable equipment	0,00		
Consumable and prototyping	720,44	Computer for CARE management office	
Travel	7 070,45	Participation in the: CARE Steering committee at CERN (2 persons); CARE Annual meeting at CERN (2 persons); CARE mid-term review at Brussels (1 person); CARE management reviews at DESY Hamburg (1 person) and at CERN (2 persons)	
Audit certificate			

		N2-BENE - Beam for European Neutrino Experiments	
		Total effort in person-months (1)	
Cost category	Actual direct eligible costs (€)	Justification of costs *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)*	
Personnel cost (2)	0,00		
Durable equipment	0,00		
Consumable and prototyping	0,00		
Travel	2 024,02	Participation to meetings organized by BENE: BENE Steering Group meetings (x2) at CERN (1 person); BENE meeting at DESY Hamburg (1 person); CARE Annual meeting at CERN (1 person).	

		N3-HHH - High Energy High Intensity Hadron Beams
		Total effort in person-months (1) 0
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)*
Personnel cost (2)	0,00	
Durable equipment	0,00	
Consumable and prototyping	0,00	
Travel	2 517,23	Participation to "Simulation of BPM Front-End Electronics and Special Mechanical Designs meeting" worshop in Hamburg (1 person) and paticipation to Ned Steering committee associated with CARE07 meeting in Geneva (5 persons)

		R1-SRF - Superconducting Radio Frequency
		Total effort in person-months (1) 58,03
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)*
Personnel cost (2)	268 333,60	Permanent and additional personnel for WP5 (Surface Preparation), Task 5.1 (EP for single cell): electropolishing of single cell cavitieson the EP set-up, modelling of single cell EP process. Permanent personnel for WP8 (Tuners): Task 8.3 (CEA tuner): warm tests of CEA tuner. WP10 (Tests in CRYHOLAB) project management. Permanent and additional personnel for WP11 (Beam Diagnostics), Task 11.1:characterization of the second beam position monitor cavity at DESY-TTF with beam; mechanics, welding and copper-coating studies for a third BPM cavity prototype.
Durable equipment	10 196,49	WP5 : purchase of EP chemical bench, heat exchanger and thermometers, purchase of one RF-laboratory PC;WP10: purchase of support and amplifier for magnestostrictive
Consumable and prototyping	11 216,50	WP5: purchasing of electropolishing chemicals and piping, copper coated plates; WP11: purchasing of high resolution electronics boards, connectors and RF components, welding test of BPM tubes.
Travel	18 242,14	Participation to the CARE-SRF Annual meeting at Warsaw (3 persons) and CARE Annual meeting at CERN (1 person); WP5: participation to TESLA Technology Collaboration meeting at FNAL Chicago (3 persons); working meeting at Legnaro (2 persons); WP11: BPM beam tests at DESY, Hamburg (2 persons, 4 weeks); CARE-SRF meeting at DESY-Hamburg (2 persons)

		R3- HIPPI - High Intensity Pulsed Proton Injector
		Total effort in person-months (1) 100,05
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)*
Personnel cost (2)	462 064,20	Permanent personnel for WP3 (design and fabrication follow-up of power couplers, cavity, magnetic shielding, cold tuning system ; installation and qualification tests of the 1MW power test stand ; chemical treatment, clean room assembly and measurement at 2K of the cavity before Helium tank welding). Permanent personnel for WP5 (beam dynamics studies).
Durable equipment	145 941,61	Components for the 1 MW - 700 MHz test stand developped in WP 3 and associated materials for control command; Prototypes of cavity and power couplers.
Consumable and prototyping	75 677,19	RF and HV components (connectors, cables, ...) for the power test stand and the power coupler test bench ; tools for handling and assembly of the components.
Travel	190,73	Fabrication controls in industry.

		R4- NED - Next European Dipole	
		Total effort in person-months (1)	19,93
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)*	
Personnel cost (2)	109 213,32	Two additionnal staffs hired at CEA : one on Innovative Insulation (WP4 , 3 monthes) and one on Heat Trasfer Measurements (WP2, 6 monthes).Permanent personnel : NED JRA coordination (WP1), Heat Transfer Studies (WP2), Critical Current measurements (WP3), Innovative Insulation Development (WP4)	
Durable equipment	1 288,20	Amortization of 2005 purchases	
Consumable and prototyping	3 795,79	WP2 (Thermal Studies and Quench Protection) : Electrical components for cryostat regulation; WP4 (Innovative Insulation Development) : Ceramic samples for tests	
Travel	7 117,19	Participation to 4 NED Steering committeemeetings, 3 in Geneva, 1 in Oxford, 1-to-2 people in average. 6 trips to Genova for Coordination (WP1), 2 trips to Genova for participation to Heat transfert meeting (WP2) and 1 trip to Genova for discussion on mechanics	

Total direct eligible costs	**1 249 995,23**		
Total indirect costs	**611 839,48**		
Adjustments to previous periods	**-3 808,39**	Adjustments related to personnel cost	
Total costs (3)	**1 858 026,32**	**Global estimate of the total costs for AC contractors (not only the eligible costs)**	

Justify any deviations with respect to the planned budget

(1) AC contractors must include both the total estimated human effort (including permanent staff) and, in brackets, additional staff only.
(2) For TA activities excluding the effort charged under the user fees if the UF cost model is used.
(3) Totals should correspond to the respective figures on FORM C - Financial Statement

Contract N°	RII3-CT-2003-506395	Project acronym	CARE
Participant N°	2	Participant short name	UCLN

		N2-BENE - Beam for European Neutrino Experiments	
		Total effort in person-months (1)	1
Cost category	Actual direct eligible costs (€)	Justification of costs *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)*	
Personnel cost (2)			
Durable equipment			
Consumable and prototyping	33,18	Express mail	
Travel			

Total direct eligible costs	**33,18**		
Total indirect costs	**6,63**		
Total costs (3)	**39,81**	Global estimate of the total costs for AC contractors (not only the eligible costs)	

Justify any deviations with respect to the planned budget

(1) AC contractors must include both the total estimated human effort (including permanent staff) and, in brackets, additional staff only.
(2) For TA activities excluding the effort charged under the user fees if the UF cost model is used.
(3) Totals should correspond to the respective figures on FORM C - Financial Statement

Contract N°	RII3-CT-2003-506395	Project acronym	CARE
Participant N°		Participant short name	

N1-ELAN - Electron Linear Accelerator Network

		Total effort in person-months (1)	
Cost category	Actual direct eligible costs (€)	Justification of costs description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)	
Personnel cost (2)			
Durable equipment			
Consumable and prototyping			
Travel	7 409,46	CERN meeting-Accelerator Workshop participation, ELAN meetings CERN ILCSC meeting Manchester,Esgard meeting geneva, TTC meeting fermilab, LCWS DESY	

R1-SRF - Superconduting Radio Frequency

		Total effort in person-months (1)	76,77
Cost category	Actual direct eligible costs (€)	Justification of costs *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)*	
Personnel cost (2)	325 996,41	WP7:Permanent and contractual personnel for the assembling and conditioning of the prototypes pairs and the realisation of the TiN bench. Administrative fo the contractual aspects. Conditionning and parameters corrections of the new prototypes. Low and high level tests. Modulator repairing.WP8:Salaries of technicians and engineer who performed the experiments for piezo actuators caraterization.	
Durable equipment	73 462,06	WP7:Prototypes couplers, TiN Bench, Vacuum systems, Acquisition system computers. (depreciation costs). WP8:Redemption of material purchased the previous years: micro-ohmeter, vacuum equipments, piezo actuators test cell, acquisition cables	
Consumable and prototyping	45 940,74	WP7:CF copper seals, HNV Helicoflex seals, alcoholised tissues, detergent for ultrasonic bath, alumina powder, CuNi2Si H screws, clean room gloves,Liquid helium (piezo caracterisation experiment and RRR measurement). WP8: Consumables for piezo actuators caracterization: liquid helium, cables, bolts, gaskets	
Travel	2 159,32	CARE06 annual meeting, CARE+SRF meeting, Missions for TiN bench at INFN (Legnaro)	

R2-PHIN - Photo Injector

		Total effort in person-months (1)	78,04
Cost category	Actual direct eligible costs (€)	Justification of costs *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)*	
Personnel cost (2)	376 890,12	Personnel for the experiments conducted at LOA on colliding laser pulses scheme for the demonstration of tuneable electron beam : 50 to 300 MeV, development of 1 GeV electron spectrometer. Personnel for the PHIN gun design realisation and brasing. Installation of the NEPAL hall for the experiments.	
Durable equipment	78 917,60	waveguides,temperature sensors, controller WAGO,steerers,laser,bellows, control system+PCI card	
Consumable and prototyping	81 871,32	Off axis parabola, optics (mirors, quarter and half wavelength plate), gas bottles, sutter, optical densities, publication charges,heating wires, pin diodes,heating wires, surface treatment, laser hall consumables, gun boxes, ceramic sheets, supply WAGO,valves	
Travel	11 494,44	CARE CERN meeting, Accelerator Workshop participation, CTF3 meeting at CERN,materiel transportation	

		R3- HIPPI - High Intensity Pulsed Proton Injector	
		Total effort in person-months [(1)]	13,47
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)*	
Personnel cost [(2)]	66 239,86	tuning of the Side Coupled Linac (SCL) cavity prototype: measurement of the single cell parameters, development of new methods, mechanical tuning of the cavity, development of innovative fine tuning method ("bead pull" method) for coupled cavity. WP3: Salaries of technicians and RF engineers who perform the design and test of the spoke power coupler. Engineering study of the spoke cavity behaviour in pulsed mode operation (Lorentz force detuning calculation)	
Durable equipment	0,00		
Consumable and prototyping	1 068,62	Instrumentation, liquid helium, gaz filter, micrometric valve	
Travel	4 327,88	Hippi meeting, SRF workshop	

Total direct eligible costs	1 075 777,83		
Total indirect costs	215 155,56		
Adjustments to previous periods			
Total costs [(3)]	1 290 933,39	**Global estimate of the total costs for AC contractors (not only the eligible costs)**	

Justify any deviations with respect to the planned budget

PHIL:Delay for the PHIL gun due to brasing problems at CERN. SRF: Delay in couplers prototypes tests due to modulator station faults

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(2) For TA activities excluding the effort charged under the user fees if the UF cost model is used.
(3) Totals should correspond to the respective figures on FORM C - Financial Statement

Contract N°	**RII3-CT-2003-506395**	**Project acronym**	**CARE**
Participant N°	**4**	**Participant short name**	**GSI**

		N3-HHH - High Energy High Intensity Hadron Beams	
		Total effort in person-months (1)	2,5
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)*	
Personnel cost (2)	0		
Durable equipment	0		
Consumable and prototyping	0		
Travel	5 002,08	Symposium "LHC-Cryo" CERN 1P; Meeting "BPM Front-End Electr." Lüneburg D 2P	

		R3- HIPPI - High Intensity Pulsed Proton Injector	
		Total effort in person-months (1)	14,6
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)*	
Personnel cost (2)	218 463,83	WP5: exclusively: non-distr. transv. profile meas.: 5.2 PM on-line transm. control: 3.6 PM coordination of beam diagn. works: 0 PM preparation/conduction of UNILAC-exp.: 1.6 PM simulation of UNILAC-exp: 1.1 PM high current modeling, code improvm./benchmarking: 2.8 PM WP management: 0.3 PM	
Durable equipment	0,00		
Consumable and prototyping	24 426,52	several electronic components for beam diagnostic prototyping	
Travel	8 177,35	all WP5: WP an. meet. Saclay 2P; Meet. "BPM Front-End Electr." Lüneburg D 2P; HIPPI an. meet. Jülich D 1P; HIPPI an. meet. Orsay F 3P; PAC2007 USA 1P;DIPAC2007 Venice 9P; staff training CERN 1P; visit of company Ingelheim D 1P; Frankfurt Univ. Spring Seminar Hirschegg A 1P CARE meeting Geneva, 2P	

Total direct eligible costs	256 069,78		
Total indirect costs	32 112,12		
Adjustments to previous periods	-29 817,13	**The personnel and according indirect costs for 2006 were corrected according to the recommendations resulting of an external EC audit performed at GSI in September 2007.**	
Total costs (3)	258 364,77	**Global estimate of the total costs for AC contractors (not only the eligible costs)**	

Justify any deviations with respect to the planned budget

(1) AC contractors must include both the total estimated human effort (including permanent staff) and, in brackets, additional staff only.
(2) For TA activities excluding the effort charged under the user fees if the UF cost model is used.
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Contract N°	**RII3-CT-2003-506395**	**Project acronym**	**CARE**
Participant N°	**5**	**Participant short name**	**IAP-FU**
		R3- HIPPI - High Intensity Pulsed Proton Injector	
		Total effort in person-months (1)	28 (22 = 18 university + 4 HIPPI EU)

Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)*
Personnel cost (2)	16 280,36	1 additional staff member (scientist/researcher) hired from 1.11.2005 until 30.04.2007. Activities within WP2 and WP5: Beam dynamics design: simulation studies; CH model and prototype cavity design: design work. 1 working student under contract since 1.01.2006: design and construction of the mechanical setup of the SC CH cavity tuner (WP3).
Durable equipment		
Consumable and prototyping	48 901,70	Accessories, supplies and components for the mechanical tuner test stand (WP3) and for the n.c. model structure(WP2).
Travel	2 341,45	Participation to the HIPPI Work Package meetings (27.4., Orsay, France, 1 person; 21.5., Paris, France, 1 person; 24.5.-25.5., Geneva, Switzerland, 1 person) and the HIPPI Annual Meeting (26.9.-28.9., Orsay, France, 3 persons).

Total direct eligible costs	67 523,51		
Total indirect costs	13 504,70		
Adjustments to previous periods	566,94	Costs of the audit certificate for the year 2005.	
Total costs (3)	81 595,15	**Global estimate of the total costs for AC contractors (not only the eligible costs)**	300000

Justify any deviations with respect to the planned budget

Personnel cost:
Scheduled budget was spent.

Consumable and prototyping:
Only about one half of the scheduled budget was spent, due to delays in the design and construction of the "main items" (these are: WP2: prototype cavity; WP3: tuner for SC-CH cavity). Both deliverables are now scheduled for mid 2008, so that the financial support from the EU will be fully utilized during the last reporting period for partly financing these costly components.

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(2) For TA activities excluding the effort charged under the user fees if the UF cost model is used.
(3) Totals should correspond to the respective figures on FORM C - Financial Statement

Contract N°	RII3-CT-2003-506395	Project acronym	CARE
Participant N°	6	Participant short name	DESY

		Management	
		Total effort in person-months (1)	16(8)
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)	
Audit certificate	1 605,43	audit certificate	

		N1-ELAN - Electron Linear Accelerator Network	
		Total effort in person-months (1)	2,5(2,5)
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)	
Personnel cost (2)			
Durable equipment			
Consumable and prototyping			
Travel	43 796,31	IEEE-SPIE Wilga (PL), (5 physicits); IEEE-EUROCON Warsaw (PL), (3 Physicists); WP5 meetings, Legnaro (I), (5 physicists);WP9 meeting Geneva (CH), (3physicists); PAC07 Conference Albuquerque (USA), (3 physicists); TTC meeting FNAL Chicago (USA), (3 physicists); MIXDES 2007 Ciechcinrk (PL), (5 physicists); Wp8 meeting Paris (F), 3 (physicists); SRF07 Workshop Beijing (CN), (8 physicists); ILC-GDE meeting Tsukuba (JAP), (1 Physicist); APAC07 Indore (IND), (1 physicist);	

		N3-HHH - High Energy High Intensity Hadron Beams	
		Total effort in person-months (1)	0,5(0,5)
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)*	
Personnel cost (2)			
Durable equipment			
Consumable and prototyping			
Travel	1 889,19	CARE-HHH-ABI annual workshop on Schottky, Tune and Chromaticity Diagnostics	

		R1-SRF - Superconduting Radio Frequency	
		Total effort in person-months (1)	218(48)
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)*	
Personnel cost (2)	193 382,32	WP 1 Management & Communication: administrative tasks (1 physicist 12 person-months); Task 3.2 Seamless cavities: Several 3-cell units have been fabricated by hydroforming from seamless tubes and also long and short end groups connected with three cell units. (2 scientists 18 person-months); Task 5.4 Dry ice cleaning: Preparation of samples for task 6.3; (1 technician 6 person-months); Task 6.1 Design of squid scanning system: A software tool has been developed to allows minimizing the noise signals caused by vibration; SQUID scanning results have been compared with Eddy Current scanning results. (1 scientist 8 person-months); Task 6.3 DC field emission scanning: Large grain Nb samples which had shown the onset of FE at high field, were dry ice cleaned and measured again in field emission scanning microscope. Dry ice cleaning (DIC) to suppress the enhanced field emission (FE) from crystalline Nb samples of very good surface quality has been very successful.(1 physicist 12 person-months); Task 9.1 Low level RF: The activities were focused on development of the cost effective version of transient detection system and on improvements of the measure	
Durable equipment			
Consumable and prototyping	48 032,97	Task 2.3Electron beam welding: commissioning of the of the rotating UHV welding chamber; Task 3.2 Seamless cavities: welding of 9-cell seamless cavity; Task 6.3 DC field emission scanning: fabrocation of especially prepared samples for field emission scans and local FE measurements; Task 9.1 Low lwvwl RF control: manufacturing and assembling of highly developed SIMCON-DSP boards	
Travel	14 256,27	Steering committee in Paris (2 physicits); CARE-SRF07 annual meeting in Warsaw (8 physicists); Steering committee meeting at CERN (2 physicists); CARE07 meeting at CERN (3 persons)	

Total direct eligible costs	301 357,06		
Total indirect costs	60 271,41		
Adjustments to previous periods	12 951,06	correction indirect costs 2004 correction direct/indirect costs 2005 adjustment on taxes Audit 2005 correction direct/indirect travel costs 2006 adjustment on taxes 2006 Audit 2006	5.530,00 -770,18 -90,00 1.199,11 3.794,15 1.165,48 2.122,50
Total costs (3)	374 579,53	**Global estimate of the total costs for AC contractors (not only the eligible costs)**	1 274 580

Justify any deviations with respect to the planned budget

Spending in HHH is about 25% of the received support. This considerable under spending is due to the very late meeting in December and subsequent accounting of the travel costs to the next year.

Spending in ELAN is more than 100% of received support.

Spending for JRA1 is slightly over 100% of received support.

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Contract N°	**RII3-CT-2003-506395**	**Project acronym**	**CARE**
Participant N°	**7**	**Participant short name**	**FZJ**

		Management	
		Total effort in person-months (1)	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Audit certificate			

		N1-ELAN - Electron Linear Accelerator Network	
		Total effort in person-months (1)	0,25
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost (2)	0		
Durable equipment	0		
Consumable and prototyping	0		
Travel	242,56	one person to two workshops in Moscow	

		N2-BENE - Beam for European Neutrino Experiments	
		Total effort in person-months (1)	1,5
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)*	
Personnel cost (2)	0		
Durable equipment	0		
Consumable and prototyping	0		
Travel	3 515,06	6 persons to workshops in Ferrara, Nice, Antalya, Geneva, Chamonix; adjustments to previous periods	

		R3- HIPPI - High Intensity Pulsed Proton Injector	
		Total effort in person-months (1)	7,64
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)*	
Personnel cost (2)	251 254,51	permanent personnel salary for work on WP3 SC spoke and for work on WP5 BD. Electrodynamics simulation of cavities, construction work on 352 MHz cavity, coupler design, report on beam dynamics calculations, report on diagnostics.	
Durable equipment	1 317,00	dedicated software to allow the cavity being welded with the available machine	
Consumable and prototyping	19 460,81	forming of niobium ingot to sheets and niobium sheets to the final geometry; copper coating of one end cap sample; chemical cleaning of niobium parts.	
Travel	2 627,95	Workpackage meetings; CARE meetings; travels to synchronize with companies supplying cavity components	

Total direct eligible costs	278 417,89		
Total indirect costs	252 906,72		
Adjustments to previous periods	18 216,14	**corrected overhead for previous period; accounting of expenses for travels which occured at end of 2006.**	
Total costs (3)	549 540,75	**Global estimate of the total costs for AC contractors (not only the eligible costs)**	

Justify any deviations with respect to the planned budget

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(2) For TA activities excluding the effort charged under the user fees if the UF cost model is used.
(3) Totals should correspond to the respective figures on FORM C - Financial Statement

Contract N°	RII3-CT-2003-506395	Project acronym	CARE
Participant N°	8	Participant short name	TUM

		N2-BENE - Beam for European Neutrino Experiments	
		Total effort in person-months (1)	0.5

Cost category	Actual direct eligible costs (€)	Justification of costs *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)*
Personnel cost (2)		
Durable equipment		
Travel	1 562,19	participation and presentation of BENE related material at workshops: Heidelberg (24.-

Total direct eligible costs	1 562,19		
Total indirect costs	306,21		
Adjustments to previous period	-31,13		
Total costs (3)	1 837,27	Global estimate of the total costs for AC contractors (not only the eligible costs)	4000

Justify any deviations with respect to the planned budget

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(2) For TA activities excluding the effort charged under the user fees if the UF cost model is used.
(3) Totals should correspond to the respective figures on FORM C - Financial Statement

Contract N°	**RII3-CT-2003-506395**	**Project acronym**	**CARE**
Participant N°	**9**	**Participant short name**	**FZR**

		N1-ELAN - Electron Linear Accelerator Network	
		Total effort in person-months (1)	1,0
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)	
Personnel cost (2)	0		
Durable equipment	0		
Consumable and prototyping	0		
Travel	2 439,98	Participation ESGARD meeting Orsay (1 person), SRF-AS meeting Berlin (1 person), ESGARD meeting Genf (1 person), SRF workshop Peking (1 person)	
		R2-PHIN - Photo Injector	
		Total effort in person-months (1)	48 (12)
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)*	
Personnel cost (2)	39 605,38	additional staff (temporary contracts) in 2007: 1 scientist working in WP 2, photocathode know-how, improvement of photocathode preparation equipment and photocathode preparation, for 5 months, 1 technician working in WP4, SC RF gun, precision mechanics work and assembly of SC RF gun cryostat, for 7 months	
Durable equipment	0,00		
Consumable and prototyping	6 691,65	WP2: vacuum parts, electronic components and materials for photocathode preparation equipment, clean-room materials	
Travel	2 116,40	WP4: Participation Intern. Workshop on Frontiers in FEL Physics, Elba (1 person), CARE 07 Annual Meeting, Genf (1 person)	

Total direct eligible costs	50 853,41		
Total indirect costs	10 170,68		
Adjustments to previous periods	0,00		
Total costs (3)	61 024,09	**Global estimate of the total costs for AC contractors (not only the eligible costs)**	350 000,00

Justify any deviations with respect to the planned budget

(1) AC contractors must include both the total estimated human effort (including permanent staff) and, in brackets, additional staff only.
(2) For TA activities excluding the effort charged under the user fees if the UF cost model is used.
(3) Totals should correspond to the respective figures on FORM C - Financial Statement

Contract N°	RII3-CT-2003-506395	Project acronym	CARE
Participant N°	10	Participant short name	INFN

		N1-ELAN - Electron Linear Accelerator Network	
		Total effort in person-months (1)	1.5
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost (2)	0,00		
Durable equipment	0,00		
Consumable and prototyping	0,00		
Travel	3 453,13	**LNF -** Susanna Guiducci - ILC GDE Meeting - Peking (China) 02/09.02.2007 € 1.863,21; Susanna Guiducci - POSIPOL 2007 Workshop - Orsay (FR) 23/25.05.2007 € 833,74. **NA** - Vittorio Vaccaro - CLIC Workshop - CERN/Prevessin 17/19.10.2007 € 756,18.	

		N2-BENE - Beam for European Neutrino Experiments	
		Total effort in person-months (1)	4,0
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)*	
Personnel cost (2)	0,00		
Durable equipment	0,00		
Consumable and prototyping	0,00		
Travel	7 696,59	**GE**: Riccardo Musenich - Thermomag 07 and Orsay Meeting - Paris (FR) 19/21.11.2007 € 1.167,08; Stefania Farinon - Thermomag 07 - Paris (FR) 19/21.11.2007 € 993,04; Stefania Farinon - CARE 07 Meeting - CERN/Prevessin € 744,43. **NA**: Giovanni De Lellis - Conference Golden07 - Valencia (ES) 26/06-01/07.2007 € 1664,59; Salvatore Buontempo - Conference Golden07 - Valencia (ES) 27/30.06.2007 € 911,76; Mauro Mezzetto - Workshop CARE07 - CERN/Prevessin 29/31.10.2007 € 821,63; Vittorio Palladino - Workshop CARE07 (Conference Fee only) - CERN/Prevessin € 79,32; Vittorio Palladino - Conference Golden07 - Valencia (ES) 26/06-02/07.2007 € 1.314,74.	

		N3-HHH - High Energy High Intensity Hadron Beams	
		Total effort in person-months (1)	2,0
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)*	
Personnel cost (2)	0,00		
Durable equipment	0,00		
Consumable and prototyping	0,00		
Travel	3 293,34	**SA** - Stefania Petracca - CARE-HHH-APD Event Beam07 Workshop - CERN/Prevessin 30/09-04/10.2007 € 1.133,31. **NA** - Daniele Davino - Poster presentation at PAC07 Conference - Albuquerque (USA) 22/06-03/07.2007 € 1.442,04; Vittorio Vaccaro - HIPPI WP2 Meeting and LINAC 4 Accelerating Structure Review - CERN/Prevessin 24/26.05.2007 € 717,99.	

		R1-SRF - Superconduting Radio Frequency	
		Total effort in person-months (1)	LNF 24 (15), LNL 24 (12), MI 24(12), RMII 2 (1)
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)*	
Personnel cost (2)	96 248,68	**LNF** - Bruno Buonomo € 9.053,50 (01.01.2007 - 14.11.2007 - 30%); Enrica Chiadroni € 24.112,51 (01.01.2007 - 31.12.2007). **LNL** Alessandro Minarello € 34.381,53 (01.01.2007 - 31.12.2007). **MI** Laura Monaco € 24.112,51 (01.01.2007 - 31.12.2007). **RM II** A. J. Lorkiewicz € 4.588,63 (01.01.2007 - 23.01.2007).	
Durable equipment	4 494,60	**LNF** € 270,00 (Depreciation cost for Notebook Latitude); **LNL** € 684,96 (Depreciation Costs for Switching Power Supply Mod. S4000); **RMII** € 3.539,64 (Depreciation Costs for Gaussmeter and Laser Nd-YAG).	
Consumable and prototyping	16 633,50	**MI** Purchasing of: Liquid Nitrogen and liquid gas € 8.845,69; Mechanical parts for tuners tests € 1.772,00; Plastic parts for Helium tank supports and monocell tank supports € 880,20; Connectors, junctions, adhesive tape, adapters € 1.976,39; Legris connections € 17,15; Viewports CF35, CF63, CF100 and CF 150 € 796,32, LNF - Construction of Plates and Mechanical Parts € 330,00. MI - Costruction of mechanical parts according to drawings € 2.015,75.	
Travel	8 026,57	**LNF** - Rossano Sorchetti - Measurements and Works related to WP11 - Hamburg(DE) 10/17.01.2007 € 1.523,86; Luciano Cacciotti - Measurements and works related to WP11 - Hamburg(DE) 10/17.01.2007 € 1.523,86; Michele Castellano - Measurements and works related to WP11 - Hamburg(DE) 10/17.11.2007 € 1.786,06; Enrica Chiadroni - Measurements on Optic Diffraction Radiation Experiment at FLASH - Hamburg(DE) 10/17.01.2007 € 1.470,14. **RMII**: Roberto Russo - EURO Conference 2007 - Warsav (PL) 09/11.09.2007 € 1.452,65.	

		R2-PHIN - Photo Injector	
		Total effort in person-months (1)	36 (19)
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)*	
Personnel cost (2)	64 821,99	**LNF** - Bruno Buonomo € 21.124,81 (01.01.2007 - 14.11.2007 - 70%); **MI** - Simone Cialdi € 43.697,18 (01.01.2007 - 31.12.2007)	
Durable equipment	0,00		
Consumable and prototyping	4 164,47	**LNF** - Purchasing of: Lenses for SPARC Laser € 1.065,00; Linear Variable ND Filters, Quick Release Square Filter Holders and Dual Filter Holders € 628,88; Crystals for SPARC Laser € 2.470,59.	
Travel	11 438,01	**LNF** - Massimo Petrarca - Collaboration to the CTF3 photoinjector Commissioning - CERN/Prevessin 04.02-01.04.2007 € 5.700,00; Mario Serio - Test CTF3 Photoinjector - CERN/Prevessin 18/21.09.2007 € 758,53; Andrea Ghigo - Test CTF3 Photoinjector - CERN/Prevessin 17/21.09.2007 € 1.100,36; Caterina Biscari - Test CTF3 Photoinjector - CERN/Prevessin 17/21.09.2007 € 888,27;Enrica Chiadroni - Participation at the Conference RREPS07 - Prague (CZ Rep.) 23/29.09.2007 € 1.203,61; Andrea Ghigo - CARE07 Annual Meeting - CERN/Prevessin 28/30.10.2007 € 945,79; Carlo Vicario - CARE07 Annual Meeting - CERN/Prevessin 28/30.10.2007 € 841,45.	

		R3- HIPPI - High Intensity Pulsed Proton Injector	
		Total effort in person-months [(1)]	9(0)
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)*	
Personnel cost [(2)]	0,00		
Durable equipment	0,00		
Consumable and prototyping	13 607,51	**MI** - Purchasing of UHV motor gearboxes € 5.620,00; Cavity mechanical supports € 2.550,00; Laboratory tools, plyers, fasteners € 176,47; Ultramet-L Gaskleens full metal filters € 1.278,00; Gasket and UHV adapters € 792,90; Stepper motor for testing in warm conditions € 332,50; Stainless steel bearings and accessories € 418,64. All the above material is the needed material for the tests of the HIPPI Cavity A, to provide vacuum and clean venting to the cavity and the actuation of the tuning mechanism at cryogenic conditions and in vacuum, MI - Degreasing and heat treatment in vacuum furnace of the HIPPI Cavity A for hydrogen removal, performed in the CERN premises, ultrasound bath and vacuum furnace at 600°C, Degreasing and heat treatment in vacuum furnace of the HIPPI Cavity A for hydrogen removal, performed in the CERN premises, ultrasound bath and vacuum furnace at 600°C, € 2439,00	
Travel	0,00		

Total direct eligible costs	233 878,39		
Total indirect costs	45 818,74		
Adjustments to previous periods	35 125,56	**LNF - JRA1 Travel & Subsistance:** Enrica Chiadroni Components Installation on Optic Diffraction Radiation Experiment at FLASH - Hamburg (DE) 03/10.10.2006 € 1662,83; Rossano Sorchetti - Installation Experiment WP11-JRA1 - Hamburg (DE) 03/10.10.2006 € 1.711,09**.** **JRA2 Consumables:** Purchasing of Optical Material €4.861,82**. N3 Travel & Subsistance:** Bruno Spataro - The 3rd CARE - HHH-APD Workshop LHC-LUMI-06 - Valencia (ES) € 1.215,96**.** **MI - N1 Travel & subsistance:** Carlo Pagani - Participation as teacher at the International Accelerator School for Linear Collider - Sokendai (Japan) 18/26.05.2006 € 3.216,10; Carlo Pagani - Tesla Technology Collaboration Meeting (Collaboration Board and Technical Board) - Tsukuba (Japan) 23/29.09.2006 € 2.820,92; Carlo Pagani - International Linear Collider workshop (ECFA and ILC-GDE Joint Meeting) - Valencia (ES) 06/10.11.2006 € 959,47. **JRA2 - Travel & Subsistance**: Ilario Boscolo - Work at the SPARC photoinjector - Frascati (IT) 12/14.02.2006 € 422,25; Ilario Boscolo - CARE 06 Annual Meeting - Frascati (IT) 12/18.11.2006 € **Consumables**: **JRA3 - Travel & Subsistance**: Paolo Pierini - WP3 HIPPI Meeting - Juelich (DE) 27/28.04.2006 € 1.092,54; Nicola Panzeri - CARE Annual Meeting - Juelich (DE) 26/29.09.2006 € 1.014,26. **JRA1 - travel & Subsistance**: Carlo Pagani - Single Crystal Niobium Technology Workshop - San Paolo-Araxa (Brazil) 27/10-03/11.2006 € 2.608,88. **Consumables-** Purchasing of: Liquid Nytrogen and Liquid Gas € 1.693,50; Radio Frequency Electronic Components € 904,20; Viewports CF35, CF63, CF100 and CF150 € 1.649,32; Stacked Ceramic Multilayer Actuator € 4.140,00. **NA - N2 Travel & Subsistance**: Vittorio Palladino - Steering Group Meeting - CERN/Prevessin 19/22.12.2006 € 594,59; Vittorio Pallladino - Management & steering Group Meeting - CERN/Prevessin 01/09.07.2006 € 1.779,38; Vittorio Palladino - Steering Group Meeting - CERN/Prevessin 12/18.09.2006 € 886,31; Vittorio Palladino - BENE meeting - CERN/Prevessin 24/10-02/11.2006 € 1.318,49.	
Total indirect costs related to Adjustments	7 025,11		
Total costs [(3)]	321 847,80	**Global estimate of the total costs for AC contractors (not only the eligible costs)**	748 448

Justify any deviations with respect to the planned budget

Note: In cell B32 (travel JRA1-SRF) it has been added 1740,14 instead of 1470,14 for the travel of Enrica Chiadroni to Hamburg(DE). This error cannot be corrected now since INFN is undergoing an Audit by the EC. It will be corrected in the report by the auditors or in the Adjustment of report 2009.

[(1)] AC contractors must include both the total estimated human effort (including permanent staff) and, in brackets, additional staff only.
[(2)] For TA activities excluding the effort charged under the user fees if the UF cost model is used.
[(3)] Totals should correspond to the respective figures on FORM C - Financial Statement

Contract N°	RII3-CT-2003-50639	Project acronym	CARE
Participant N°	11	Participant short name	TEU

		Management	
		Total effort in person-months (1)	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)	
Audit certificate			

		N1-ELAN - Electron Linear Accelerator Network	
		Total effort in person-months (1)	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)	
Personnel cost (2)			
Durable equipment			
Consumable and prototyping			
Travel	796,75	1 Person, JRA-CARE and ELAN Meeting Cern 2007	

		N3-HHH - High Energy High Intensity Hadron Beams	
		Total effort in person-months (1)	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)*	
Personnel cost (2)			
Durable equipment			
Consumable and prototyping			
Travel	515,21	HHH meeting and Care central meeting at Cern 2007	

		R2- PHIN - Photo Injector	
		Total effort in person-months (1)	3,5
Cost category	Actual direct eligible costs (€)	Justification of costs *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)*	
Personnel cost (2)	18 624,27	WP2: Experiments and reporting on diagnostics for photocathode production	
Durable equipment			
Consumable and prototyping	1 562,32	WP2: Experiments and reporting on diagnostics for photocathode production	
Travel	77,68	1 person: JRA-CARE and JRA-PHIN Meeting Cern 2007	
		R4- NED - Next European Dipole	
		Total effort in person-months (1)	8
Cost category	Actual direct eligible costs (€)	Justification of costs *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)*	
Personnel cost (2)	5 359,46	WP1: JRA management, WP3: Management Workgroup on Conductor Characterisation + experiments and reporting conductor characterisation	
Durable equipment			
Consumable and prototyping			
Travel	3 962,79	1 person: 4 SC meeting + visit LBNL for first experimental cabling PIT strands	

Total direct eligible costs	**30 898,48**		
Total indirect costs	**28 671,19**		
Adjusments to previous periods	**2 346,86**	**Corr pers. costs and indirect costs 2004, 2005, 2006 + non-declared costs 2004: HHH Workshop Archamps + HEHIB corr 2006 travel costs R4-NED**	
Total costs (3)	**61 916,53**	**Global estimate of the total costs for AC contractors (not only the eligible costs)**	

Justify any deviations with respect to the planned budget

N3-HEHIHB declaration includes corrections 2004 and 2005.

(1) AC contractors must include both the total estimated human effort (including permanent staff) and, in brackets, additional staff only.
(2) For TA activities excluding the effort charged under the user fees if the UF cost model is used.
(3) Totals should correspond to the respective figures on FORM C - Financial Statement

Contract N°	**RII3-CT-2003-506395**	**Project acronym**	**CARE**
Participant N°	**12 (AC)**	**Participant short name**	**TUL**
		Management	
		Total effort in person-months (1)	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)	
Audit certificate			
		R1-SRF - Superconduting Radio Frequency	
		Total effort in person-months (1)	72(27)
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)*	
Personnel cost (2)	20 546,99	WP8: Task 8.2 (Magneto-strictive Tuner) 2 researchers (9 months each) - design, production and validation of driver boards for magnetostrictive and piezo control systems, WP9: in total five researchers: Task 9.1.2 (LLRF Automation): development of Automat	
Durable equipment			
Consumable and prototyping	6 456,25	WP8: Task 8.2 electronic parts for piezo driver boards, WP9: Task 9.2.2 electronic parts for RADMON units, computer and electronic parts for experiments in the accelerator tunnel (memories, communication interfaces cards, power supplies, chargers)	
Travel	1 314,74	31.05.-9.06.2007 Sweden, (2persons, CERN School on Digital signal processing), 28-31.10.2007 Switzerland, 2 persons (Care Annual Meeting), all those travels were supplied also with own sourced	
Total direct eligible costs	**28 317,98**		
Total indirect costs	**5 663,60**		
Adjustments to previous periods	**8 614,49**	WP8: Task 8.2 electronic parts for piezo driver boards, WP9: Task 9.2.2 electronic parts for RADMON units, computer and electronic parts for experiments in the accelerator tunnel (memories, communication interfaces cards, power supplies, chargers) and indirect costs	
Total costs (3)	**42 596,07**	**Global estimate of the total costs for AC contractors (not only the eligible costs)**	

Justify any deviations with respect to the planned budget

Adjustment to previous period : Consumables and prototyping (electronics parts), travel (not included all travel costs,Brussels)
Total Euro 8 614,51

(1) AC contractors must include both the total estimated human effort (including permanent staff) and, in brackets, additional staff only.
(2) For TA activities excluding the effort charged under the user fees if the UF cost model is used.
(3) Totals should correspond to the respective figures on FORM C - Financial Statement

Contract N°	RII3-CT-2003-506395	Project acronym	CARE
Participant N°	13	Participant short name	IPJ

		Management	
		Total effort in person-months (1)	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Audit certificate	1 000,00	audit certificate	

		N1-ELAN - Electron Linear Accelerator Network	
		Total effort in person-months (1)	0,4(0,2)
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost (2)			
Durable equipment			
Consumable and prototyping			
Travel	1 610,85	WP4 visit of 3 persons from IPJ at the Tor Vergata University lab.	

		R1-SRF - Superconduting Radio Frequency	
		Total effort in person-months (1)	73(11,1)
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)*	
Personnel cost (2)	14 899,24	Additional staff - 1 scientist working for WP4.1 (8 months) + 1 partially (12 months).	
Durable equipment	1 217,15	WP4.1 depreciation costs of equipment (turbomolecular pump ATP900 and camera).	
Consumable and prototyping	5 659,27	WP4.1 - special equipment , materials, and services.	
Travel	2 340,83	4 domestic conferences + Meeting at CERN on November 10-11, 2007.	

Total direct eligible costs	26 727,34		
Total indirect costs	5 145,47		
Adjustments to previous periods			
Total costs (3)	31 872,81	**Global estimate of the total costs for AC contractors (not only the eligible costs)**	116 446,02
Justify any deviations with respect to the planned budget			

(1) AC contractors must include both the total estimated human effort (including permanent staff) and, in brackets, additional staff only.
(2) For TA activities excluding the effort charged under the user fees if the UF cost model is used.
(3) Totals should correspond to the respective figures on FORM C - Financial Statement

Contract N°	RII3-CT-2003-506395	Project acronym	CARE
Participant N°	14	Participant short name	WUT-ISE

		Management	
		Total effort in person-months (1)	
Cost category	Actual direct eligible costs (€)	Justification of costs description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)	
Audit certificate	340,16	audit certificate	

		N1-ELAN - Electron Linear Accelerator Network	
		Total effort in person-months (1)	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)	
Personnel cost (2)			
Durable equipment			
Consumable and prototyping			
Travel	229,09	Participation research team in 19th IEEE-SPIE Joint Symposium on Photonics and Web Engineering, Wilga 2007 – from 21st until 27th May.	

		R1-SRF - Supercondunting Radio Frequency	
		Total effort in person-months (1)	16.00
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)*	
Personnel cost (2)	20 421,41	Salary for two employees (full and part time staff)	
Durable equipment	0,00		
Consumable and prototyping	610,89	Purchase of electronic (complete sub-assembles, PCB, connectors, wires and cable) for LLRF blocks-WP9-TO3	
Travel			

Total direct eligible costs	21 601,55		
Total indirect costs	4 252,27		
Adjustments to previous periods			
Total costs (3)	25 853,82	**Global estimate of the total costs for AC contractors (not only the eligible costs)**	121 771,75
Justify any deviations with respect to the planned budget			

(1) AC contractors must include both the total estimated human effort (including permanent staff) and, in brackets, additional staff only.
(2) For TA activities excluding the effort charged under the user fees if the UF cost model is used.
(3) Totals should correspond to the respective figures on FORM C - Financial Statement

Contract N°	RII3-CT-2003-506395	Project acronym	CARE
Participant N°		Participant short name	WUT
		N3-HHH - High Energy High Intensity Hadron Beams	
		Total effort in person-months (1)	0.4 (0.0)

Cost category	Actual direct eligible costs (€)	Justification of costs *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)*
Personnel cost (2)		
Durable equipment		
Consumable and prototyping		
Travel	2 139,53	Participation in CARE Joint Steering Committee, 1person, CERN Genewa; Participation in CARE Annual Meeting, 2 people, CERN Genewa

Total direct eligible costs	2 139,53		
Total indirect costs	427,91		
Adjustments to previous periods			
Total costs (3)	2 567,44	Global estimate of the total costs for AC contractors (not only the eligible costs)	61 000,00
Justify any deviations with respect to the planned budget			

(1) AC contractors must include both the total estimated human effort (including permanent staff) and, in brackets, additional staff only.
(2) For TA activities excluding the effort charged under the user fees if the UF cost model is used.
(3) Totals should correspond to the respective figures on FORM C - Financial Statement

Contract N°	RII3-CT-2003-506395	Project acronym	CARE
Participant N°	16	Participant short name	csic

		Management	
		Total effort in person-months (1)	
Cost category	Actual direct eligible costs (€)	Justification of costs description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)	
Audit certificate		audit certificate	
		N1-ELAN - Electron Linear Accelerator Network	
		Total effort in person-months (1)	
Cost category	Actual direct eligible costs (€)	Justification of costs description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)	
Personnel cost (2)			
Durable equipment			
Consumable and prototyping			
Travel	2 173,25	CLIC07 (16-18 October,1 person), IBS07 (28-29 August,1 person), CARE07 (29-31 October, 1 person); WP:BDYN	
		N2-BENE - Beam for European Neutrino Experiments	
		Total effort in person-months (1)	10.8
Cost category	Actual direct eligible costs (€)	Justification of costs *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)*	
Personnel cost (2)			
Durable equipment			
Consumable and prototyping			
Travel	5 926,75	NuFact07 (6-11 August,3 people), ISS/IDS (29-31 March, 2 people), Golden07 (27-30 June, 1 peson); WP:Physics	

Total direct eligible costs	8 100,00		
Total indirect costs			
Adjustments to previous periods	5 097,20	N2-BENE: NuFact06 (24-30 August, 1 person), NOW06 (9-16 September 1 person), CARE06 (15-17 November, 1 person) WP:Physics; N3-HHH: WAMDO2006 (3-6 April,1 person), ASC2006 (27August-1September, 1 person) WP: BDYN	
Total costs (3)	13 197,20	Global estimate of the total costs for AC contractors (not only the eligible costs)	
Justify any deviations with respect to the planned budget			

(1) AC contractors must include both the total estimated human effort (including permanent staff) and, in brackets, additional staff only.
(2) For TA activities excluding the effort charged under the user fees if the UF cost model is used.
(3) Totals should correspond to the respective figures on FORM C - Financial Statement

Contract N°	RII3-CT-2003-506395	Project acronym	CARE 2007
Participant N°	17	Participant short name	CERN

		Management	
		Total effort in person-months (1)	0.00 (0.00)
Cost category	**Actual direct eligible costs (€)**	**Justification of costs description of expenditure and link to the specific work carried out (e.g. tasks,**	
Audit certificate		audit certificate	

		N1-ELAN - Electron Linear Accelerator Network	
		Total effort in person-months (1)	5.25 (0.00)
Cost category	**Actual direct eligible costs (€)**	**Justification of costs description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)**	
Personnel cost (2)	0,00		
Durable equipment	0,00		
Consumable and prototyping	4 210,45	Laptop bought for use by different participants in meetings and workshops, in order to present talks and exchange files. Expenses for organizing the ECL2 workshop on electron-cloud clearing (March 2007) in collaboration with N3-HHH (see below).	
Travel	8 038,85	Participation in various meetings; 1) CTF3 collaboration meeting at CERN in January, 2) Mini-workshop on electron cloud clearing at CERN in March 3) TESLA Technology collaboration meeting in April at DESY, 4) workshop on polarized positron sources in Orsay in May, 5) linear collider workshop in May at DESY, 6) accelerating structure workshop at CERN in June, 7) workshop on Intrabeam scattering at Daresbury in August, 8) CLIC workshop at CERN in September, 9) CARE07 annual meeting at CERN in October.	

		N2-BENE - Beam for European Neutrino Experiments	
		Total effort in person-months (1)	2.20 (1)
Cost category	**Actual direct eligible costs (€)**	**Justification of costs description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)**	
Personnel cost (2)	968,00	one student for one month	
Durable equipment	0,00		
Consumable and prototyping	0,00		
Travel	13 296,16	Participation in various meetings and one experiment: 1) Particle Accelerator Conference in Albuquerque in June 2) Neutrino factory annual meeting in Okayama in August 3) S334 experiment at GSI, Darmstadt in August 4) Beta-beams collaboration meeting in Louvain-la-Neuve in July 5) 3rd workshop on High-Power Tagetry 6) Neutrino beam workshop at CARE07 at CERN in October 7) Beta-beam workshop at DESY in October-November	

		N3-HHH - High Energy High Intensity Hadron Beams	
		Total effort in person-months (1)	38.06 (0.00)
Cost category	**Actual direct eligible costs (€)**	**Justification of costs description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)**	
Personnel cost (2)	0,00		
Durable equipment	0,00		
Consumable and prototyping	0,00		
Travel	30 156,59	Participation in various meetings: 1) Mini workshop on cristal collimation CC07 2) Mini-workshop on electron cloud clearing at CERN in March 3) Particle Accelerator Conference in Albuquerque in June 4) Mini-workshop on Beam-beam Compensation at Stanford in July. 5) Meeting on the roadmap for upgrading CERN & GSI accelerator complex in October at CERN, 6) workshop an Interaction Regions for LHC and DAΦNE upgrade in November at INFN, Frascati, 7) workshop on Heat generation & transfer in SC magnets in November, in Paris, 8) annual workshop on beam instrumentation and diagnostics in December.	

		R2-PHIN - Photo Injector	
		Total effort in person-months (1)	12.20 (8.00)
Cost category	**Actual direct eligible costs (€)**	**Justification of costs description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)**	
Personnel cost (2)	11 329,78	Subsistence for C. Serpico (simulations on thermomechanical effects on RF gun), M. Petrarca (set-up and test of first and second amplifier of the laser), C. Siour (studies on the laser beam transport and effect on the beam quality)	
Durable equipment	0,00		
Consumable and prototyping	163 708,98	WP2: Refurbishment of the preparation chamber and of the DC gun test line for the qualification and commissioning of photocathodes.Materials for photocathode production. WP3: Materials for the construction of the laser and of its control system WP4: CERN compatible vacuum equipment (valves, pumps, gauges) and ancillaries, cost of installation of equipment in CTF2 facility.	
Travel	1 614,71	Visit to LAL for meetings on RF-gun, participation to meetings in CARE 07	

		R3- HIPPI - High Intensity Pulsed Proton Injector	
		Total effort in person-months (1)	170.04 (33)
Cost category	**Actual direct eligible costs (€)**	**Justification of costs description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)**	
Personnel cost (2)	189 965,68	Sargsyan's salaries for 12 months +Wegner's salaries for 12 months + Pasini's salaries for 9 months	
Durable equipment	0,00		
Consumable and prototyping	0,00		
Travel	8 461,43	Conference fees for CARE07 (October, CERN, 5 participants) - participation to the HIPPI Annual Meeting in Orsay (September, 5 participants) - participation to the HIPPI WP3-5 Meeting in Saclay (May, 1 participant) - participation of the members of the ESAC to the HIPPI Annual Meeting at Saclay (September, 3 participants) - delayed payment for the participation of 1 member of the ESAC to the 2006 HIPPI Annual Meeting (Juelich).	

		R4- NED - Next European Dipole	
		Total effort in person-months (1)	1.80 (0.00)
Cost category	**Actual direct eligible costs (€)**	**Justification of costs description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)**	
Personnel cost (2)	0,00		
Durable equipment			
Consumable and prototyping	87 661,72	Costs paid to ALSTOM-MSA for achievement of step1 (qualification of initial strand design) and to SMI for achievement of step2 (qualificaton of final strand design) in July 2007. Transfer of technology from SMI to EAS (which acquired SMI) explains a delay of 9 months in the delivery. Fabrication difficulties encountered by ALSTOM-MSA explains the delays for the completion of step1 and in the achievement of step2 (under way).	
Travel	235,95	fees for participation in CARE 2007 at CERN	
Total direct eligible costs	519 648,30		
Total indirect costs	86 397,32		
Adjustments to previous periods	-36 853,57	Salaries claimed in Form C 2004 not eligible (31 752.64 eur with overheads included) and Consumables not eligible (5100.83 eur with overheads included)	
Total costs (3)	569 192,05	**Global estimate of the total costs for AC contractors (not only the eligible costs)**	2 676 962,03

Justify any deviations with respect to the planned budget

Contract N°	RII3-CT-2003-506395	Project acronym	CARE
Participant N°	18	Participant short name	UniGE

		N2-BENE - Beam for European Neutrino Experiments	
		Total effort in person-months (1)	7
Cost category	Actual direct eligible costs (€)	Justification of costs *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)*	
Personnel cost (2)			
Durable equipment			
Consumable and prototyping	0,00 €		
Travel	3 838,89 €	CARE meeting 2007 CERN; GOLDEN07 Workshop Valencia; Reports to GDR France; beta-beam workshop Heidelberg 2007; Visit to Bruxells headquarters; Participation to workshop or expriment on muon cooling	

Total direct eligible costs	3 838,89 €		
Total indirect costs	186,61 €		
Total costs (3)	4 025,50 €	Global estimate of the total costs for AC contractors (not only the eligible costs)	

Justify any deviations with respect to the planned budget

Contract N°	RII3-CT-2003-506395	Project acronym	CARE
Participant N°	19	Participant short name	PSI

		Management	
		Total effort in person-months (1)	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Audit certificate			

		N1-ELAN - Electron Linear Accelerator Network	
		Total effort in person-months (1)	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost (2)			
Durable equipment			
Consumable and prototyping			
Travel	5 584,87	Travel Expenses for Network and Collaboration Meetings: - ESGARD OMIA Workshop - CARE Meeting at CERN and Collaboration Meeting(s) at DESY	

		R1-SRF - Superconduting Radio Frequency	
		Total effort in person-months (1)	
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)*	
Personnel cost (2)	25 314,00	WP9 LLRF: - 1 CARE person (PhD) for work at DESY in LLRF Gun Control (half year) - PSI support of PhD work at DESY in the area of RF Gun Regulation	
Durable equipment			
Consumable and prototyping			
Travel			

Total direct eligible costs	30 898,87		
Total indirect costs	3 892,93		
Adjustments to previous periods			
Total costs (3)	34 791,80	**Global estimate of the total costs for AC contractors (not only the eligible costs)**	

Justify any deviations with respect to the planned budget

(1) AC contractors must include both the total estimated human effort (including permanent staff) and, in brackets, additional staff only.
(2) For TA activities excluding the effort charged under the user fees if the UF cost model is used.
(3) Totals should correspond to the respective figures on FORM C - Financial Statement

Contract N°	RII3-CT-2003-506395	Project acronym	CARE
Participant N°	20	Participant short name	STFC

		Management	
		Total effort in person-months (1)	
Cost category	Actual direct eligible costs (€)	Justification of costs description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)	
Audit certificate		audit certificate	

		N1-ELAN - Electron Linear Accelerator Network	
		Total effort in person-months (1)	0,0
Cost category	Actual direct eligible costs (€)	Justification of costs description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)	
Personnel cost (2)			
Durable equipment			
Consumable and prototyping			
Travel	901,46	CARE07 meeting, CERN, 30-31/10/07	

		N2-BENE - Beam for European Neutrino Experiments	
		Total effort in person-months (1)	0,0
Cost category	Actual direct eligible costs (€)	Justification of costs *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)*	
Personnel cost (2)			
Durable equipment			
Consumable and prototyping			
Travel	5 271,01	3*CARE07 meeting, CERN, 29-31/10/07	

		N3-HHH - High Energy High Intensity Hadron Beams	
		Total effort in person-months (1)	0,0
Cost category	Actual direct eligible costs (€)	Justification of costs *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)*	
Personnel cost (2)			
Durable equipment			
Consumable and prototyping			
Travel	598,99	HHH discussions CERN, 17/9/07; CARE07, CERN, 29/10/07	

		R3- HIPPI - High Intensity Pulsed Proton Injector	
		Total effort in person-months (1)	31,6
Cost category	**Actual direct eligible costs (€)**	**Justification of costs** *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, ...)*	
Personnel cost (2)	161 289,55	14.0 staff months on WP2, 16.9 on WP4 and 0.7 on WP5	
Durable equipment			
Consumable and prototyping	13 327,72	Computer hardware, software and licenses; hardware for equipment testing	
Travel	12 488,02	UK HIPPI meetings 18/4/07, 11/7/07, 3/8/07 (4 people total); HIPPI07, Orsay 26/28/9/07	

Total direct eligible costs	193 876,75		
Total indirect costs	169 354,02		
Adjustments to previous periods			
Total costs (3)	363 230,77	**Global estimate of the total costs for AC contractors (not only the eligible costs)**	
Justify any deviations with respect to the planned budget			

(1) AC contractors must include both the total estimated human effort (including permanent staff) and, in brackets, additional staff only.
(2) For TA activities excluding the effort charged under the user fees if the UF cost model is used.
(3) Totals should correspond to the respective figures on FORM C - Financial Statement

Contract N°	RII3-CT-2003-506395	Project acronym	CARE
Participant N°	21	Participant short name	ICL

		Management	
		Total effort in person-months (1)	
Cost category	Actual direct eligible costs (€)	Justification of costs description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Audit certificate		audit certificate	

		N2-BENE - Beam for European Neutrino Experiments	
		Total effort in person-months (1)	
Cost category	Actual direct eligible costs (€)	Justification of costs *description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)*	
Personnel cost (2)			
Durable equipment			
Consumable and prototyping			
Travel	21 383,61	Participation in BENE meetings: CERN, Feb07; DESY, Mar07; CERN, Mar07, paris, Apr07, CERN, Sep07; CERN, Oct07 (20 persons)	

Total direct eligible costs	21 383,61		
Total indirect costs	4 276,72		
Adjustments to previous periods			
Total costs (3)	25 660,33	Global estimate of the total costs for AC contractors (not only the eligible costs)	
Justify any deviations with respect to the planned budget			

(1) AC contractors must include both the total estimated human effort (including permanent staff) and, in brackets, additional staff only.
(2) For TA activities excluding the effort charged under the user fees if the UF cost model is used.
(3) Totals should correspond to the respective figures on FORM C - Financial Statement

Contract N°	RII3-CT-2003-506395	Project acronym	CARE
Participant N°	22	Participant short name	UMA

		Management	
		Total effort in person-months (1)	
Cost category	Actual direct eligible costs (€)	Justification of costs description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Audit certificate	800,00		
		N1-ELAN - Electron Linear Accelerator Network	
		Total effort in person-months (1)	
Cost category	Actual direct eligible costs (€)	Justification of costs description of expenditure and link to the specific work carried out (e.g. tasks, work packages, …)	
Personnel cost (2)			
Durable equipment			
Consumable and prototyping			
Travel	5 944,22	3 ELAN meetings (3 persons at, 1 person at Frascati, 1 person at DESY), Plasma workshop HEEAUP05 (5 persons, Paris), ELAN-ILC meeting (1 person, DESY). Also Care Meeting in Geneva in Oct 07	

Total direct eligible costs	6 744,22		
Total indirect costs	1 188,84		
Adjustments to previous periods			
Total costs (3)	7 933,06	Global estimate of the total costs for AC contractors (not only the eligible costs)	18 000,00

Justify any deviations with respect to the planned budget

(1) AC contractors must include both the total estimated human effort (including permanent staff) and, in brackets, additional staff only.
(2) For TA activities excluding the effort charged under the user fees if the UF cost model is used.
(3) Totals should correspond to the respective figures on FORM C - Financial Statement

2. Forms C - Financial Statements

Form C – Financial Statements (Appendix 2)

1 CEA

Form C - Model of Financial Statement per Activity for Integrated Infrastructure Initiatives

(to be completed by each contractor)

Type of instrument	Integrated Infrastructure Initiatives	Type of Action (if necessary)	I3
Project Title (or Acronym)	CARE	Contract n°	RII3-CT-2003-506395
Contractors's legal name	COMMISSARIAT A L'ENERGIE ATOMIQUE		
Legal Type	Governemental		
Contact Person	Roy Aleksan	Telephone	33 1 69083347
Telecopy	33 1 69086428	E-mail	aleksan@dapnia.cea.fr
Cost model used (AC/FC or FCF)/ (UF: User Fee)(*)	FC	Indirect costs (Real or Flat Rate of 20% of Direct costs, except subcontracting)	Real
Period from	01/01/2007	TO	31/12/2007

(*) If UF is used under "other specific activities: transnational access/connectivity", please mention the two cost models used (eg. FC/UF or FCF/UF or AC/UF)

1- Resources (Third party(ies))

Are there any resources made available on the basis of a prior agreement with third parties identified in Annex I of the contract? (Yes / No)				NO
If Yes, please provide the following information				
Third Party 1 (Y1)	Legal name		Cost model used	

If necessary add another Form C

2- Declaration of eligible costs (in €)

Please complete only the activity covered by the relevant instrument (and type of action) indicated above and as mentioned in Article II.25 and/or in Annexes I and III of the contract.
If you are a contractor using the additional cost model (AC):
- indicate only your additional eligible costs, except for Management of the Consortium Activity for which you may indicate your full eligible costs;
- do not declare eligible direct additional costs specifically covered by contributions from third parties as mentioned in Articles II.20 and II.23.a and b of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate your full eligible costs
The costs declared should distinguish between direct and indirect costs
If necessary, adjustments to previous period(s) may be included where appropriate

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (E)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Direct costs	1 113 276,95	0	0	0	132 177,03	0	4 541,25	0	0	0	0	0	1 249 995,23	
Of which subcontracting					0,00									
Indirect costs	532 580,63	0	0	0	79 258,85	0	0,00	0	0	0	0		611 839,48	
Adjustments to previous period(s)	-3 808,39												-3 808,39	
Total costs	1 642 049,19	0,00	0,00	0,00	211 435,88	0,00	4 541,25	0,00	0,00	0,00	0,00	0,00	1 858 026,32	

3- Declaration of receipts (in €)

If you are a contractor using the additional cost model (AC), indicate only receipts covered by Article II.23.c of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate receipts covered by Article II.23 of the contract.

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (E)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Total receipts														

4- Declaration of interest generated by the pre-financing (in €)	
To be completed only by the coordinator.	
Did the pre-financing (advance) you received by the Commission for this period earn interest? (Yes / No)	
If yes, please indicate the amount (in €)	

5- Request of FP6 Financial Contribution (in €)	
For this period, the FP6 Community financial contribution resuested is equal to (amount in €)	474 166,46

6- Audit certificates		
According to the contract, does this Financial Statement need an audit certificate (or several in case of Third party(ies)) delivered by independent auditor(s)? (Yes / No)		YES
If Yes, does this(those) audit certificate(s) cover only this Financial Statement per Activity? (Yes / No)		NO
If No, what are the periods covered by this(those) audit certificate(s) ?	From - to	
What is the total cost of this(those) audit certificate(s) (in €) per independent auditor(s) ?		

Audit certificate of the contractor (X)			
Legal name of the audit firm	KMPG	Cost of the certificate	
Audit certificate(s) of the third party(ies) (Ys) *(if necessary)*			
Y1 : Legal name of the audit firm		Cost of the certificate	
Y2 : Legal name of the audit firm		Cost of the certificate	
Y3 : Legal name of the audit firm		Cost of the certificate	
Y4 : Legal name of the audit firm		Cost of the certificate	
If necessary add another Form C.		Total (Z) = (X) +	

Reminders:
The cost of an audit certificate is included in the costs declared under the activity "Management of the Consortium". The required audit certificate (s) is (are) attached to this Financial Statement

7- Conversion rates
Costs incurred in currencies other than EURO shall be reported in EURO.
Please mention the conversion rate used (only one choice is possible) – Please note that the same principle applies for

Contractor	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party(ies) *(if necessary)*	
Third Party 1 (Y1)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 1 (Y2)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 3 (Y3)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 4 (Y4)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	

If necessary add another Form C.

8- Contractor's Certificate
We certify that:
- the costs declared above are directly related to the resources used to reach the objectives of the project ;
- the receipts declared above are directly related to the resources used to reach the objectives of the project ;
- the costs declared above fall within the definition of eligible costs specified in Articles II.19, II.20, II.21, II.22 and II.25 of the contract, and, if relevant, in Annex III and Article 9 (special clauses) of the contract ;
- the receipts declared above fall within the definition of receipts specified in Article II.23 of the contract ;
- the interest generated by the pre-financing declared above falls within the definition of Article II.27 of the contract ;
- the necessary adjustments, especially to costs reported in previous Financial Statement(s) per Activity, have been incorporated in the above Statement ;
- the above information declared is complete and true ;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised represen

Contractor's Stamp	Name of the Person responsible for the work	Name of the duly authorised Financial Officer
	Aleksan Roy	**Nathalie JUDAS**
	Date	Date
	27/02/2007	**27/02/2007**
	Signature	Signature

UCLN

Form C - Model of Financial Statement per Activity for Integrated Infrastructure Initiatives

(to be completed by each contractor)

Type of instrument	Integrated Infrastructure Initiatives	Type of Action (if necessary)	
Project Title (or Acronym)	CARE	Contract n°	RII-CT-2003-506395
Contractors's legal name	Universite Catholique de Louvain (UCL)		
Legal Type	PRIV		
Contact Person	Thierry Delbar	Telephone	(32)10473202
Telecopy	(32)10452183	E-mail	delbar@fynu.ucl.ac.be
Cost model used (AC/FC or FCF)/ (UF: User Fee)(*)	AC	Indirect costs (Real or Flat Rate of 20% of Direct costs, except subcontracting)	20%
Period from	01/01/2007	TO	31/12/2007

(*) If UF is used under "other specific activities: transnational access/connectivity", please mention the two cost models used (eg. FC/UF or FCF/UF or AC/UF)

1- Resources (Third party(ies))

Are there any resources made available on the basis of a prior agreement with third parties identified in Annex I of the contract? (Yes / No)	No
If Yes, please provide the following information	

Third Party 1 (Y1)	Legal name		Cost model used	

If necessary add another Form C

2- Declaration of eligible costs (in €)

Please complete only the activity covered by the relevant instrument (and type of action) indicated above and as mentioned in Article II.25 and/or in Annexes I and III of the contract.
If you are a contractor using the additional cost model (AC):
- indicate only your additional eligible costs, except for Management of the Consortium Activity for which you may indicate your full eligible costs;
- do not declare eligible direct additional costs specifically covered by contributions from third parties as mentioned in Articles II.20 and II.23.a and b of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate your full eligible costs
The costs declared should distinguish between direct and indirect costs
If necessary, adjustments to previous period(s) may be included where appropriate

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (E)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Direct costs							33,18						33,18	
Of which subcontracting														
Indirect costs							6,63						6,63	
Adjustments to previous period(s)														
Total costs							39,81						39,81	

3- Declaration of receipts (in €)

If you are a contractor using the additional cost model (AC), indicate only receipts covered by Article II.23.c of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate receipts covered by Article II.23 of the contract.

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (E)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Total receipts													0	

2

4- Declaration of interest generated by the pre-financing (in €)	
To be completed only by the coordinator.	
Did the pre-financing (advance) you received by the Commission for this period earn interest? (Yes / No)	
If yes, please indicate the amount (in €)	

5- Request of FP6 Financial Contribution (in €)	
For this period, the FP6 Community financial contribution resuested is equal to (amount in €)	39,81

6- Audit certificates		
According to the contract, does this Financial Statement need an audit certificate (or several in case of Third party(ies)) delivered by independent auditor(s)? (Yes / No)		No
If Yes, does this(those) audit certificate(s) cover only this Financial Statement per Activity? (Yes / No)		
If No, what are the periods covered by this(those) audit certificate(s) ?	From - to	
What is the total cost of this(those) audit certificate(s) (in €) per independent auditor(s) ?		

Audit certificate of the contractor (X)			
Legal name of the audit firm		**Cost of the certificate**	
Audit certificate(s) of the third party(ies) (Ys) ***(if necessary)***			
Y1 : Legal name of the audit firm		**Cost of the certificate**	
Y2 : Legal name of the audit firm		**Cost of the certificate**	
Y3 : Legal name of the audit firm		**Cost of the certificate**	
Y4 : Legal name of the audit firm		**Cost of the certificate**	
If necessary add another Form C.		**Total (Z) = (X) + (Ys)**	

Reminders:
The cost of an audit certificate is included in the costs declared under the activity "Management of the Consortium". The required audit certificate (s) is (are) attached to this Financial Statement

7- Conversion rates

Costs incurred in currencies other than EURO shall be reported in EURO.
Please mention the conversion rate used (only one choice is possible) – Please note that the same principle applies for

Contractor	
- Conversion rate of the date of incurred actual costs? (YES / NO)	No
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	No
Third Party(ies) ***(if necessary)***	
Third Party 1 (Y1)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 1 (Y2)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 3 (Y3)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 4 (Y4)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	

If necessary add another Form C.

8- Contractor's Certificate

We certify that:
- the costs declared above are directly related to the resources used to reach the objectives of the project ;
- the receipts declared above are directly related to the resources used to reach the objectives of the project ;
- the costs declared above fall within the definition of eligible costs specified in Articles II.19, II.20, II.21, II.22 and II.25 of the contract, and, if relevant, in Annex III and Article 9 (special clauses) of the contract ;
- the receipts declared above fall within the definition of receipts specified in Article II.23 of the contract ;
- the interest generated by the pre-financing declared above falls within the definition of Article II.27 of the contract ;
- the necessary adjustments, especially to costs reported in previous Financial Statement(s) per Activity, have been incorporated in the above Statement ;
- the above information declared is complete and true ;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Contractor's Stamp	**Name of the Person responsible for the work**	**Name of the duly authorised Financial Officer**
	Thierry DELBAR	**Cécile SIBILLE**
	Date	**Date**
	08/02/2008	**08/02/2008**
	Signature	**Signature**

3 CNRS

Form C - Model of Financial Statement per Activity for Integrated Infrastructure Initiatives

(to be completed by each contractor)

Type of instrument	Integrated Infrastructure Initiatives	Type of Action (if necessary)	
Project Title (or Acronym)	CARE	Contract n°	RII3-CT-2003-506395
Contractors's legal name	22-CNRS		
Legal Type	GOV		
Contact Person	M. Alessandro VARIOLA	Telephone	(+33)1 64 46 83 00
Telecopy	331 64 46 83 62	E-mail	variola@lal.in2p3.fr
Cost model used (AC/FC or FCF)/ (UF: User Fee)(*)	FCF	Indirect costs (Real or Flat Rate of 20% of Direct costs, except subcontracting)	Flate rate 20%
Period from	01/01/2007	To	31/12/2007

(*) If UF is used under "other specific activities: transnational access/connectivity", please mention the two cost models used (eg. FC/UF or FCF/UF or AC/UF)

1- Resources (Third party(ies))

Are there any resources made available on the basis of a prior agreement with third parties identified in Annex I of the contract? (Yes / No)

If Yes, please provide the following information

Third Party 1 (Y1)	Legal name		Cost model used	
Third Party 2 (Y2)	Legal name		Cost model used	
Third Party 3 (Y3)	Legal name		Cost model used	
Third Party 4 (Y4)	Legal name		Cost model used	

If necessary add another Form C

2- Declaration of eligible costs (in €)

Please complete only the activity covered by the relevant instrument (and type of action) indicated above and as mentioned in Article II.25 and/or in Annexes I and III of the contract.
If you are a contractor using the additional cost model (AC):
- indicate only your additional eligible costs, except for Management of the Consortium Activity for which you may indicate your full eligible costs;
- do not declare eligible direct additional costs specifically covered by contributions from third parties as mentioned in Articles II.20 and II.23.a and b of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate your full eligible costs
The costs declared should distinguish between direct and indirect costs
If necessary, adjustments to previous period(s) may be included where appropriate

Type of Activity	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (F)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Direct costs	1 065 652,96						1 146,75						**1 066 799,71**	**0,00**
Of which subcontracting														
Indirect costs	213 130,59	0,00		0,00		0,00	229,35	0,00				0,00	**213 359,94**	**0,00**
Adjustments to previous period(s)														
Total costs	1 278 783,55	0,00		0,00		0,00	1 376,10	0,00		0,00		0,00	**1 280 159,65**	**0,00**

3- Declaration of receipts (in €)

If you are a contractor using the additional cost model (AC), indicate only receipts covered by Article II.23.c of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate receipts covered by Article II.23 of the contract.

Type of Activity	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (F)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Total receipts														

4- Declaration of interest generated by the pre-financing (in €)	
To be completed only by the coordinator.	
Did the pre-financing (advance) you received by the Commission for this period earn interest? (Yes / No)	
If yes, please indicate the amount (in €)	

5- Request of FP6 Financial Contribution (in €)	
For this period, the FP6 Community financial contribution requested is equal to (amount in €)	200 000,00

6- Audit certificates		
According to the contract, does this Financial Statement need an audit certificate (or several in case of Third party(ies)) delivered by independent auditor(s)? (Yes / No)		No
If Yes, does this(those) audit certificate(s) cover only this Financial Statement per Activity? (Yes / No)		
If No, what are the periods covered by this(those) audit certificate(s) ?	From - to	
What is the total cost of this(those) audit certificate(s) (in €) per independent auditor(s) ?		

Audit certificate of the contractor (X)			
Legal name of the audit firm	Agence Comptable Secondaire de PMA	Cost of the certificate	3 049,59
Audit certificate(s) of the third party(ies) (Ys) *(if necessary)*			
Y1 : Legal name of the audit firm		Cost of the certificate	
Y2 : Legal name of the audit firm		Cost of the certificate	
Y3 : Legal name of the audit firm		Cost of the certificate	
Y4 : Legal name of the audit firm		Cost of the certificate	
If necessary add another Form C.		Total (Z) = (X) + (Ys)	

Reminders:
The cost of an audit certificate is included in the costs declared under the activity "Management of the Consortium". The required audit certificate (s) is (are) attached to this Financial Statement

7- Conversion rates
Costs incurred in currencies other than EURO shall be reported in EURO.
Please mention the conversion rate used (only one choice is possible) – Please note that the same principle applies for receipts.

Contractor	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party(ies) *(if necessary)*	
Third Party 1 (Y1)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 1 (Y2)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 3 (Y3)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 4 (Y4)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	

If necessary add another Form C.

8- Contractor's Certificate
We certify that:
- the costs declared above are directly related to the resources used to reach the objectives of the project ;
- the receipts declared above are directly related to the resources used to reach the objectives of the project ;
- the costs declared above fall within the definition of eligible costs specified in Articles II.19, II.20, II.21, II.22 and II.25 of the contract, and, if relevant, in Annex III and Article 9 (special clauses) of the contract ;
- the receipts declared above fall within the definition of receipts specified in Article II.23 of the contract ;
- the interest generated by the pre-financing declared above falls within the definition of Article II.27 of the contract ;
- the necessary adjustments, especially to costs reported in previous Financial Statement(s) per Activity, have been incorporated in the above Statement ;
- the above information declared is complete and true ;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Contractor's Stamp	Name of the Person responsible for the work	Name of the duly authorised Financial Officer
	M. Alessandro VARIOLA	M. Gilles SENTISE
	Date	Date
	29/02/2008	29/02/2008
	Signature	Signature

PSEUDO Form C - Model of Financial Statement per Activity for Integrated Initiatives for Infrastructures

(to be completed by each contractor)

Type of instrument	**Integrated Initiatives for Infrastructures**	**Type of Action**	**Communication Network Development**
Project Title (or Acronym)	**CARE**	**Contract n°**	**RII3-CT-2003-506395**

Contractor's Legal Name	**- RII3-CT-2003-506395**		
Legal Type	**GOVERNEMENTAL**		
Contact Person	**M. Alessandro VARIOLA**	**Telephone**	**(+33)1 64 46 89 61**
Telecopy	**(+33)1 64 46 83 62**	**E-mail**	variola@lal.in2p3.fr

Cost model used (AC/FC or FCF)	**FCF**	**Indirect costs (Real or Flat Rate of 20% of Direct costs, except subcontracting)**	**Flate Rate of 20%**
Period from	**01/01/2007**	**To**	**31/12/2007**

1- Resources (Third party(ies), JRU)

Are there any resources made available on the basis of a prior agreement with third parties or JRU identified in Annex I of the contract? (Yes / No)

If Yes, please provide the following information

Third Party/JRU 1 (Y1)	**Legal Name**	**UNIVERSITE PARIS-SUD**	**Cost Model used**	**FCF**
Third Party/JRU 2 (Y2)	**Legal Name**		**Cost Model used**	
Third Party/JRU 3 (Y3)	**Legal Name**		**Cost Model used**	
Third Party/JRU 4 (Y4)	**Legal Name**		**Cost Model used**	
Third Party/JRU 5 (Y5)	**Legal Name**		**Cost Model used**	
Third Party/JRU 6 (Y6)	**Legal Name**		**Cost Model used**	
Third Party/JRU 7 (Y7)	**Legal Name**		**Cost Model used**	
Third Party/JRU 8 (Y8)	**Legal Name**		**Cost Model used**	

2- Declaration of eligible costs (in €)

Please complete only the activity covered by the relevant instrument (and type of action) indicated above and as mentioned in Article II.25 and/or in Annexes I and III of the contract.
If you are a contractor using the additional cost model (AC):
- indicate only your additional eligible costs, except for Management of the Consortium Activity for which you may indicate your full eligible costs;
- do not declare eligible direct additional costs specifically covered by contributions from third parties as mentioned in Articles II.20 and II.23.a and b of the contract.

If you are a contractor using a full cost model (FC/FCF), indicate your full eligible costs.
The costs declared should distinguish between direct and indirect costs.
If necessary, adjustments to previous period(s) may be included where appropriate.

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Connectivity (E)		Other Specific Activities (F)		**Total G =(A)+(B)+(C)+(D)+(E)+(F)**	
	JRA1,JRA2,JRA3,JRA4		N/A		NA1 + Audit Certificate Costs		NA2, NA3, NA4, NA5		N/A		SA1 SA2			
	Contractor	Third party/JRU	Contractor	Third party/JRU	Contractor	Third party/JRU	Contractor	Third party/JRU	Contractor	Third party/JRU	Contractor	Third party/JRU	Contractor	Third party/JRU
Direct costs		2 715,41						6 262,71						**8 978,12**
Of which subcontracting		0,00						0,00						**0,00**
Indirect Costs		543,08						1 252,54						**1 795,62**
Adjustments to previous period(s)		0,00						0,00						**0,00**
Total costs	**0,00**	**3 258,49**						**7 515,25**						**10 773,74**

3- Declaration of receipts (in €)

Please report in this section the total receipts reported by each member of the Third Party Agreement / JRU. Individual FormC must be attached

	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Connectivity (E)		Other Specific Activities (F)		Total G =(A)+(B)+(C)+(D)+(E)+(F)	
	JRA1,JRA2,JRA3,JRA4		N/A		NA1 + Audit Certificate Costs		NA2, NA3, NA4, NA5		N/A		SA1 SA2			
	Contractor	Third party/JRU	Contractor	Third party/JRU	Contractor	Third party/JRU	Contractor	Third party/JRU	Contractor	Third party/JRU	Contractor	Third party/JRU	Contractor	Third party/JRU
Total Receipts													**0,00**	

Type of Activity

4- Declaration of interest generated by the pre-financing (in €)

To be completed only by the coordinator.

Did the pre-financing (advance) you received by the Commission for this period earn interest? (Yes / No)	N/A	
If yes, please indicate the amount (in €)	N/A	

5- Request of FP6 Financial contribution (in €)

				Contractor	Third party/JRU
FP6 Community financial contribution requested by	The Contractor		amount in €		
FP6 Community financial contribution requested by	Member of Third Party/JRU1	UNIVERSITE PARIS-SUD	amount in €		9 144,50
FP6 Community financial contribution requested by	Member of Third Party/JRU2	N/A	amount in €		0,00
FP6 Community financial contribution requested by	Member of Third Party/JRU3	N/A	amount in €		0,00
FP6 Community financial contribution requested by	Member of Third Party/JRU4	N/A	amount in €		0,00
FP6 Community financial contribution requested by	Member of Third Party/JRU5	N/A	amount in €		0,00
FP6 Community financial contribution requested by	Member of Third Party/JRU6	N/A	amount in €		0,00
FP6 Community financial contribution requested by	Member of Third Party/JRU7	N/A	amount in €		0,00
FP6 Community financial contribution requested by	Member of Third Party/JRU8	N/A	amount in €		0,00
For this period, the FP6 Community financial contribution requested is equal to (amount in €)					**9 144,50**

6- Audit certificates

According to the contract, does this Financial Statement need an audit certificate delivered by independent auditor(s)? (Yes / No)				**No**
If Yes, does this(those) audit certificate(s) cover only this Financial Statement per Activity? (Yes / No)				
If No, what are the periods covered by this (those) audit certificate(s) ?	From		To	
What is the total cost of this (those) audit certificate(s) (in €) per independent auditor(s) ?				**0,00**

			Contractor	Third party/JRU
Audit certificate of the contractor (X)				
Legal name of the audit firm		Cost of the certificate	0,00	
Audit certificate of the Third Party/JRU member1				
Legal name of the audit firm		Cost of the certificate		0,00
Audit certificate of the Third Party/JRU member2				
Legal name of the audit firm		Cost of the certificate		0,00
Audit certificate of the Third Party/JRU member3				
Legal name of the audit firm		Cost of the certificate		0,00
Audit certificate of the Third Party/JRU member4				
Legal name of the audit firm		Cost of the certificate		0,00
Audit certificate of the Third Party/JRU member5				
Legal name of the audit firm		Cost of the certificate		0,00
Audit certificate of the Third Party/JRU member6				
Legal name of the audit firm		Cost of the certificate		0,00
Audit certificate of the Third Party/JRU member7				
Legal name of the audit firm		Cost of the certificate		0,00
Audit certificate of the Third Party/JRU member8				
Legal name of the audit firm		Cost of the certificate		0,00

Reminders:
The cost of an audit certificate is included in the costs declared under the activity “Management of the Consortium”.
The required audit certificate(s) is(are) attached to this Financial Statement.

7- Conversion rates	
Costs incurred in currencies other than EURO shall be reported in EURO.	
Please mention the conversion rate used (only one choice is possible) – Please note that the same principle applies for receipts.	
Contractor	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	

8- Contractor's Certificate

We certify that:
- the costs declared above are directly related to the resources used to reach the objectives of the project ;
- the receipts declared above are directly related to the resources used to reach the objectives of the project ;
- the costs declared above fall within the definition of eligible costs specified in Articles II.19, II.20, II.21, II.22 and II.25 of the contract, and, if relevant, in Annex III and Article 9 (special clauses) of the contract ;
- the receipts declared above fall within the definition of receipts specified in Article II.23 of the contract ;
- the interest generated by the pre-financing declared above falls within the definition of Article II.27 of the contract ;
- the necessary adjustments, especially to costs reported in previous Financial Statement(s) per Activity, have been incorporated in the above Statement ;
- the above information declared is complete and true ;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised represen

Contractor's Stamp	Name of the Person responsible for the work	Name of the duly authorised Finanacial Officer
	M. Alessandro VARIOLA	Mme Brigitte RENARD
	Date	**Date**
	22/01/2008	22/01/2008
	Signature	**Signature**

4 GSI

Form C - Model of Financial Statement per Activity for Integrated Infrastructure Initiatives

(to be completed by each contractor)

Type of instrument	Integrated Infrastructure Initiatives	Type of Action *(if necessary)*	
Project Title (or Acronym)	CARE	Contract n°	RII3-CT-2003-506395
Contractors's legal name	Gesellschaft für Schwerionenforschung mbH		
Legal Type	PNP		
Contact Person	Hartmut Eickhoff	Telephone	+ 49 6159 712395
Telecopy	+49 6159 712987	E-mail	h.eickhoff@gsi.de
Cost model used (AC/FC or FCF)/ (UF: User Fee)(*)	FC/UF	Indirect costs (Real or Flat Rate of 20% of Direct costs, except subcontracting)	REAL
Period from	01/01/2007	To	31/12/2007

(*) If UF is used under "other specific activities: transnational access/connectivity", please mention the two cost models used (eg. FC/UF or FCF/UF or AC/UF)

1- Resources (Third party(ies))

Are there any resources made available on the basis of a prior agreement with third parties identified in Annex I of the contract? (Yes / No)				NO
If Yes, please provide the following information				
Third Party 1 (Y1)	Legal name		Cost model used	

If necessary add another Form C

2- Declaration of eligible costs (in €)

Please complete only the activity covered by the relevant instrument (and type of action) indicated above and as mentioned in Article II.25 and/or in Annexes I and III of the contract.
If you are a contractor using the additional cost model (AC):
- indicate only your additional eligible costs, except for Management of the Consortium Activity for which you may indicate your full eligible costs;
- do not declare eligible direct additional costs specifically covered by contributions from third parties as mentioned in Articles II.20 and II.23.a and b of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate your full eligible costs
The costs declared should distinguish between direct and indirect costs
If necessary, adjustments to previous period(s) may be included where appropriate

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (F)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Direct costs	251 067,70						5 002,08						256 069,78	
Of which subcontracting													0,00	
Indirect costs	32 112,12												32 112,12	
Adjustments to previous period(s)	-29 591,19						-225,94						-29 817,13	
Total costs	253 588,63				0,00		4 776,14		0,00		0,00		258 364,77	

3- Declaration of receipts (in €)

If you are a contractor using the additional cost model (AC), indicate only receipts covered by Article II.23.c of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate receipts covered by Article II.23 of the contract.

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (F)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Total receipts													0	

4- Declaration of interest generated by the pre-financing (in €)	
To be completed only by the coordinator.	
Did the pre-financing (advance) you received by the Commission for this period earn interest? (Yes / No)	
If yes, please indicate the amount (in €)	

5- Request of FP6 Financial Contribution (in €)	
For this period, the FP6 Community financial contribution requested is equal to (amount in €)	**131 570,46**

6- Audit certificates		
According to the contract, does this Financial Statement need an audit certificate (or several in case of Third party(ies)) delivered by independent auditor(s)? (Yes / No)		**YES**
If Yes, does this(those) audit certificate(s) cover only this Financial Statement per Activity? (Yes / No)		**NO**
If No, what are the periods covered by this(those) audit certificate(s) ?	From - to	**01.01.2006 - 31.12.2007**
What is the total cost of this(those) audit certificate(s) (in €) per independent auditor(s) ?		

Audit certificate of the contractor (X)			
Legal name of the audit firm	**Internal Audit**	Cost of the certificate	250
Audit certificate(s) of the third party(ies) (Ys) *(if necessary)*			
Y1 : Legal name of the audit firm		Cost of the certificate	
Y2 : Legal name of the audit firm		Cost of the certificate	
Y3 : Legal name of the audit firm		Cost of the certificate	
Y4 : Legal name of the audit firm		Cost of the certificate	
If necessary add another Form C.		Total (Z) = (X) + (Ys)	

Reminders:
The cost of an audit certificate is included in the costs declared under the activity "Management of the Consortium". The required audit certificate (s) is (are) attached to this Financial Statement

7- Conversion rates

Costs incurred in currencies other than EURO shall be reported in EURO.

Please mention the conversion rate used (only one choice is possible) – Please note that the same principle applies for receipts.

Contractor	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party(ies) *(if necessary)*	
Third Party 1 (Y1)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 1 (Y2)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 3 (Y3)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 4 (Y4)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	

If necessary add another Form C.

8- Contractor's Certificate

We certify that:
- the costs declared above are directly related to the resources used to reach the objectives of the project ;
- the receipts declared above are directly related to the resources used to reach the objectives of the project ;
- the costs declared above fall within the definition of eligible costs specified in Articles II.19, II.20, II.21, II.22 and II.25 of the contract, and, if relevant, in Annex III and Article 9 (special clauses) of the contract ;
- the receipts declared above fall within the definition of receipts specified in Article II.23 of the contract ;
- the interest generated by the pre-financing declared above falls within the definition of Article II.27 of the contract ;
- the necessary adjustments, especially to costs reported in previous Financial Statement(s) per Activity, have been incorporated in the above Statement ;
- the above information declared is complete and true ;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Contractor's Stamp	Name of the Person responsible for the work	Name of the duly authorised Financial Officer
	Dr. Hartmut Eickhoff	**Dr. Johannes Heilmann**
	Date	Date
	19/02/2008	**19/02/2008**
	Signature	Signature

5 IAP-FU

Form C - Model of Financial Statement per Activity for Integrated Infrastructure Initiatives

(to be completed by each contractor)

Type of instrument	Integrated Infrastructure Initiatives	Type of Action (if necessary)	
Project Title (or Acronym)	CARE	Contract n°	RII3-CT-2003-506395
Contractors's legal name	Johann Wolfgang Goethe Universität Frankfurt am Main		
Legal Type	Public research body organized under the laws of Germany		
Contact Person	Christoph Denecke	Telephone	+ 49 69 798 29547
Telecopy	+ 49 69 798 29546	E-mail	Denecke@ltg.uni-frankfurt.de
Cost model used (AC/FC or FCF)/ (UF: User Fee)(*)	AC	Indirect costs (Real or Flat Rate of 20% of Direct costs, except subcontracting)	20%
Period from	1.01.2007	TO	31/12/2007

(*) If UF is used under "other specific activities: transnational access/connectivity", please mention the two cost models used (eg. FC/UF or FCF/UF or AC/UF)

1- Resources (Third party(ies))

Are there any resources made available on the basis of a prior agreement with third parties identified in Annex I of the contract? (Yes / No)				
If Yes, please provide the following information				
Third Party 1 (Y1)	Legal name		Cost model used	

If necessary add another Form C

2- Declaration of eligible costs (in €)

Please complete only the activity covered by the relevant instrument (and type of action) indicated above and as mentioned in Article II.25 and/or in Annexes I and III of the contract.
If you are a contractor using the additional cost model (AC):
- indicate only your additional eligible costs, except for Management of the Consortium Activity for which you may indicate your full eligible costs;
- do not declare eligible direct additional costs specifically covered by contributions from third parties as mentioned in Articles II.20 and II.23.a and b of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate your full eligible costs
The costs declared should distinguish between direct and indirect costs
If necessary, adjustments to previous period(s) may be included where appropriate

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (E)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Direct costs	67523,51												67523,51	
Of which subcontracting														
Indirect costs	13504,70												13504,70	
Adjustments to previous period(s)					566,94									
Total costs	81028,21				566,94								81595,15	

3- Declaration of receipts (in €)

If you are a contractor using the additional cost model (AC), indicate only receipts covered by Article II.23.c of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate receipts covered by Article II.23 of the contract.

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (E)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Total receipts														

4- Declaration of interest generated by the pre-financing (in €)	
To be completed only by the coordinator.	
Did the pre-financing (advance) you received by the Commission for this period earn interest? (Yes / No)	
If yes, please indicate the amount (in €)	

5- Request of FP6 Financial Contribution (in €)	
For this period, the FP6 Community financial contribution resuested is equal to (amount in €)	81595,15

6- Audit certificates		
According to the contract, does this Financial Statement need an audit certificate (or several in case of Third party(ies)) delivered by independent auditor(s)? (Yes / No)		Yes
If Yes, does this(those) audit certificate(s) cover only this Financial Statement per Activity? (Yes / No)		No
If No, what are the periods covered by this(those) audit certificate(s) ?	From - to	1.01.2006 - 31.12.2007
What is the total cost of this(those) audit certificate(s) (in €) per independent auditor(s) ?		

Audit certificate of the contractor (X)			
Legal name of the audit firm	Interne Revision - Frankf. Univ.	Cost of the certificate	
Audit certificate(s) of the third party(ies) (Ys) *(if necessary)*			
Y1 : Legal name of the audit firm		Cost of the certificate	
Y2 : Legal name of the audit firm		Cost of the certificate	
Y3 : Legal name of the audit firm		Cost of the certificate	
Y4 : Legal name of the audit firm		Cost of the certificate	
If necessary add another Form C.		Total (Z) = (X) + (Ys)	

Reminders:
The cost of an audit certificate is included in the costs declared under the activity "Management of the Consortium". The required audit certificate (s) is (are) attached to this Financial Statement

7- Conversion rates
Costs incurred in currencies other than EURO shall be reported in EURO.
Please mention the conversion rate used (only one choice is possible) – Please note that the same principle applies for receipts.

Contractor	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party(ies) *(if necessary)*	
Third Party 1 (Y1)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 1 (Y2)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 3 (Y3)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 4 (Y4)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	

If necessary add another Form C.

8- Contractor's Certificate

We certify that:
- the costs declared above are directly related to the resources used to reach the objectives of the project ;
- the receipts declared above are directly related to the resources used to reach the objectives of the project ;
- the costs declared above fall within the definition of eligible costs specified in Articles II.19, II.20, II.21, II.22 and II.25 of the contract, and, if relevant, in Annex III and Article 9 (special clauses) of the contract ;
- the receipts declared above fall within the definition of receipts specified in Article II.23 of the contract ;
- the interest generated by the pre-financing declared above falls within the definition of Article II.27 of the contract ;
- the necessary adjustments, especially to costs reported in previous Financial Statement(s) per Activity, have been incorporated in the above Statement ;
- the above information declared is complete and true ;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Contractor's Stamp	Name of the Person responsible for the work	Name of the duly authorised Financial Officer
	U. Ratzinger	C. Denecke
	Date	Date
	10/03/2008	10/03/2008
	Signature	Signature

6 DESY

Form C - Model of Financial Statement per Activity for Integrated Infrastructure Initiatives

(to be completed by each contractor)

Type of instrument	Integrated Infrastructure Initiatives	Type of Action (if necessary)	
Project Title (or Acronym)	CARE	Contract n°	RII3-CT-2003-506395
Contractors's legal name	Stiftung Deutsches Elektronen-Synchrotron		
Legal Type			
Contact Person	Prof. Dr. Dieter Proch	Telephone	(+49)-40-8998-3273
Telecopy	(+49)-40-8998-4302	E-mail	dieter.proch@desy.de
Cost model used (AC/FC or FCF)/ (UF: User Fee)(*)	AC	Indirect costs (Real or Flat Rate of 20% of Direct costs, except subcontracting)	Flat rate 20%
Period from	01/01/2007	TO	31/12/2007

(*) If UF is used under "other specific activities: transnational access/connectivity", please mention the two cost models used (eg. FC/UF or FCF/UF or AC/UF)

1- Resources (Third party(ies))

Are there any resources made available on the basis of a prior agreement with third parties identified in Annex I of the contract? (Yes / No)	No
If Yes, please provide the following information	

Third Party 1 (Y1)	Legal name		Cost model used	

If necessary add another Form C

2- Declaration of eligible costs (in €)

Please complete only the activity covered by the relevant instrument (and type of action) indicated above and as mentioned in Article II.25 and/or in Annexes I and III of the contract.
If you are a contractor using the additional cost model (AC):
- indicate only your additional eligible costs, except for Management of the Consortium Activity for which you may indicate your full eligible costs;
- do not declare eligible direct additional costs specifically covered by contributions from third parties as mentioned in Articles II.20 and II.23.a and b of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate your full eligible costs
The costs declared should distinguish between direct and indirect costs
If necessary, adjustments to previous period(s) may be included where appropriate

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (E)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Direct costs	255 671,56						45 685,50						301 357,06	
Of which subcontracting														
Indirect costs	51 134,31						9 137,10						60 271,41	
Adjustments to previous period(s)	10 287,64				3 321,61		-658,19						12 951,06	
Total costs	317 093,51				3 321,61		54 164,41						374 579,53	

3- Declaration of receipts (in €)

If you are a contractor using the additional cost model (AC), indicate only receipts covered by Article II.23.c of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate receipts covered by Article II.23 of the contract.

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (E)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Total receipts														

4- Declaration of interest generated by the pre-financing (in €)	
To be completed only by the coordinator.	
Did the pre-financing (advance) you received by the Commission for this period earn interest? (Yes / No)	
If yes, please indicate the amount (in €)	

5- Request of FP6 Financial Contribution (in €)	
For this period, the FP6 Community financial contribution resuested is equal to (amount in €)	374 579,53

6- Audit certificates		
According to the contract, does this Financial Statement need an audit certificate (or several in case of Third party(ies)) delivered by independent auditor(s)? (Yes / No)		Yes
If Yes, does this(those) audit certificate(s) cover only this Financial Statement per Activity? (Yes / No)		Yes
If No, what are the periods covered by this(those) audit certificate(s) ?	From - to	
What is the total cost of this(those) audit certificate(s) (in €) per independent auditor(s) ?		*1.605,43*

Audit certificate of the contractor (X)			
Legal name of the audit firm	DESY Internal Auditor	Cost of the certificate	1 605,43
Audit certificate(s) of the third party(ies) (Ys) *(if necessary)*			
Y1 : Legal name of the audit firm		Cost of the certificate	
Y2 : Legal name of the audit firm		Cost of the certificate	
Y3 : Legal name of the audit firm		Cost of the certificate	
Y4 : Legal name of the audit firm		Cost of the certificate	
If necessary add another Form C.		**Total (Z) = (X) + (Ys)**	

Reminders:
The cost of an audit certificate is included in the costs declared under the activity "Management of the Consortium". The required audit certificate (s) is (are) attached to this Financial Statement

7- Conversion rates
Costs incurred in currencies other than EURO shall be reported in EURO.

Please mention the conversion rate used (only one choice is possible) – Please note that the same principle applies for receipts.

Contractor	
- Conversion rate of the date of incurred actual costs? (YES / NO)	No
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party(ies) *(if necessary)*	
Third Party 1 (Y1)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 1 (Y2)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 3 (Y3)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 4 (Y4)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	

If necessary add another Form C.

8- Contractor's Certificate
We certify that:
- the costs declared above are directly related to the resources used to reach the objectives of the project ;
- the receipts declared above are directly related to the resources used to reach the objectives of the project ;
- the costs declared above fall within the definition of eligible costs specified in Articles II.19, II.20, II.21, II.22 and II.25 of the contract, and, if relevant, in Annex III and Article 9 (special clauses) of the contract ;
- the receipts declared above fall within the definition of receipts specified in Article II.23 of the contract ;
- the interest generated by the pre-financing declared above falls within the definition of Article II.27 of the contract ;
- the necessary adjustments, especially to costs reported in previous Financial Statement(s) per Activity, have been incorporated in the above Statement ;
- the above information declared is complete and true ;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Contractor's Stamp	Name of the Person responsible for the work	Name of the duly authorised Financial Officer
	Prof. Dr. Dieter Proch	**Uwe Wolframm**
	Date	Date
	13-févr-08	**13-févr-08**
	Signature	Signature

7-FZJ

Form C - Model of Financial Statement per Activity for Integrated Infrastructure Initiatives

(to be completed by each contractor)

Type of instrument	Integrated Infrastructure Initiatives	Type of Action *(if necessary)*	
Project Title (or Acronym)	CARE	Contract n°	RII3-CT-2003-506395
Contractors's legal name	Forschungszentrum Juelich GmbH		
Legal Type	GmbH		
Contact Person	Dr. Raimund Tölle	Telephone	+49-2461-615615
Telecopy	+49-2461-612670	E-mail	r.toelle@fz-juelich.de
Cost model used (AC/FC or FCF)/ (UF: User Fee)(*)	FC	Indirect costs (Real or Flat Rate of 20% of Direct costs, except subcontracting)	Real
Period from	01/01/2007	To	31/12/2007

1- Resources (Third party(ies))

Are there any resources made available on the basis of a prior agreement with third parties identified in Annex I of the contract? (Yes / No)	No
If Yes, please provide the following information	

Third Party 1 (Y1)	Legal name		Cost model used	

If necessary add another Form C

2- Declaration of eligible costs (in €)

Please complete only the activity covered by the relevant instrument (and type of action) indicated above and as mentioned in Article II.25 and/or in Annexes I and III of the contract.
If you are a contractor using the additional cost model (AC):
- indica

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (E)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Direct costs	274 660,27				0,00		3 757,62						278 417,89	0,00
Of which subcontracting													0,00	0,00
Indirect costs	252 906,72						0,00						252 906,72	0,00
Adjustments to previous period(s)	17 682,75						533,39						18 216,14	0,00
Total costs	545 249,74	0,00	0,00	0,00	0,00	0,00	4 291,01	0,00	0,00	0,00	0,00	0,00	549 540,75	0,00

3- Declaration of receipts (in €)

If you are a contractor using the additional cost model (AC), indicate only receipts covered by Article II.23.c of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate receipts covered by Article II.23 of the contract.

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (E)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Total receipts													0	0

4- Declaration of interest generated by the pre-financing (in €)	
To be completed only by the coordinator.	
Did the pre-financing (advance) you received by the Commission for this period earn interest? (Yes / No)	
If yes, please indicate the amount (in €)	

5- Request of FP6 Financial Contribution (in €)	
For this period, the FP6 Community financial contribution requested is equal to (amount in €)	**127 902,28**

6- Audit certificates		
According to the contract, does this Financial Statement need an audit certificate (or several in case of Third party(ies)) delivered by independent auditor(s)? (Yes / No)		Yes
If Yes, does this(those) audit certificate(s) cover only this Financial Statement per Activity? (Yes / No)		No
If No, what are the periods covered by this(those) audit certificate(s) ?	From - to	**01.01.06-31.12.07**
What is the total cost of this(those) audit certificate(s) (in €) per independent auditor(s) ?		

Audit certificate of the contractor (X)			
Legal name of the audit firm	**Ernst & Young be declared next perio**	**Cost of the certificate**	2200
v			
Y1 : Legal name of the audit firm		**Cost of the certificate**	
Y2 : Legal name of the audit firm		**Cost of the certificate**	
Y3 : Legal name of the audit firm		**Cost of the certificate**	
Y4 : Legal name of the audit firm		**Cost of the certificate**	
If necessary add another Form C.		**Total (Z) = (X) + (Ys)**	2200

Reminders:
The cost of an audit certificate is included in the costs declared under the activity "Management of the Consortium". The required audit certificate (s) is (are) attached to this Financial Statement

7- Conversion rates
Costs incurred in currencies other than EURO shall be reported in EURO.
Please mention the conversion rate used (only one choice is possible) – Please note that the same principle applies for

Contractor	
- Conversion rate of the date of incurred actual costs? (YES / NO)	Yes
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	No
Third Party(ies) ***(if necessary)***	
Third Party 1 (Y1)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 1 (Y2)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 3 (Y3)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 4 (Y4)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	

If necessary add another Form C.

8- Contractor's Certificate
We certify that:
- the costs declared above are directly related to the resources used to reach the objectives of the project ;
- the receipts declared above are directly related to the resources used to reach the objectives of the project ;
- the costs declared above fall within the definition of eligible costs specified in Articles II.19, II.20, II.21, II.22 and II.25 of the contract, and, if relevant, in Annex III and Article 9 (special clauses) of the contract ;
- the receipts declared above fall within the definition of receipts specified in Article II.23 of the contract ;
- the interest generated by the pre-financing declared above falls within the definition of Article II.27 of the contract ;
- the necessary adjustments, especially to costs reported in previous Financial Statement(s) per Activity, have been incorporated in the above Statement ;
- the above information declared is complete and true ;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised represen

Contractor's Stamp	**Name of the Person responsible for the work**	**Name of the duly authorised Financial Officer**
	Dr. Raimund Tölle	**i.A. Jutta Stier i.A. Ruth Henschke**
	Date	**Date**
	Signature	**Signature**

8 TUM

Form C - Model of Financial Statement per Activity for Integrated Infrastructure Initiatives

(to be completed by each contractor)

Type of instrument	Integrated Infrastructure Initiatives	Type of Action (if necessary)	
Project Title (or Acronym)	CARE	Contract n°	RII-CT-2003-506395
Contractors's legal name	Technical University of München		
Legal Type			
Contact Person	Manfred Lindner	Telephone	+49 89 289 12350
Telecopy	(49) 89 289 14583	E-mail	lindner@ph.tum.de
Cost model used (AC/FC or FCF)/ (UF: User Fee)(*)	AC	Indirect costs (Real or Flat Rate of 20% of Direct costs, except subcontracting)	20%
Period from	01/01/2007	TO	31/12/2007

(*) If UF is used under "other specific activities: transnational access/connectivity", please mention the two cost models used (eg. FC/UF or FCF/UF or AC/UF)

1- Resources (Third party(ies))

Are there any resources made available on the basis of a prior agreement with third parties identified in Annex I of the contract? (Yes / No)			No
If Yes, please provide the following information			
Third Party 1 (Y1)	Legal name	Cost model used	

If necessary add another Form C

2- Declaration of eligible costs (in €)

Please complete only the activity covered by the relevant instrument (and type of action) indicated above and as mentioned in Article II.25 and/or in Annexes I and III of the contract.
If you are a contractor using the additional cost model (AC):
- indicate only your additional eligible costs, except for Management of the Consortium Activity for which you may indicate your full eligible costs;
- do not declare eligible direct additional costs specifically covered by contributions from third parties as mentioned in Articles II.20 and II.23.a and b of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate your full eligible costs
The costs declared should distinguish between direct and indirect costs
If necessary, adjustments to previous period(s) may be included where appropriate

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (E)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Direct costs							1 562,19						1 562,19	
Of which subcontracting														
Indirect costs							306,21						306,21	
Adjustments to previous period(s)							-31,13						-31,13	
Total costs							1 837,27						1 837,27	

3- Declaration of receipts (in €)

If you are a contractor using the additional cost model (AC), indicate only receipts covered by Article II.23.c of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate receipts covered by Article II.23 of the contract.

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (E)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Total receipts													0	

4- Declaration of interest generated by the pre-financing (in €)	
To be completed only by the coordinator.	
Did the pre-financing (advance) you received by the Commission for this period earn interest? (Yes / No)	
If yes, please indicate the amount (in €)	

5- Request of FP6 Financial Contribution (in €)	
For this period, the FP6 Community financial contribution resuested is equal to (amount in €)	**1 837,27**

6- Audit certificates		
According to the contract, does this Financial Statement need an audit certificate (or several in case of Third party(ies)) delivered by independent auditor(s)? (Yes / No)		No
If Yes, does this(those) audit certificate(s) cover only this Financial Statement per Activity? (Yes / No)		
If No, what are the periods covered by this(those) audit certificate(s) ?	From - to	
What is the total cost of this(those) audit certificate(s) (in €) per independent auditor(s) ?		

Audit certificate of the contractor (X)			
Legal name of the audit firm		**Cost of the certificate**	
Audit certificate(s) of the third party(ies) (Ys) ***(if necessary)***			
Y1 : Legal name of the audit firm		**Cost of the certificate**	
Y2 : Legal name of the audit firm		**Cost of the certificate**	
Y3 : Legal name of the audit firm		**Cost of the certificate**	
Y4 : Legal name of the audit firm		**Cost of the certificate**	
If necessary add another Form C.		**Total (Z) = (X) + (Ys)**	

Reminders:
The cost of an audit certificate is included in the costs declared under the activity "Management of the Consortium". The required audit certificate (s) is (are) attached to this Financial Statement

7- Conversion rates

Costs incurred in currencies other than EURO shall be reported in EURO.

Please mention the conversion rate used (only one choice is possible) – Please note that the same principle applies for receipts.

Contractor	
- Conversion rate of the date of incurred actual costs? (YES / NO)	No
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	No
Third Party(ies) ***(if necessary)***	
Third Party 1 (Y1)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 1 (Y2)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 3 (Y3)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 4 (Y4)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	

If necessary add another Form C.

8- Contractor's Certificate

We certify that:
- the costs declared above are directly related to the resources used to reach the objectives of the project ;
- the receipts declared above are directly related to the resources used to reach the objectives of the project ;
- the costs declared above fall within the definition of eligible costs specified in Articles II.19, II.20, II.21, II.22 and II.25 of the contract, and, if relevant, in Annex III and Article 9 (special clauses) of the contract ;
- the receipts declared above fall within the definition of receipts specified in Article II.23 of the contract ;
- the interest generated by the pre-financing declared above falls within the definition of Article II.27 of the contract ;
- the necessary adjustments, especially to costs reported in previous Financial Statement(s) per Activity, have been incorporated in the above Statement ;
- the above information declared is complete and true ;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Contractor's Stamp	Name of the Person responsible for the work	Name of the duly authorised Financial Officer
	Prof. Dr. Manfred Lindner	**A. Baur**
	Date	Date
	01/01/2008	**01/01/2008**
	Signature	Signature

9 FZR

Form C - Model of Financial Statement per Activity for Integrated Infrastructure Initiatives

(to be completed by each contractor)

Type of instrument	Integrated Infrastructure Initiatives	Type of Action (if necessary)	
Project Title (or Acronym)	CARE	Contract n°	RII3-CT-2003-506395
Contractors's legal name	Forschungszentrum Dresden-Rossendorf e.V.		
Legal Type	Private public non-commercial		
Contact Person	Dr. Jochen Teichert	Telephone	0049 351 260 3445
Telecopy	0049 351 260 3690	E-mail	j.teichert@fzd.de
Cost model used (AC/FC or FCF)/ (UF: User Fee)(*)	AC	Indirect costs (Real or Flat Rate of 20% of Direct costs, except subcontracting)	20%
Period from	01/01/2007	TO	31/12/2007

(*) If UF is used under "other specific activities: transnational access/connectivity", please mention the two cost models used (eg. FC/UF or FCF/UF or AC/UF)

1- Resources (Third party(ies))

Are there any resources made available on the basis of a prior agreement with third parties identified in Annex I of the contract? (Yes / No)				No
If Yes, please provide the following information				
Third Party 1 (Y1)	Legal name		Cost model used	

If necessary add another Form C

2- Declaration of eligible costs (in €)

Please complete only the activity covered by the relevant instrument (and type of action) indicated above and as mentioned in Article II.25 and/or in Annexes I and III of the contract.
If you are a contractor using the additional cost model (AC):
- indicate only your additional eligible costs, except for Management of the Consortium Activity for which you may indicate your full eligible costs;
- do not declare eligible direct additional costs specifically covered by contributions from third parties as mentioned in Articles II.20 and II.23.a and b of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate your full eligible costs
The costs declared should distinguish between direct and indirect costs
If necessary, adjustments to previous period(s) may be included where appropriate

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (E)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Direct costs	50 853,41												50 853,41	
Of which subcontracting														
Indirect costs	10 170,68												10 170,68	
Adjustments to previous period(s)														
Total costs	61 024,09												61 024,09	

3- Declaration of receipts (in €)

If you are a contractor using the additional cost model (AC), indicate only receipts covered by Article II.23.c of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate receipts covered by Article II.23 of the contract.

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (E)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Total receipts													0	0

4- Declaration of interest generated by the pre-financing (in €)	
To be completed only by the coordinator.	
Did the pre-financing (advance) you received by the Commission for this period earn interest? (Yes / No)	
If yes, please indicate the amount (in €)	

5- Request of FP6 Financial Contribution (in €)	
For this period, the FP6 Community financial contribution requested is equal to (amount in €)	61 024,09

6- Audit certificates		
According to the contract, does this Financial Statement need an audit certificate (or several in case of Third party(ies)) delivered by independent auditor(s)? (Yes / No)		Yes
If Yes, does this(those) audit certificate(s) cover only this Financial Statement per Activity? (Yes / No)		No
If No, what are the periods covered by this(those) audit certificate(s) ?	From - to	01.01.2006 - 31.12.2007

Audit certificate of the contractor (X)			
Legal name of the audit firm	ECOVIS Wirtschaftstreuhand GmbH Dresden	**Cost of the certificate**	240,00 € (+ 45,60 € VAT)
Audit certificate(s) of the third party(ies) (Ys) *(if necessary)*			
Y1 : Legal name of the audit firm		**Cost of the certificate**	
Y2 : Legal name of the audit firm		**Cost of the certificate**	
Y3 : Legal name of the audit firm		**Cost of the certificate**	
Y4 : Legal name of the audit firm		**Cost of the certificate**	
If necessary add another Form C.		**Total (Z) = (X) + (Ys)**	240,00 € (+ 45,60 € VAT)

Reminders:
The cost of an audit certificate is included in the costs declared under the activity "Management of the Consortium". The required audit certificate (s) is (are) attached to this Financial Statement

7- Conversion rates

Costs incurred in currencies other than EURO shall be reported in EURO.

Please mention the conversion rate used (only one choice is possible) – Please note that the same principle applies for receipts.

Contractor	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party(ies) *(if necessary)*	
Third Party 1 (Y1)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 1 (Y2)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 3 (Y3)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 4 (Y4)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	

If necessary add another Form C.

8- Contractor's Certificate

We certify that:
- the costs declared above are directly related to the resources used to reach the objectives of the project ;
- the receipts declared above are directly related to the resources used to reach the objectives of the project ;
- the costs declared above fall within the definition of eligible costs specified in Articles II.19, II.20, II.21, II.22 and II.25 of the contract, and, if relevant, in Annex III and Article 9 (special clauses) of the contract ;
- the receipts declared above fall within the definition of receipts specified in Article II.23 of the contract ;
- the interest generated by the pre-financing declared above falls within the definition of Article II.27 of the contract ;
- the necessary adjustments, especially to costs reported in previous Financial Statement(s) per Activity, have been incorporated in the above Statement ;
- the above information declared is complete and true ;

- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Contractor's Stamp	**Name of the Person responsible for the work**	**Name of the duly authorised Financial Officer**
	Dr. Jochen Teichert	Dr. Rainer Maletti
	Date	**Date**
	22/01/2008	22/01/2008
	Signature	**Signature**

10 INFN

Form C - Model of Financial Statement per Activity for Integrated Infrastructure Initiatives

(to be completed by each contractor)

Type of instrument	Integrated Infrastructure Initiatives	Type of Action (if necessary)	
Project Title (or Acronym)	CARE	Contract n°	RII3-CT-2003-506395
Contractors's legal name	Istituto Nazionale di Fisica Nucleare		
Legal Type	GOV		
Contact Person	Maria Teresa Ghirelli	Telephone	+39 6 94032237
Telecopy	+39 6 94032630	E-mail	ghirelli@lnf.infn.it
Cost model used (AC/FC or FCF)/ (UF: User Fee)(*)	AC	Indirect costs (Real or Flat Rate of 20% of Direct costs, except subcontracting)	20%
Period from	01/01/2007	TO	31/12/2007

(*) If UF is used under "other specific activities: transnational access/connectivity", please mention the two cost models used (eg. FC/UF or FCF/UF or AC/UF)

1- Resources (Third party(ies))

Are there any resources made available on the basis of a prior agreement with third parties identified in Annex I of the contract? (Yes / No)				NO
If Yes, please provide the following information				
Third Party 1 (Y1)	Legal name		Cost model used	

If necessary add another Form C

2- Declaration of eligible costs (in €)

Please complete only the activity covered by the relevant instrument (and type of action) indicated above and as mentioned in Article II.25 and/or in Annexes I and III of the contract.
If you are a contractor using the additional cost model (AC):
- indicate only your additional eligible costs, except for Management of the Consortium Activity for which you may indicate your full eligible costs;
- do not declare eligible direct additional costs specifically covered by contributions from third parties as mentioned in Articles II.20 and II.23.a and b of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate your full eligible costs
The costs declared should distinguish between direct and indirect costs
If necessary, adjustments to previous period(s) may be included where appropriate

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (E)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Direct costs	219 435,33						14 443,06						233 878,39	
Of which subcontracting	4 784,75						0,00						4 784,75	
Indirect costs	42 930,12						2 888,62						45 818,74	
Adjustments to previous period(s) + indirect costs	26 801,21						15 349,46						42 150,67	
Total costs	289 166,66						32 681,14						321 847,80	

3- Declaration of receipts (in €)

If you are a contractor using the additional cost model (AC), indicate only receipts covered by Article II.23.c of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate receipts covered by Article II.23 of the contract.

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (E)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Total receipts														

4- Declaration of interest generated by the pre-financing (in €)	
To be completed only by the coordinator.	
Did the pre-financing (advance) you received by the Commission for this period earn interest? (Yes / No)	
If yes, please indicate the amount (in €)	

5- Request of FP6 Financial Contribution (in €)	
For this period, the FP6 Community financial contribution requested is equal to (amount in €)	**321 847,80**

6- Audit certificates		
According to the contract, does this Financial Statement need an audit certificate (or several in case of Third party(ies)) delivered by independent auditor(s)? (Yes / No)		**Yes**
If Yes, does this(those) audit certificate(s) cover only this Financial Statement per Activity? (Yes / No)		**No**
If No, what are the periods covered by this(those) audit certificate(s) ?	From - to	**01.01.2006 - 31.12.2007**
What is the total cost of this(those) audit certificate(s) (in €) per independent auditor(s) ?		

Audit certificate of the contractor (X)			
Legal name of the audit firm	Dr. Ugo Braico	Cost of the certificate	3 977,05
Audit certificate(s) of the third party(ies) (Ys) *(if necessary)*			
Y1 : Legal name of the audit firm		Cost of the certificate	
Y2 : Legal name of the audit firm		Cost of the certificate	
Y3 : Legal name of the audit firm		Cost of the certificate	
Y4 : Legal name of the audit firm		Cost of the certificate	
If necessary add another Form C.		Total (Z) = (X) + (Ys)	

Reminders:
The cost of an audit certificate is included in the costs declared under the activity "Management of the Consortium". The required audit certificate (s) is (are) attached to this Financial Statement

7- Conversion rates
Costs incurred in currencies other than EURO shall be reported in EURO.
Please mention the conversion rate used (only one choice is possible) – Please note that the same principle applies for receipts.

Contractor	
- Conversion rate of the date of incurred actual costs? (YES / NO)	Yes
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party(ies) *(if necessary)*	
Third Party 1 (Y1)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 1 (Y2)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 3 (Y3)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 4 (Y4)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	

If necessary add another Form C.

8- Contractor's Certificate
We certify that:
- the costs declared above are directly related to the resources used to reach the objectives of the project ;
- the receipts declared above are directly related to the resources used to reach the objectives of the project ;
- the costs declared above fall within the definition of eligible costs specified in Articles II.19, II.20, II.21, II.22 and II.25 of the contract, and, if relevant, in Annex III and Article 9 (special clauses) of the contract ;
- the receipts declared above fall within the definition of receipts specified in Article II.23 of the contract ;
- the interest generated by the pre-financing declared above falls within the definition of Article II.27 of the contract ;
- the necessary adjustments, especially to costs reported in previous Financial Statement(s) per Activity, have been incorporated in the above Statement ;
- the above information declared is complete and true ;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Contractor's Stamp	Name of the Person responsible for the work	Name of the duly authorised Financial Officer
	Susanna Guiducci	**Maria Teresa Ghirelli**
	Date	Date
	19/02/2008	**19/02/2008**
	Signature	Signature

11 TEU

Form C - Model of Financial Statement per Activity for Integrated Infrastructure Initiatives

(to be completed by each contractor)

Type of instrument	Integrated Infrastructure Initiatives	Type of Action (if necessary)	
Project Title (or Acronym)	CARE	Contract n°	RII3-CT-2003-506395
Contractors's legal name	UNIVERSITY OF TECHNOLOGY TWENTE		
Legal Type	GOVERNMENTAL		
Contact Person	M. Eertink	Telephone	31534893657
Telecopy	+31 53 4894841	E-mail	g.m.eertink@utwente.nl
Cost model used (AC/FC or FCF)/ (UF: User Fee)(*)	FC	Indirect costs (Real or Flat Rate of 20% of Direct costs, except subcontracting)	Real
Period from	January 1st. 2007	TO	December 31st. 2007

(*) If UF is used under "other specific activities: transnational access/connectivity", please mention the two cost models used (eg. FC/UF or FCF/UF or AC/UF)

1- Resources (Third party(ies))

Are there any resources made available on the basis of a prior agreement with third parties identified in Annex I of the contract? (Yes / No)	**No**
If Yes, please provide the following information	

Third Party 1	Legal name		Cost model used	

If necessary add another Form C

2- Declaration of eligible costs (in €)

Please complete only the activity covered by the relevant instrument (and type of action) indicated above and as mentioned in Article II.25 and/or in Annexes I and III of the contract.
If you are a contractor using the additional cost model (AC):
- indicate only your additional eligible costs, except for Management of the Consortium Activity for which you may indicate your full eligible costs;
- do not declare eligible direct additional costs specifically covered by contributions from third parties as mentioned in Articles II.20 and II.23.a and b of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate your full eligible costs
The costs declared should distinguish between direct and indirect costs
If necessary, adjustments to previous period(s) may be included where appropriate

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (E)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Direct costs	29 586,52						1 311,96						30 898,48	
subcontracting														
Indirect costs	28 671,19												28 671,19	
Adjustments to previous period(s)	380,52						1 966,34						2 346,86	
Total costs	58 638,23						3 278,30						61 916,53	

3- Declaration of receipts (in €)

If you are a contractor using the additional cost model (AC), indicate only receipts covered by Article II.23.c of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate receipts covered by Article II.23 of the contract.

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (E)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Total receipts													0	0

4- Declaration of interest generated by the pre-financing (in €)	
To be completed only by the coordinator.	
Did the pre-financing (advance) you received by the Commission for this period earn interest? (Yes / No)	
If yes, please indicate the amount (in €)	
5- Request of FP6 Financial Contribution (in €)	
For this period, the FP6 Community financial contribution resuested is equal to (amount in €)	**31929,05**
6- Audit certificates	
According to the contract, does this Financial Statement need an audit certificate (or several in case of Third party(ies)) delivered by independent auditor(s)? (Yes / No)	**yes**
If Yes, does this(those) audit certificate(s) cover only this Financial Statement per Activity? (Yes / No)	yes
If No, what are the periods covered by this(those) audit certificate(s) ? From - to	
What is the total cost of this(those) audit certificate(s) (in €) per independent auditor(s) ?	

Audit certificate of the contractor (X)			
Legal name of the audit firm	Ten Kate & Huizinga Accountants B.V	Cost of the certificate	to be declared in the next cs
Audit certificate(s) of the third party(ies) (Ys) *(if necessary)*			
Y1 : Legal name of the audit firm		Cost of the certificate	
Y2 : Legal name of the audit firm		Cost of the certificate	
Y3 : Legal name of the audit firm		Cost of the certificate	
Y4 : Legal name of the audit firm		Cost of the certificate	
If necessary add another Form C.		Total (Z) = (X) + (Ys)	

Reminders:

The cost of an audit certificate is included in the costs declared under the activity "Management of the Consortium". The required audit certificate (s) is (are) attached to this Financial Statement

7- Conversion rates

Costs incurred in currencies other than EURO shall be reported in EURO.
Please mention the conversion rate used (only one choice is possible) – Please note that the same principle applies for receipts.

Contractor	
- Conversion rate of the date of incurred actual costs? (YES / NO)	**No**
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party(ies) *(if necessary)*	
Third Party 1 (Y1)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 1 (Y2)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 3 (Y3)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 4 (Y4)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	

If necessary add another Form C.

8- Contractor's Certificate

We certify that:

- the costs declared above are directly related to the resources used to reach the objectives of the project ;
- the receipts declared above are directly related to the resources used to reach the objectives of the project ;
- the costs declared above fall within the definition of eligible costs specified in Articles II.19, II.20, II.21, II.22 and II.25 of the contract, and, if relevant, in Annex III and Article 9 (special clauses) of the contract ;
- the receipts declared above fall within the definition of receipts specified in Article II.23 of the contract ;
- the interest generated by the pre-financing declared above falls within the definition of Article II.27 of the contract ;
- the necessary adjustments, especially to costs reported in previous Financial Statement(s) per Activity, have been incorporated in the above Statement ;
- the above information declared is complete and true ;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Contractor's Stamp	Name of the Person responsible for the work	Name of the duly authorised Financial Officer
	ir. A. den Ouden	**A. Groenink**
	Date	Date
	13-mrt-08	**13-mrt-08**
	Signature	Signature

12 TUL

Form C - Model of Financial Statement per Activity for Integrated Infrastructure Initiatives

(to be completed by each contractor)

Type of instrument	Integrated Infrastructure Initiatives	Type of Action (if necessary)	
Project Title (or Acronym)	CARE	Contract n°	RII3-CT-2003-506395
Contractors's legal name	TECHNICAL UNIVERSITY of LODZ, POLAND		
Legal Type	TECHNICAL UNIVERSITY		
Contact Person	Mariusz Grecki	Telephone	0-48-42-631-26-28
Telecopy	0-48-42-636-03-27	E-mail	grecki@dmcs.p.lodz.pl
Cost model used (AC/FC or FCF)/ (UF: User Fee)(*)	AC	Indirect costs (Real or Flat Rate of 20% of Direct costs, except subcontracting)	20%
Period from	1.01.2007	TO	31.12.2007

(*) If UF is used under "other specific activities: transnational access/connectivity", please mention the two cost models used (eg. FC/UF or FCF/UF or AC/UF)

1- Resources (Third party(ies))

Are there any resources made available on the basis of a prior agreement with third parties identified in Annex I of the contract? (Yes / No)				No
If Yes, please provide the following information				
Third Party 1 (Y1)	Legal name		Cost model used	

If necessary add another Form C

2- Declaration of eligible costs (in €)

Please complete only the activity covered by the relevant instrument (and type of action) indicated above and as mentioned in Article II.25 and/or in Annexes I and III of the contract.
If you are a contractor using the additional cost model (AC):
- indicate only your additional eligible costs, except for Management of the Consortium Activity for which you may indicate your full eligible costs;
- do not declare eligible direct additional costs specifically covered by contributions from third parties as mentioned in Articles II.20 and II.23.a and b of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate your full eligible costs
The costs declared should distinguish between direct and indirect costs
If necessary, adjustments to previous period(s) may be included where appropriate

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (E)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Direct costs	28317,98												28317,98	
Of which subcontracting													0,00	
Indirect costs	5663,60												5663,60	
Adjustments to previous period(s)	8614,49												8614,49	
Total costs	42596,07												42596,07	

3- Declaration of receipts (in €)

If you are a contractor using the additional cost model (AC), indicate only receipts covered by Article II.23.c of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate receipts covered by Article II.23 of the contract.

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (E)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Total receipts	0	0	0	0	0	0	0	0	0	0	0	0	0	0

4- Declaration of interest generated by the pre-financing (in €)	
To be completed only by the coordinator.	
Did the pre-financing (advance) you received by the Commission for this period earn interest? (Yes / No)	
If yes, please indicate the amount (in €)	

5- Request of FP6 Financial Contribution (in €)	
For this period, the FP6 Community financial contribution resuested is equal to (amount in €)	0

6- Audit certificates		
According to the contract, does this Financial Statement need an audit certificate (or several in case of Third party(ies)) delivered by independent auditor(s)? (Yes / No)		YES
If Yes, does this(those) audit certificate(s) cover only this Financial Statement per Activity? (Yes / No)		YES
If No, what are the periods covered by this(those) audit certificate(s) ?	From - to	
What is the total cost of this(those) audit certificate(s) (in €) per independent auditor(s) ?		*Euro 1250*

Audit certificate of the contractor (X)			
Legal name of the audit firm	AuditioSp.z o.o.Łódź, Kolarska 141,No.2187	**Cost of the certificate**	
Y1 : Legal name of the audit firm		**Cost of the certificate**	
Y2 : Legal name of the audit firm		**Cost of the certificate**	
Y3 : Legal name of the audit firm		**Cost of the certificate**	
Y4 : Legal name of the audit firm		**Cost of the certificate**	
If necessary add another Form C.		**Total (Z) = (X) + (Ys)**	

Reminders:

The cost of an audit certificate is included in the costs declared under the activity "Management of the Consortium". The required audit certificate (s) is (are) attached to this Financial Statement

7- Conversion rates

Costs incurred in currencies other than EURO shall be reported in EURO.

Please mention the conversion rate used (only one choice is possible) – Please note that the same principle applies for receipts.

Contractor	
- Conversion rate of the date of incurred actual costs? (NO)	No
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES)	Yes
Third Party(ies) ***(if necessary)***	
Third Party 1 (Y1)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 1 (Y2)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 3 (Y3)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 4 (Y4)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	

If necessary add another Form C.

8- Contractor's Certificate

We certify that:

- the costs declared above are directly related to the resources used to reach the objectives of the project ;
- the receipts declared above are directly related to the resources used to reach the objectives of the project ;
- the costs declared above fall within the definition of eligible costs specified in Articles II.19, II.20, II.21, II.22 and II.25 of the contract, and, if relevant, in Annex III and Article 9 (special clauses) of the contract ;
- the receipts declared above fall within the definition of receipts specified in Article II.23 of the contract ;
- the interest generated by the pre-financing declared above falls within the definition of Article II.27 of the contract ;
- the necessary adjustments, especially to costs reported in previous Financial Statement(s) per Activity, have been incorporated in the above Statement ;
- the above information declared is complete and true ;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Contractor's Stamp	**Name of the Person responsible for the work**	**Name of the duly authorised Financial Officer**
	prof. Andrzej Napieralski	**Jadwiga Machnicka**
	Date	**Date**
	07.02.2007	**07.02.2007**
	Signature	**Signature**

13 IPJ

Form C - Model of Financial Statement per Activity for Integrated Infrastructure Initiatives

(to be completed by each contractor)

Type of instrument	Integrated Infrastructure Initiatives	Type of Action (if necessary)	N.A.
Project Title (or Acronym)	CARE	Contract n°	RII3-CT-2003-506395
Contractors's legal name	The Andrzej Soltan Institute for Nuclear Studies		
Legal Type	gov		
Contact Person	Marek Sadowski	Telephone	48227180536
Telecopy	48227793481	E-mail	msadowski@ipj.gov.pl
Cost model used (AC/FC or FCF)/ (UF: User Fee)(*)	AC	Indirect costs (Real or Flat Rate of 20% of Direct costs, except subcontracting)	20%
Period from	January 1st 2007	To	December 31 2007

(*) If UF is used under "other specific activities: transnational access/connectivity", please mention the two cost models used (eg. FC/UF or FCF/UF or AC/UF)

1- Resources (Third party(ies))

Are there any resources made available on the basis of a prior agreement with third parties identified in Annex I of the contract? (Yes / No)	NO

If Yes, please provide the following information

Third Party 1 (Y1)	Legal name		Cost model used	
Third Party 2 (Y2)	Legal name		Cost model used	
Third Party 3 (Y3)	Legal name		Cost model used	
Third Party 4 (Y4)	Legal name		Cost model used	

If necessary add another Form C

2- Declaration of eligible costs (in €)

Please complete only the activity covered by the relevant instrument (and type of action) indicated above and as mentioned in Article II.25 and/or in Annexes I and III of the contract.
If you are a contractor using the additional cost model (AC):
- indicate only your additional eligible costs, except for Management of the Consortium Activity for which you may indicate your full eligible costs;
- do not declare eligible direct additional costs specifically covered by contributions from third parties as mentioned in Articles II.20 and II.23.a and b of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate your full eligible costs
The costs declared should distinguish between direct and indirect costs
If necessary, adjustments to previous period(s) may be included where appropriate

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (E)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Direct costs	24116,49				1000,00		1610,85						**26727,35**	
Of which subcontracting														
Indirect costs	4823,30						322,17						5145,47	
Adjustments to previous period(s)														
Total costs	28939,79				1000,00		1933,03						**31872,81**	

3- Declaration of receipts (in €)

If you are a contractor using the additional cost model (AC), indicate only receipts covered by Article II.23.c of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate receipts covered by Article II.23 of the contract.

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (E)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Total receipts													0	

4- Declaration of interest generated by the pre-financing (in €)		
To be completed only by the coordinator.		
Did the pre-financing (advance) you received by the Commission for this period earn interest? (Yes / No)		
If yes, please indicate the amount (in €)		
5- Request of FP6 Financial Contribution (in €)		
For this period, the FP6 Community financial contribution requested is equal to (amount in €)		31872,81
6- Audit certificates		
According to the contract, does this Financial Statement need an audit certificate (or several in case of Third party(ies)) delivered by independent auditor(s)? (Yes / No)		**YES**
If Yes, does this(those) audit certificate(s) cover only this Financial Statement per Activity? (Yes / No)		**NO**
If No, what are the periods covered by this(those) audit certificate(s) ?	From - to	**Jan 1, 2004 - Dec 31, 2007**
What is the total cost of this(those) audit certificate(s) (in €) per independent auditor(s) ? *1220,00*		

Audit certificate of the contractor (X)			
Legal name of the audit firm	**DORADCA Auditors Sp. z o.o.**	**Cost of the certificate**	1 220,00
Audit certificate(s) of the third party(ies) (Ys) ***(if necessary)***			
Y1 : Legal name of the audit firm		**Cost of the certificate**	
Y2 : Legal name of the audit firm		**Cost of the certificate**	
Y3 : Legal name of the audit firm		**Cost of the certificate**	
Y4 : Legal name of the audit firm		**Cost of the certificate**	
If necessary add another Form C.		**Total (Z) = (X) + (Ys)**	1 220,00

Reminders:
The cost of an audit certificate is included in the costs declared under the activity "Management of the Consortium". The required audit certificate (s) is (are) attached to this Financial Statement

7- Conversion rates

Costs incurred in currencies other than EURO shall be reported in EURO.

Please mention the conversion rate used (only one choice is possible) – Please note that the same principle applies for receipts.

Contractor	
- Conversion rate of the date of incurred actual costs? (YES / NO)	**NO**
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	**YES**
Third Party(ies) ***(if necessary)***	
Third Party 1 (Y1)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 1 (Y2)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 3 (Y3)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 4 (Y4)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	

If necessary add another Form C.

8- Contractor's Certificate

We certify that:
- the costs declared above are directly related to the resources used to reach the objectives of the project ;
- the receipts declared above are directly related to the resources used to reach the objectives of the project ;
- the costs declared above fall within the definition of eligible costs specified in Articles II.19, II.20, II.21, II.22 and II.25 of the contract, and, if relevant, in Annex III and Article 9 (special clauses) of the contract ;
- the receipts declared above fall within the definition of receipts specified in Article II.23 of the contract ;
- the interest generated by the pre-financing declared above falls within the definition of Article II.27 of the contract ;
- the necessary adjustments, especially to costs reported in previous Financial Statement(s) per Activity, have been incorporated in the above Statement ;
- the above information declared is complete and true ;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Contractor's Stamp	Name of the Person responsible for the work	Name of the duly authorised Financial Officer
	Marek Sadowski	**Jadwiga Trzaskowska**
	Date	**Date**
	January 21 2008	**January 21 2008**
	Signature	**Signature**

14 WUT-ISE

Form C - Model of Financial Statement per Activity for Integrated Infrastructure Initiatives

(to be completed by each contractor)

Type of instrument	Integrated Infrastructure Initiatives	Type of Action (if necessary)	
Project Title (or Acronym)	CARE	Contract n°	RII-3-CT-2003-506395
Contractors's legal name	Politechnika Warszawska		
Legal Type	Governmental		
Contact Person	Ryszard Romaniuk	Telephone	48226607738
Telecopy	48228252300	E-mail	rrom@ise.pw.edu.pl
Cost model used (AC/FC or FCF)/ (UF: User Fee)(*)	AC	Indirect costs (Real or Flat Rate of 20% of Direct costs, except subcontracting)	Flat rate 20%
Period from	1st of January 2007	To	31st of December 2007

(*) If UF is used under "other specific activities: transnational access/connectivity", please mention the two cost models used (eg. FC/UF or FCF/UF or AC/UF)

1- Resources (Third party(ies))

Are there any resources made available on the basis of a prior agreement with third parties identified in Annex I of the contract? (Yes / No)				No
If Yes, please provide the following information				
Third Party 1 (Y1)	Legal name		Cost model used	

If necessary add another Form C

2- Declaration of eligible costs (in €)

Please complete only the activity covered by the relevant instrument (and type of action) indicated above and as mentioned in Article II.25 and/or in Annexes I and III of the contract.
If you are a contractor using the additional cost model (AC):
- indicate only your additional eligible costs, except for Management of the Consortium Activity for which you may indicate your full eligible costs;
- do not declare eligible direct additional costs specifically covered by contributions from third parties as mentioned in Articles II.20 and II.23.a and b of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate your full eligible costs
The costs declared should distinguish between direct and indirect costs
If necessary, adjustments to previous period(s) may be included where appropriate

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (E)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Direct costs	21 032,30				340,16		229,09						21 601,55	
Of which subcontracting													0,00	
Indirect costs	4 206,46						45,81						4 252,27	
Adjustments to previous period(s)													0,00	
Total costs	25 238,76				340,16		274,90						25 853,82	

3- Declaration of receipts (in €)

If you are a contractor using the additional cost model (AC), indicate only receipts covered by Article II.23.c of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate receipts covered by Article II.23 of the contract.

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (E)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Total receipts														

4- Declaration of interest generated by the pre-financing (in €)	
To be completed only by the coordinator.	
Did the pre-financing (advance) you received by the Commission for this period earn interest? (Yes / No)	
If yes, please indicate the amount (in €)	

5- Request of FP6 Financial Contribution (in €)	
For this period, the FP6 Community financial contribution resuested is equal to (amount in €)	25 853,82

6- Audit certificates		
According to the contract, does this Financial Statement need an audit certificate (or several in case of Third party(ies)) delivered by independent auditor(s)? (Yes / No)		Yes
If Yes, does this(those) audit certificate(s) cover only this Financial Statement per Activity? (Yes / No)		Yes
If No, what are the periods covered by this(those) audit certificate(s) ?	From - to	
What is the total cost of this(those) audit certificate(s) (in €) per independent auditor(s) ?		

Audit certificate of the contractor (X)			
Legal name of the audit firm	Horwath Sp. z o.o.	**Cost of the certificate**	340,16
Audit certificate(s) of the third party(ies) (Ys) *(if necessary)*			
Y1 : Legal name of the audit firm		**Cost of the certificate**	
Y2 : Legal name of the audit firm		**Cost of the certificate**	
Y3 : Legal name of the audit firm		**Cost of the certificate**	
Y4 : Legal name of the audit firm		**Cost of the certificate**	
If necessary add another Form C.		**Total (Z) = (X) + (Ys)**	

Reminders:
The cost of an audit certificate is included in the costs declared under the activity "Management of the Consortium". The required audit certificate (s) is (are) attached to this Financial Statement

7- Conversion rates
Costs incurred in currencies other than EURO shall be reported in EURO.
Please mention the conversion rate used (only one choice is possible) – Please note that the same principle applies for receipts.

Contractor	
- Conversion rate of the date of incurred actual costs? (YES / NO)	No
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	Yes
Third Party(ies) *(if necessary)*	
Third Party 1 (Y1)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 1 (Y2)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 3 (Y3)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 4 (Y4)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	

If necessary add another Form C.

8- Contractor's Certificate
We certify that:
- the costs declared above are directly related to the resources used to reach the objectives of the project ;
- the receipts declared above are directly related to the resources used to reach the objectives of the project ;
- the costs declared above fall within the definition of eligible costs specified in Articles II.19, II.20, II.21, II.22 and II.25 of the contract, and, if relevant, in Annex III and Article 9 (special clauses) of the contract ;
- the receipts declared above fall within the definition of receipts specified in Article II.23 of the contract ;
- the interest generated by the pre-financing declared above falls within the definition of Article II.27 of the contract ;
- the necessary adjustments, especially to costs reported in previous Financial Statement(s) per Activity, have been incorporated in the above Statement ;
- the above information declared is complete and true ;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Contractor's Stamp	**Name of the Person responsible for the work**	**Name of the duly authorised Financial Officer**
	Ryszard Romaniuk	**Jadwiga Bajkowska**
	Date	**Date**
	29.01.2008	**29.01.2008**
	Signature	**Signature**

15 WUT

Form C - Model of Financial Statement per Activity for Integrated Infrastructure Initiatives

(to be completed by each contractor)

Type of instrument	Integrated Infrastructure Initiatives	Type of Action *(if necessary)*	
Project Title (or Acronym)	CARE	Contract n°	RII3-CT-2003-506395
Contractors's legal name	WROCLAW UNIVERSITY OF TECHNOLOGY		
Legal Type			
Contact Person	Maciej CHOROWSKI	Telephone	+48 71 320 23 25
Telecopy	+48 71 320 42 28	E-mail	maciej.chorowski@pwr.wroc.pl
Cost model used (AC/FC or FCF)/ (UF: User Fee)(*)	AC	Indirect costs (Real or Flat Rate of 20% of Direct costs, except subcontracting)	Flat Rate of 20% of Direct costs, except subcontracting
Period from	January 1st 2007	To	December 31 2007

(*) If UF is used under "other specific activities: transnational access/connectivity", please mention the two cost models used (eg. FC/UF or FCF/UF or AC/UF)

1- Resources (Third party(ies))

Are there any resources made available on the basis of a prior agreement with third parties identified in Annex I of the contract? (Yes / No)			**No**
If Yes, please provide the following information			
Third Party 1 (Y1)	Legal name		Cost model used

If necessary add another Form C

2- Declaration of eligible costs (in €)

Please complete only the activity covered by the relevant instrument (and type of action) indicated above and as mentioned in Article II.25 and/or in Annexes I and III of the contract.
If you are a contractor using the additional cost model (AC):
- indicate only your additional eligible costs, except for Management of the Consortium Activity for which you may indicate your full eligible costs;
- do not declare eligible direct additional costs specifically covered by contributions from third parties as mentioned in Articles II.20 and II.23.a and b of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate your full eligible costs
The costs declared should distinguish between direct and indirect costs
If necessary, adjustments to previous period(s) may be included where appropriate

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (E)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Direct costs							2 139,53						2 139,53	
Of which subcontracting							0,00						0,00	
Indirect costs							427,91						427,91	
Adjustments to previous period(s)							0,00						0,00	
Total costs							2 567,44						2 567,44	

3- Declaration of receipts (in €)

If you are a contractor using the additional cost model (AC), indicate only receipts covered by Article II.23.c of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate receipts covered by Article II.23 of the contract.

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (E)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Total receipts													0	

4- Declaration of interest generated by the pre-financing (in €)	
To be completed only by the coordinator.	
Did the pre-financing (advance) you received by the Commission for this period earn interest? (Yes / No)	
If yes, please indicate the amount (in €)	

5- Request of FP6 Financial Contribution (in €)	
For this period, the FP6 Community financial contribution requested is equal to (amount in €)	2 567,44

6- Audit certificates		
According to the contract, does this Financial Statement need an audit certificate (or several in case of Third party(ies)) delivered by independent auditor(s)? (Yes / No)		No
If Yes, does this(those) audit certificate(s) cover only this Financial Statement per Activity? (Yes / No)		
If No, what are the periods covered by this(those) audit certificate(s) ?	From - to	
What is the total cost of this(those) audit certificate(s) (in €) per independent auditor(s) ?		

Audit certificate of the contractor (X)			
Legal name of the audit firm		Cost of the certificate	
Audit certificate(s) of the third party(ies) (Ys) *(if necessary)*			
Y1 : Legal name of the audit firm		Cost of the certificate	
Y2 : Legal name of the audit firm		Cost of the certificate	
Y3 : Legal name of the audit firm		Cost of the certificate	
Y4 : Legal name of the audit firm		Cost of the certificate	
If necessary add another Form C.		Total (Z) = (X) + (Ys)	

Reminders:
The cost of an audit certificate is included in the costs declared under the activity "Management of the Consortium". The required audit certificate (s) is (are) attached to this Financial Statement

7- Conversion rates
Costs incurred in currencies other than EURO shall be reported in EURO.
Please mention the conversion rate used (only one choice is possible) – Please note that the same principle applies for receipts.

Contractor	
- Conversion rate of the date of incurred actual costs? (YES / NO)	No
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	Yes
Third Party(ies) *(if necessary)*	
Third Party 1 (Y1)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 1 (Y2)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 3 (Y3)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 4 (Y4)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	

If necessary add another Form C.

8- Contractor's Certificate
We certify that:
- the costs declared above are directly related to the resources used to reach the objectives of the project ;
- the receipts declared above are directly related to the resources used to reach the objectives of the project ;
- the costs declared above fall within the definition of eligible costs specified in Articles II.19, II.20, II.21, II.22 and II.25 of the contract, and, if relevant, in Annex III and Article 9 (special clauses) of the contract ;
- the receipts declared above fall within the definition of receipts specified in Article II.23 of the contract ;
- the interest generated by the pre-financing declared above falls within the definition of Article II.27 of the contract ;
- the necessary adjustments, especially to costs reported in previous Financial Statement(s) per Activity, have been incorporated in the above Statement ;
- the above information declared is complete and true ;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Contractor's Stamp	Name of the Person responsible for the work	Name of the duly authorised Financial Officer
	Maciej Chorowski	**Alicja Maniak**
	Date	Date
	Signature	Signature

16 CSIC

Form C - Model of Financial Statement per Activity for Integrated Infrastructure Initiatives

(to be completed by each contractor)

Type of instrument	Integrated Infrastructure Initiatives	Type of Action (if necessary)	
Project Title (or Acronym)	CARE	Contract n°	RII3-CT-2003-506395
Contractors's legal name	Consejo Superior de Investigaciones Científicas		
Legal Type			
Contact Person	Angeles Faus-Golfe	Telephone	34 963543545
Telecopy	34 963543488	E-mail	Angeles.Faus-Golfe@uv.es
Cost model used (AC/FC or FCF)/ (UF: User Fee)(*)	FC	Indirect costs (Real or Flat Rate of 20% of Direct costs, except subcontracting)	Real
Period from	1 January 2007	TO	31 December 2007

(*) If UF is used under "other specific activities: transnational access/connectivity", please mention the two cost models used (eg. FC/UF or FCF/UF or AC/UF)

1- Resources (Third party(ies))

Are there any resources made available on the basis of a prior agreement with third parties identified in Annex I of the contract? (Yes / No)	No

If Yes, please provide the following information

Third Party 1 (Y1)	Legal name		Cost model used	

If necessary add another Form C

2- Declaration of eligible costs (in €)

Please complete only the activity covered by the relevant instrument (and type of action) indicated above and as mentioned in Article II.25 and/or in Annexes I and III of the contract.
If you are a contractor using the additional cost model (AC):
- indicate only your additional eligible costs, except for Management of the Consortium Activity for which you may indicate your full eligible costs;
- do not declare eligible direct additional costs specifically covered by contributions from third parties as mentioned in Articles II.20 and II.23.a and b of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate your full eligible costs
The costs declared should distinguish between direct and indirect costs
If necessary, adjustments to previous period(s) may be included where appropriate

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (E)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Direct costs							8100						8100	
Of which subcontracting														
Indirect costs														
Adjustments to previous period(s)							5097,2						5097,2	
Total costs							13197,2						13197,2	

3- Declaration of receipts (in €)

If you are a contractor using the additional cost model (AC), indicate only receipts covered by Article II.23.c of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate receipts covered by Article II.23 of the contract.

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (E)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Total receipts														

4- Declaration of interest generated by the pre-financing (in €)	
To be completed only by the coordinator.	
Did the pre-financing (advance) you received by the Commission for this period earn interest? (Yes / No)	
If yes, please indicate the amount (in €)	

5- Request of FP6 Financial Contribution (in €)	
For this period, the FP6 Community financial contribution resuested is equal to (amount in €)	13197,2

6- Audit certificates		
According to the contract, does this Financial Statement need an audit certificate (or several in case of Third party(ies)) delivered by independent auditor(s)? (Yes / No)		No
If Yes, does this(those) audit certificate(s) cover only this Financial Statement per Activity? (Yes / No)		No
If No, what are the periods covered by this(those) audit certificate(s) ?	From - to	
What is the total cost of this(those) audit certificate(s) (in €) per independent auditor(s) ?		

Audit certificate of the contractor (X)			
Legal name of the audit firm		**Cost of the certificate**	
Audit certificate(s) of the third party(ies) (Ys) ***(if necessary)***			
Y1 : Legal name of the audit firm		**Cost of the certificate**	
Y2 : Legal name of the audit firm		**Cost of the certificate**	
Y3 : Legal name of the audit firm		**Cost of the certificate**	
Y4 : Legal name of the audit firm		**Cost of the certificate**	
If necessary add another Form C.		**Total (Z) = (X) + (Ys)**	

Reminders:
The cost of an audit certificate is included in the costs declared under the activity "Management of the Consortium". The required audit certificate (s) is (are) attached to this Financial Statement

7- Conversion rates

Costs incurred in currencies other than EURO shall be reported in EURO.

Please mention the conversion rate used (only one choice is possible) – Please note that the same principle applies for receipts.

Contractor	
- Conversion rate of the date of incurred actual costs? (YES / NO)	No
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party(ies) ***(if necessary)***	
Third Party 1 (Y1)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 1 (Y2)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 3 (Y3)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 4 (Y4)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	

If necessary add another Form C.

8- Contractor's Certificate

We certify that:

- the costs declared above are directly related to the resources used to reach the objectives of the project ;
- the receipts declared above are directly related to the resources used to reach the objectives of the project ;
- the costs declared above fall within the definition of eligible costs specified in Articles II.19, II.20, II.21, II.22 and II.25 of the contract, and, if relevant, in Annex III and Article 9 (special clauses) of the contract ;
- the receipts declared above fall within the definition of receipts specified in Article II.23 of the contract ;
- the interest generated by the pre-financing declared above falls within the definition of Article II.27 of the contract ;
- the necessary adjustments, especially to costs reported in previous Financial Statement(s) per Activity, have been incorporated in the above Statement ;
- the above information declared is complete and true ;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Contractor's Stamp	**Name of the Person responsible for the work**	**Name of the duly authorised Financial Officer**
	Angeles Faus-Golfe	Maria del Mar Garcia Ferrer
	Date	**Date**
	1 February 2008	
	Signature	**Signature**

17 CERN

Form C - Model of Financial Statement per Activity for Integrated Infrastructure Initiatives

(to be completed by each contractor)

Type of instrument	Integrated Infrastructure Initiatives	Type of Action (if necessary)	
Project Title (or Acronym)	CARE	Contract n°	RII3-CT-2003-506395
Contractors's legal name	European Organisation for Nuclear Research		
Legal Type	GOV		
Contact Person	Gilbert Guignard	Telephone	+41-22-7675975
Telecopy	+41-22-7679590	E-mail	gilbert.guignard@cern.ch
Cost model used (AC/FC or FCF)/ (UF: User Fee)(*)	AC	Indirect costs (Real or Flat Rate of 20% of Direct costs, except subcontracting)	Flat Rate of 20%
Period from	01-janv-07	TO	31-déc-07

(*) If UF is used under "other specific activities: transnational access/connectivity", please mention the two cost models used (eg. FC/UF or FCF/UF or AC/UF)

1- Resources (Third party(ies))

Are there any resources made available on the basis of a prior agreement with third parties identified in Annex I of the contract? (Yes / No)	NO

If Yes, please provide the following information

Third Party 1 (Y1)	Legal name	N/A	Cost model used	

If necessary add another Form C

2- Declaration of eligible costs (in €)

Please complete only the activity covered by the relevant instrument (and type of action) indicated above and as mentioned in Article II.25 and/or in Annexes I and III of the contract.
If you are a contractor using the additional cost model (AC):
- indica

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (E)		Total (G) = (A)+(B)+(C)+	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Direct costs	462 978,26	N/A	N/A	N/A	N/A	N/A	56 670,04	N/A	N/A	N/A	N/A	N/A	519 648,30	N/A
Of which subcontracting	87 661,72	N/A	N/A	N/A	N/A	N/A	0,00	N/A	N/A	N/A	N/A	N/A	87 661,72	N/A
Indirect costs	75 063,31	N/A	N/A	N/A	N/A	N/A	11 334,01	N/A	N/A	N/A	N/A	N/A	86 397,32	N/A
Adjustments to previous period(s)	-36 853,57	N/A	N/A	N/A	N/A	N/A	0,00	N/A	N/A	N/A	N/A	N/A	-36 853,57	N/A
Total costs	501 188,00	N/A	N/A	N/A	N/A	N/A	68 004,05	N/A	N/A	N/A	N/A	N/A	569 192,05	N/A

3- Declaration of receipts (in €)

If you are a contractor using the additional cost model (AC), indicate only receipts covered by Article II.23.c of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate receipts covered by Article II.23 of the contract.

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (E)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Total receipts													N/A	N/A

4- Declaration of interest generated by the pre-financing (in €)	
To be completed only by the coordinator.	
Did the pre-financing (advance) you received by the Commission for this period earn interest? (Yes / No)	**N/A**
If yes, please indicate the amount (in €)	

5- Request of FP6 Financial Contribution (in €)	
For this period, the FP6 Community financial contribution requested is equal to (amount in €)	**569 192,05**

6- Audit certificates			
According to the contract, does this Financial Statement need an audit certificate (or several in case of Third party(ies)) delivered by independent auditor(s)? (Yes / No)			**NO**
If Yes, does this(those) audit certificate(s) cover only this Financial Statement per Activity? (Yes / No)			
If No, what are the periods covered by this(those) audit certificate(s) ?		From - to	**01.01.2007 / 31.12.2007**
What is the total cost of this(those) audit certificate(s) (in €) per independent auditor(s) ?	**NIL**		

Audit certificate of the contractor (X)			
Legal name of the audit firm	**N/A**	Cost of the certificate	**NIL**
Audit certificate(s) of the third party(ies) (Ys) *(if necessary)*			
Y1 : Legal name of the audit firm	**N/A**	Cost of the certificate	**N/A**
Y2 : Legal name of the audit firm	**N/A**	Cost of the certificate	**N/A**
Y3 : Legal name of the audit firm	**N/A**	Cost of the certificate	**N/A**
Y4 : Legal name of the audit firm	**N/A**	Cost of the certificate	**N/A**
If necessary add another Form C.		Total (Z) = (X) + (Ys)	

Reminders:
The cost of an audit certificate is included in the costs declared under the activity "Management of the Consortium". The required audit certificate (s) is (are) attached to this Financial Statement

7- Conversion rates
Costs incurred in currencies other than EURO shall be reported in EURO.

Please mention the conversion rate used (only one choice is possible) – Please note that the same principle applies for receipts.
Euro 1 = 1.6529 CHF

Contractor	
- Conversion rate of the date of incurred actual costs? (YES / NO)	**NO**
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	**YES**
Third Party(ies) *(if necessary)*	
Third Party 1 (Y1)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	**N/A**
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 1 (Y2)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 3 (Y3)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 4 (Y4)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	

If necessary add another Form C.

8- Contractor's Certificate
We certify that:
- the costs declared above are directly related to the resources used to reach the objectives of the project ;
- the receipts declared above are directly related to the resources used to reach the objectives of the project ;
- the costs declared above fall within the definition of eligible costs specified in Articles II.19, II.20, II.21, II.22 and II.25 of the contract, and, if relevant, in Annex III and Article 9 (special clauses) of the contract ;
- the receipts declared above fall within the definition of receipts specified in Article II.23 of the contract ;
- the interest generated by the pre-financing declared above falls within the definition of Article II.27 of the contract ;
- the necessary adjustments, especially to costs reported in previous Financial Statement(s) per Activity, have been incorporated in the above Statement ;
- the above information declared is complete and true ;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised represen

Contractor's Stamp	Name of the Person responsible for the work	Name of the duly authorised Financial Officer
	Gilbert Guignard	**Thierry Lagrange**
	Date	Date
	January 28, 2008	**January 28, 2008**

18 UNI-GE

Form C - Model of Financial Statement per Activity for Integrated Infrastructure Initiatives

(to be completed by each contractor)

Type of instrument	Integrated Infrastructure Initiatives	Type of Action (if necessary)	
Project Title (or Acronym)	CARE	Contract n°	RII3-CT-2003-506395

Contractors's legal name	University of Geneva		
Legal Type			
Contact Person	Alain Blondel	Telephone	00 41 22 379 6227
Telecopy	41223796992	E-mail	alain.blondel@cern.ch

Cost model used (AC/FC or FCF)/ (UF: User Fee)(*)	AC	Indirect costs (Real or Flat Rate of 20% of Direct costs, except subcontracting)	

Period from	01-janv-07	TO	31-déc-07

(*) If UF is used under "other specific activities: transnational access/connectivity", please mention the two cost models used (eg. FC/UF or FCF/UF or AC/UF)

1- Resources (Third party(ies))

Are there any resources made available on the basis of a prior agreement with third parties identified in Annex I of the contract? (Yes / No)	

If Yes, please provide the following information

Third Party 1 (Y1)	Legal name		Cost model used	
Third Party 2 (Y2)	Legal name		Cost model used	
Third Party 3 (Y3)	Legal name		Cost model used	
Third Party 4 (Y4)	Legal name		Cost model used	

If necessary add another Form C

2- Declaration of eligible costs (in €)

Please complete only the activity covered by the relevant instrument (and type of action) indicated above and as mentioned in Article II.25 and/or in Annexes I and III of the contract.
If you are a contractor using the additional cost model (AC):
- indicate only your additional eligible costs, except for Management of the Consortium Activity for which you may indicate your full eligible costs;
- do not declare eligible direct additional costs specifically covered by contributions from third parties as mentioned in Articles II.20 and II.23.a and b of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate your full eligible costs
The costs declared should distinguish between direct and indirect costs
If necessary, adjustments to previous period(s) may be included where appropriate

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (E)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Direct costs							3 838,89 €						3 838,89 €	
Of which subcontracting														
Indirect costs							186,61 €						186,61 €	
Adjustments to previous period(s)														
Total costs							4 025,50 €						4 025,50 €	

3- Declaration of receipts (in €)

If you are a contractor using the additional cost model (AC), indicate only receipts covered by Article II.23.c of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate receipts covered by Article II.23 of the contract.

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnationa (E)		Other Specific Activities (E)		Total (G) = (A)+(B)+(C)+	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Total receipts														

4- Declaration of interest generated by the pre-financing (in €)

To be completed only by the coordinator.

Did the pre-financing (advance) you received by the Commission for this period earn interest? (Yes / No)	
If yes, please indicate the amount (in €)	

5- Request of FP6 Financial Contribution (in €)

For this period, the FP6 Community financial contribution resuested is equal to (amount in €)	0 €

6- Audit certificates

According to the contract, does this Financial Statement need an audit certificate (or several in case of Third party(ies)) delivered by independent auditor(s)? (Yes / No)		no
If Yes, does this(those) audit certificate(s) cover only this Financial Statement per Activity? (Yes / No)		
If No, what are the periods covered by this(those) audit certificate(s) ?	From - to	
What is the total cost of this(those) audit certificate(s) (in €) per independent auditor(s) ?		

Audit certificate of the contractor (X)			
Legal name of the audit firm		Cost of the certificate	
Audit certificate(s) of the third party(ies) (Ys) *(if necessary)*			
Y1 : Legal name of the audit firm		Cost of the certificate	
Y2 : Legal name of the audit firm		Cost of the certificate	
If necessary add another Form C.		Total (Z) = (X) +	

Reminders:

The cost of an audit certificate is included in the costs declared under the activity "Management of the Consortium". The required audit certificate (s) is (are) attached to this Financial Statement

7- Conversion rates

Costs incurred in currencies other than EURO shall be reported in EURO.
Please mention the conversion rate used (only one choice is possible) – Please note that the same principle applies for receipts. 1€ = 1.6058 CHF

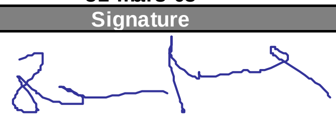
Contractor	
- Conversion rate of the date of incurred actual costs? (YES / NO)	NO
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	YES
Third Party(ies) ***(if necessary)***	
Third Party 1 (Y1)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	

If necessary add another Form C.

8- Contractor's Certificate

We certify that:

- the costs declared above are directly related to the resources used to reach the objectives of the project ;
- the receipts declared above are directly related to the resources used to reach the objectives of the project ;
- the costs declared above fall within the definition of eligible costs specified in Articles II.19, II.20, II.21, II.22 and II.25 of the contract, and, if relevant, in Annex III and Article 9 (special clauses) of the contract ;
- the receipts declared above fall within the definition of receipts specified in Article II.23 of the contract ;
- the interest generated by the pre-financing declared above falls within the definition of Article II.27 of the contract ;
- the necessary adjustments, especially to costs reported in previous Financial Statement(s) per Activity, have been incorporated in the above Statement ;
- the above information declared is complete and true ;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Contractor's Stamp	Name of the Person responsible for the work	Name of the duly authorised Financial Officer
	Alain Blondel	Madame Allison MAUTONE
	Date	Date
	31-mars-08	**31-mars-08**
	Signature	Signature
		

19 PSI

Form C - Model of Financial Statement per Activity for Integrated Infrastructure Initiatives
(to be completed by each contractor)

Type of instrument	Integrated Infrastructure Initiatives	Type of Action (if necessary)	
Project Title (or Acronym)	CARE	Contract n°	RII3-CT-2003-506395
Contractors's legal name	Paul Scherrer Institute (PSI)		
Legal Type			
Contact Person	Volker Schlott	Telephone	00 41 56 310 4237
Telecopy	0041 56 310 4528	E-mail	volker.schlott@psi.ch
Cost model used (AC/FC or FCF)/ (UF: User Fee)(*)	FC	Indirect costs (Real or Flat Rate of 20% of Direct costs, except subcontracting)	Real
Period from	01. Jan 07	TO	31. Dez 07

(*) If UF is used under "other specific activities: transnational access/connectivity", please mention the two cost models used (eg. FC/UF or FCF/UF or AC/UF)

1- Resources (Third party(ies))

Are there any resources made available on the basis of a prior agreement with third parties identified in Annex I of the contract? (Yes / No)			No
If Yes, please provide the following information			
Third Party 1 (Y1) Legal name		Cost model used	
Third Party 2 (Y2) Legal name		Cost model used	
Third Party 3 (Y3) Legal name		Cost model used	
Third Party 4 (Y4) Legal name		Cost model used	

If necessary add another Form C

2- Declaration of eligible costs (in €)

Please complete only the activity covered by the relevant instrument (and type of action) indicated above and as mentioned in Article II.25 and/or in Annexes I and III of the contract.
If you are a contractor using the additional cost model (AC):
- indicate only your additional eligible costs, except for Management of the Consortium Activity for which you may indicate your full eligible costs;
- do not declare eligible direct additional costs specifically covered by contributions from third parties as mentioned in Articles II.20 and II.23.a and b of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate your full eligible costs
The costs declared should distinguish between direct and indirect costs
If necessary, adjustments to previous period(s) may be included where appropriate

Type of Activity	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (E)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Direct costs	25'314.00						5'584.87						30'898.87	
Of which subcontracting														
Indirect costs	2'725.05						1'167.88						3'892.93	
Adjustments to previous period(s)														
Total costs	28'039.05						6'752.75						34'791.80	

3- Declaration of receipts (in €)
If you are a contractor using the additional cost model (AC), indicate only receipts covered by Article II.23.c of the contract.   *If you are a contractor using a full cost model (FC/FCF), indicate receipts covered by Article II.23 of the contract.*

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (E)		Total (G) = (A)+(B)+(C)+ (D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Total receipts													0	

4- Declaration of interest generated by the pre-financing (in €)	
To be completed only by the coordinator.	
Did the pre-financing (advance) you received by the Commission for this period earn interest? (Yes / No)	
If yes, please indicate the amount (in €)	

5- Request of FP6 Financial Contribution (in €)	
For this period, the FP6 Community financial contribution resuested is equal to (amount in €)	0 €

6- Audit certificates		
According to the contract, does this Financial Statement need an audit certificate (or several in case of Third party(ies)) delivered by independent auditor(s)? (Yes / No)		**No**
If Yes, does this(those) audit certificate(s) cover only this Financial Statement per Activity? (Yes / No)		
If No, what are the periods covered by this(those) audit certificate(s) ?	From - to	
What is the total cost of this(those) audit certificate(s) (in €) per independent auditor(s) ?		

Audit certificate of the contractor (X)			
Legal name of the audit firm		Cost of the certificate	
Audit certificate(s) of the third party(ies) (Ys) *(if necessary)*			
Y1 : Legal name of the audit firm		Cost of the certificate	
Y2 : Legal name of the audit firm		Cost of the certificate	
Y3 : Legal name of the audit firm		Cost of the certificate	
Y4 : Legal name of the audit firm		Cost of the certificate	
If necessary add another Form C.		Total (Z) = (X) + (Ys)	

Reminders:
The cost of an audit certificate is included in the costs declared under the activity "Management of the Consortium". The required audit certificate (s) is (are) attached to this Financial Statement

7- Conversion rates

Costs incurred in currencies other than EURO shall be reported in EURO.

Please mention the conversion rate used (only one choice is possible) – Please note that the same principle applies for receipts.

Contractor	
- Conversion rate of the date of incurred actual costs? (YES / NO)	No
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	Yes
Third Party(ies) *(if necessary)*	
Third Party 1 (Y1)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 1 (Y2)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 3 (Y3)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 4 (Y4)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	

If necessary add another Form C.

8- Contractor's Certificate

We certify that:

- the costs declared above are directly related to the resources used to reach the objectives of the project ;
- the receipts declared above are directly related to the resources used to reach the objectives of the project ;
- the costs declared above fall within the definition of eligible costs specified in Articles II.19, II.20, II.21, II.22 and II.25 of the contract, and, if relevant, in Annex III and Article 9 (special clauses) of the contract ;
- the receipts declared above fall within the definition of receipts specified in Article II.23 of the contract ;
- the interest generated by the pre-financing declared above falls within the definition of Article II.27 of the contract ;
- the necessary adjustments, especially to costs reported in previous Financial Statement(s) per Activity, have been incorporated in the above Statement ;
- the above information declared is complete and true ;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Contractor's Stamp	Name of the Person responsible for the work	Name of the duly authorised Financial Officer
PAUL SCHERRER INSTITUT PSI 5232 Villigen PSI, Schweiz	Volker Schlott	Angela Vatter
	Date	**Date**
	20. Feb 08	20. Feb 08
	Signature	**Signature**
	V. Schlott	A Vatter

20a STFC

This document has been approved by the Commission on 23 October 2003- Decision C(2003)3834 dated 23.10.03

Form C - Model of Financial Statement per Activity for Integrated Initiatives for Infrastructures

(to be completed by each contractor)

Type of instrument	Integrated Initiative for Infrastructures	**Type of Action** (if necessary)	N.A.
Project title (or Acronym)	CARE	**Contract n°**	RII3-CT-2003-506395
Contractor's Legal Name	Science & Technology Facilities Council		
Legal Type			
Contact Person	Rose Hayes	**Telephone**	01235 446908
Telecopy	01235 445848	**E-mail**	r.a.hayes@rl.ac.uk
Cost Model used (AC/FC or FCF) / (UF: User Fee) (*)	FC	**Indirect costs (**Real or Flat rate of 20% of Direct costs, except subcontracting)	Real
Period from	01-avr-07	**To**	31-déc-07

(*) If UF is used under "other specific activities: transnational access/connectivity", please mention the two cost models used (e.g.: FC / UF or FCF / UF or AC/UF)

1 - Resources (Third party(ies))

Are there any resources made available on the basis of a prior agreement with third parties identified in Annex I of the contract (Yes/No)			
If yes, please provide the following information			
Third Party 1 (Y1) **Legal Name**		**Cost model used**	
Third Party 2 (Y2) **Legal Name**		**Cost model used**	
Third Party 3 (Y3) **Legal Name**		**Cost model used**	
Third Party 4 (Y4) **Legal Name**		**Cost model used**	

If necessary add another Form C

2 - Declaration of eligible costs (in €)

Please complete only the activity covered by the relevant instrument (and type of action) indicated above and as mentioned in Article II.25 and/or in annexes I and III of the contract.

If you are a contractor using the additional cost model (AC):

- indicate only your additional eligible costs, except for Management of the Consortium Activity for which you may indicate your full eligible costs;

- do not declare eligible additional costs specifically covered by contributions from third parties as mentioned in Articles II.20 and II.23.a and b of the contract.

If you are a contractor using the full cost model (FC/FCF), indicate your eligible costs.

The costs declared should distinguish between direct and indirect costs

If necessary, adjustments to previous period(s) may be included where appropriate.

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (F)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Direct Costs	140 328,97		0,00		0,00		5 078,59		0,00		0		145 407,56	
Of which subcontracting														
Indirect costs	127 015,52		0,00		0,00		0,00		0,00		0,00		127 015,52	
Adjustments to previous period(s)													0,00	
Total costs	267 344,49		0,00		0,00		5 078,59		0,00		0,00		272 423,08	

3- Declaration of receipts (in €)
If you are a contractor using the additional cost model (AC), indicate only receipts covered by Article II.23.c of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate receipts covered by Article II.23 of the contract.

	Type of Activity													
	Research and Technological Development / Innovation (A')		Demonstration (B')		Management of the Consortium (C')		Other Specific Activities: Coordination / Networking (D')		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (F)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Total Receipts														

4- Declaration of interest generated by the pre-financing (in €)
To be completed only by the coordinator.

Did the pre-financing (advance) you received by the Commission for this period earn interest? (Yes / No)	
If yes, please indicate the amount (in €)	

5- Request of FP6 Financial contribution (in €)

For this period, the FP6 Community financial contribution requested is equal to (amount in €)	**€ 71 899,71**

6- Audit certificates

According to the contract, does this Financial Statement need an audit certificate (or several in case of Third party(ies)) delivered by independent auditor(s)? (Yes / No)			**No**
If Yes, does this(those) audit certificate(s) cover only this Financial Statement per Activity? (Yes / No)			
If No, what are the periods covered by this(those) audit certificate(s) ?	**From - To**		
What is the total cost of this(those) audit certificate(s) (in €) per independent auditor(s)	**€**		

Audit certificate of the contractor (X)

Legal name of the audit firm		Cost of the certificate	

Audit certificate(s) of the third party(ies) (Ys) (if necessary)

Y1 : Legal name of the audit firm		**Cost of the certificate**	
Y2 : Legal name of the audit firm		**Cost of the certificate**	
Y3 : Legal name of the audit firm		**Cost of the certificate**	
Y4 : Legal name of the audit firm		**Cost of the certificate**	
If necessary add another Form C.		**Total (Z) = (X) + (Ys)**	

Reminders:
The cost of an audit certificate is included in the costs declared under the activity "Management of the Consortium".
The required audit certificate(s) is(are) attached to this Financial Statement.

7- Conversion rates
Costs incurred in currencies other than EURO shall be reported in EURO.
Please mention the conversion rate used (only one choice is possible) – Please note that the same principle applies for receipts.

Contractor	
- Conversion rate of the date of incurred actual costs? (YES / NO)	**NO**
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	**Yes E/R 0.7413**
Third Party(ies) ***(if necessary)*** **Third Party 1 (Y1)**	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	

Third Party 2 (Y2)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 3 (Y3)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 4 (Y4)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	

If necessary add another Form C.

8- Contractor's Certificate
We certify that:
- the costs declared above are directly related to the resources used to reach the objectives of the project ;
- the receipts declared above are directly related to the resources used to reach the objectives of the project ;
- the costs declared above fall within the definition of eligible costs specified in Articles II.19, II.20, II.21, II.22 and II.25 of the contract, and, if relevant, in Annex III and Article 9 (special clauses) of the contract ;
- the receipts declared above fall within the definition of receipts specified in Article II.23 of the contract ;
- the interest generated by the pre-financing declared above falls within the definition of Article II.27 of the contract ;
- the necessary adjustments, especially to costs reported in previous Financial Statement(s) per Activity, have been incorporated in the above Statement ;
- the above information declared is complete and true ;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Contractor's Stamp	Name of the Person responsible for the work	Name of the duly authorised Financial Officer
	Dr Rob Edgecock	**Rose Hayes**
	Date	**Date**
	Signature	**Signature**

20b CCLRC

This document has been approved by the Commission on 23 October 2003- Decision C(2003)3834 dated 23.10.03

Form C - Model of Financial Statement per Activity for Integrated Initiatives for Infrastructures
(to be completed by each contractor)

Type of instrument	Integrated Initiative for Infrastructures	**Type of Action** (if necessary)	N.A.
Project title (or Acronym)	CARE	**Contract n°**	RII3-CT-2003-506395
Contractor's Legal Name	Council for the Central Laboratory of the Research Councils		
Legal Type			
Contact Person	Rose Hayes	**Telephone**	01235 446908
Telecopy	01235 445848	**E-mail**	r.a.hayes@rl.ac.uk
Cost Model used (AC/FC or FCF) / (UF: User Fee) (*)	FC	**Indirect costs** (Real or Flat rate of 20% of Direct costs, except subcontracting)	Real
Period from	01-janv-07	**To**	31-mars-07

(*) If UF is used under "other specific activities: transnational access/connectivity", please mention the two cost models used (e.g.: FC / UF or FCF / UF or AC/UF)

1 - Resources (Third party(ies))

Are there any resources made available on the basis of a prior agreement with third parties identified in Annex I of the contract (Yes/No)	
If yes, please provide the following information	

Third Party 1 (Y1)	Legal Name		Cost model used	
Third Party 2 (Y2)	Legal Name		Cost model used	
Third Party 3 (Y3)	Legal Name		Cost model used	
Third Party 4 (Y4)	Legal Name		Cost model used	

If necessary add another Form C

2 - Declaration of eligible costs (in €)
Please complete only the activity covered by the relevant instrument (and type of action) indicated above and as mentioned in Article II.25 and/or in annexes I and III of the contract.
If you are a contractor using the additional cost model (AC):

- indicate only your additional eligible costs, except for Management of the Consortium Activity for which you may indicate your full eligible costs;

- do not declare eligible additional costs specifically covered by contributions from third parties as mentioned in Articles II.20 and II.23.a and b of the contract.
If you are a contractor using the full cost model (FC/FCF), indicate your eligible costs.
The costs declared should distinguish between direct and indirect costs
If necessary, adjustments to previous period(s) may be included where appropriate.

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (F)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Direct Costs	46 776,32		0,00		0,00		1 692,87		0,00		0		48 469,19	
Of which subcontracting														
Indirect costs	42 338,50		0,00		0,00		0,00		0,00		0,00		42 338,50	
Adjustments to previous period(s)													0,00	
Total costs	89 114,82		0,00		0,00		1 692,87		0,00		0,00		90 807,69	

3- Declaration of receipts (in €)
If you are a contractor using the additional cost model (AC), indicate only receipts covered by Article II.23.c of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate receipts covered by Article II.23 of the contract.

	Type of Activity													
	Research and Technological Development / Innovation (A')		Demonstration (B')		Management of the Consortium (C')		Other Specific Activities: Coordination / Networking (D')		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (F)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Total Receipts														

4- Declaration of interest generated by the pre-financing (in €)
To be completed only by the coordinator.

Did the pre-financing (advance) you received by the Commission for this period earn interest? (Yes / No)	
If yes, please indicate the amount (in €)	

5- Request of FP6 Financial contribution (in €)

For this period, the FP6 Community financial contribution requested is equal to (amount in €)	**€ 23 966,57**

6- Audit certificates

According to the contract, does this Financial Statement need an audit certificate (or several in case of Third party(ies)) delivered by independent auditor(s)? (Yes / No)				**No**
If Yes, does this(those) audit certificate(s) cover only this Financial Statement per Activity? (Yes / No)				
If No, what are the periods covered by this(those) audit certificate(s) ?		**From - To**		
What is the total cost of this(those) audit certificate(s) (in €) per independent auditor(s)		€		
Audit certificate of the contractor (X)				
Legal name of the audit firm		Cost of the certificate		
Audit certificate(s) of the third party(ies) (Ys) (if necessary)				
Y1 : Legal name of the audit firm		**Cost of the certificate**		
Y2 : Legal name of the audit firm		**Cost of the certificate**		
Y3 : Legal name of the audit firm		**Cost of the certificate**		
Y4 : Legal name of the audit firm		**Cost of the certificate**		
If necessary add another Form C.		**Total (Z) = (X) + (Ys)**		

Reminders:
The cost of an audit certificate is included in the costs declared under the activity "Management of the Consortium".
The required audit certificate(s) is(are) attached to this Financial Statement.

7- Conversion rates
Costs incurred in currencies other than EURO shall be reported in EURO.
Please mention the conversion rate used (only one choice is possible) – Please note that the same principle applies for receipts.

Contractor	
- Conversion rate of the date of incurred actual costs? (YES / NO)	**NO**
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	**Yes E/R 0.7413**
Third Party(ies) ***(if necessary)***	
Third Party 1 (Y1)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	

Third Party 2 (Y2)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 3 (Y3)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 4 (Y4)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	

If necessary add another Form C.

8- Contractor's Certificate
We certify that:
- the costs declared above are directly related to the resources used to reach the objectives of the project ;
- the receipts declared above are directly related to the resources used to reach the objectives of the project ;
- the costs declared above fall within the definition of eligible costs specified in Articles II.19, II.20, II.21, II.22 and II.25 of the contract, and, if relevant, in Annex III and Article 9 (special clauses) of the contract ;
- the receipts declared above fall within the definition of receipts specified in Article II.23 of the contract ;
- the interest generated by the pre-financing declared above falls within the definition of Article II.27 of the contract ;

- the necessary adjustments, especially to costs reported in previous Financial Statement(s) per Activity, have been incorporated in the above Statement ;
- the above information declared is complete and true ;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Contractor's Stamp	Name of the Person responsible for the work	Name of the duly authorised Financial Officer
	Dr Rob Edgecock	**Rose Hayes**
	Date	**Date**
	Signature	**Signature**

21 ICL

Form C - Model of Financial Statement per Activity for Integrated Initiatives for Infrastructures
(to be completed by each contractor)

Type of instrument	Integrated Initiatives for Infrastructures	Type of Action *(if necessary)*	N.A.
Project Title (or Acronym)	CARE	Contract n°	RII3-CT-2003-506395
Contractor's Legal Name	Imperial College of Science, Technology and Medicine		
Legal Type	Non profit		
Contact Person	Brooke Alasya	Telephone	+44 (0)207 5941181
Telecopy	+44 (0)207 5941418	E-mail	b.alasya@imperial.ac.uk
Cost model used (AC/FC or FCF) / (UF: User Fee) (*)	AC	Indirect costs (Real or Flat Rate of 20% of Direct costs, except subcontracting)	Flat Rate of 20% of Direct Costs, except subcontracting
Period from	01 January 2007	To	31 December 2007

(*) If UF is used under "other specific activities: transnational access", please mention the two costs models used (eg: FC/UF or FCF/UF or AC/UF)

1 - Resources (Third party(ies))

Are there any resources made available on the basis of a prior agreement with third parties identified in Annex I of the contract? (Yes / No) No

If Yes, please provide the following information

Third party 1 (Y1)	Legal Name		Cost model used	

If necessary add another Form C.

2 - Declaration of eligible costs (in €)

Please complete only the activity covered by the relevant instrument (and type of action) indicated above and as mentioned in Article II.25 and/or in Annexes I and III of the contract.
If you are a contractor using the additional cost model (AC):
- indicate only your additional eligible costs, except for Management of the Consortium Activity for which you may indicate your full eligible costs;
- do not declare eligible direct additional costs specifically covered by contributions from third parties as mentioned in Articles II.20 and II.23.a and b of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate your full eligible costs.
The costs declared should distinguish between direct and indirect costs.
If necessary, adjustments to previous period(s) may be included where appropriate.

Type of Activity	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access /Connectivity (E)		Other Specific Activities (F)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Direct costs							21 383,61						21 383,61	0,00
Of which subcontracting													0,00	0,00
Indirect costs							4 276,72						4 276,72	0,00
Adjustments to previous period(s)													0,00	0,00
Total costs	0,00	0,00	0,00	0,00	0,00	0,00	25 660,33	0,00	0,00	0,00	0,00	0,00	25 660,33	0,00

3 - Declaration of receipts (in €)

If you are a contractor using the additional cost model (AC), indicate only receipts covered by Article II.23.c of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate receipts covered by Article II.23 of the contract.

Type of Activity	Research and Technological Development / Innovation (A')		Demonstration (B')		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access /Connectivity (E)		Other Specific Activities (F)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Total receipts													0,00	0,00

4 - Declaration of interest generated by the pre-financing (in €)

To be completed only by the coordinator.

Did the pre-financing (advance) you received by the Commission for this period earn interest (Yes / No)	
If yes, please indicate the amount (in €)	

5 - Request of FP6 Financial contribution (in €)

For this period, the FP6 Community financial contribution requested is equal to (amount in €).	25 660,33

6 - Audit certificates

According to the contract, does this Financial Statement need an audit certificate (or several in case of Third party(ies)) delivered by independent auditor(s)? (Yes / No)			No
If Yes, does this(those) audit certificate(s) cover only this Financial Statement per Activity? (Yes / No)			No
If No, what are the periods covered by this(those) audit certificate(s)?	From - To		
What is the total cost of this(those) audit certificate(s) (in €) per independent auditor(s)?			
Audit certificate of the contractor (X)			
Legal name of the audit firm	Imperial College of Science, Technology & Medicine	**Cost of the certificate**	
Audit certificate(s) of the third party(ies) (Ys) *(if necessary)*			
Y1 : Legal name of the audit firm		**Cost of the certificate**	
Y2 : Legal name of the audit firm		**Cost of the certificate**	
Y3 : Legal name of the audit firm		**Cost of the certificate**	
Y4 : Legal name of the audit firm		**Cost of the certificate**	
If necessary, add another Form C.		**Total (Z) = (X) + (Ys)**	0,00

Reminders:
The cost of an audit certificate is included in the costs declared under the activity "Management of the Consortium".
The required audit certificate(s) is(are) attached to this Financial Statement.

7 - Conversion rates

Costs incurred in currencies other than EURO shall be reported in EURO.
Please mention the conversion rate used (only one choice is possible) - Please note that the same principle applies for receipts.

Contractor	
- Conversion rate of the date of incurred actual costs? (YES / NO)	No
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	Yes
Third party(ies) *(if necessary)*	
Third party 1 (Y1)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third party 2 (Y2)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third party 3 (Y3)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third party 4 (Y4)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	

If necessary add another form C.

8 - Contractor's Certificate

We certify that:
- the costs declared above are directly related to the resources used to reach the objectives of the project ;
- the receipts declared above are directly related to the resources used to reach the objectives of the project ;
- the costs declared above fall within the definition of eligible costs specified in Articles II.19, II.20, II.21, II.22 and II.25 of the contract, and, if relevant, in Annex III and Article 9 (special clauses) of the contract ;
- the receipts declared above fall within the definition of receipts specified in Article II.23 of the contract ;
- the interest generated by the pre-financing declared above falls within the definition of Article II.27 of the contract ;
- the necessary adjustments, especially to costs reported in previous Financial Statement(s) per Activity, have been incorporated in the above Statement ;
- the above information declared is complete and true ;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Contractor's Stamp	Name of the Person responsible for the work	Name of the duly authorised Financial Officer
	Professor Ken Long	Ms Brooke Alasya
	Date	**Date**
	Signature	**Signature**

22 UMA

Form C - Model of Financial Statement per Activity for Integrated Infrastructure Initiatives
(to be completed by each contractor)

Type of instrument	Integrated Infrastructure Initiatives	Type of Action *(if necessary)*	
Project Title (or Acronym)	CARE	Contract n°	RII3-CT-2003-506395/DGRes/F
Contractors's legal name	The University Of Manchester		
Legal Type			
Contact Person	Elias Mungwala	Telephone	+44(0)161 275 54109
Telecopy	+44(0)161 275 54109	E-mail	elias.mungwala@manchester.ac.uk
Cost model used (AC/FC or FCF)/ (UF: User Fee)(*)	AC	Indirect costs (Real or Flat Rate of 20% of Direct costs, except subcontracting)	Flat Rate of 20%
Period from	01/01/2007	To	31/12/2007

(*) If UF is used under "other specific activities: transnational access/connectivity", please mention the two cost models used (eg. FC/UF or FCF/UF or AC/UF)

1- Resources (Third party(ies))

Are there any resources made available on the basis of a prior agreement with third parties identified in Annex I of the contract? (Yes / No)			NO
If Yes, please provide the following information			
Third Party 1 (Y1)	Legal name		Cost model used

If necessary add another Form C

2- Declaration of eligible costs (in €)

Please complete only the activity covered by the relevant instrument (and type of action) indicated above and as mentioned in Article II.25 and/or in Annexes I and III of the contract.
If you are a contractor using the additional cost model (AC):
- indicate only your additional eligible costs, except for Management of the Consortium Activity for which you may indicate your full eligible costs;
- do not declare eligible direct additional costs specifically covered by contributions from third parties as mentioned in Articles II.20 and II.23.a and b of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate your full eligible costs
The costs declared should distinguish between direct and indirect costs
If necessary, adjustments to previous period(s) may be included where appropriate

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (F)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Direct costs					800,00		5 944,22						6 744,22	
Of which subcontracting														
Indirect costs							1 188,84						1 188,84	
Adjustments to previous period(s)														
Total costs	0,00				800,00		7 133,06		0,00		0,00		7 933,06	

3- Declaration of receipts (in €)

If you are a contractor using the additional cost model (AC), indicate only receipts covered by Article II.23.c of the contract.
If you are a contractor using a full cost model (FC/FCF), indicate receipts covered by Article II.23 of the contract.

	Type of Activity													
	Research and Technological Development / Innovation (A)		Demonstration (B)		Management of the Consortium (C)		Other Specific Activities: Coordination / Networking (D)		Other Specific Activities: Transnational Access / Connectivity (E)		Other Specific Activities (F)		Total (G) = (A)+(B)+(C)+(D)+(E)+(F)	
	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)	Contractor	Third Party(ies)
Total receipts													0	

4- Declaration of interest generated by the pre-financing (in €)	
To be completed only by the coordinator.	
Did the pre-financing (advance) you received by the Commission for this period earn interest? (Yes / No)	
If yes, please indicate the amount (in €)	

5- Request of FP6 Financial Contribution (in €)	
For this period, the FP6 Community financial contribution requested is equal to (amount in €)	**7 933,06**

6- Audit certificates			
According to the contract, does this Financial Statement need an audit certificate (or several in case of Third party(ies)) delivered by independent auditor(s)? (Yes / No)			**YES**
If Yes, does this(those) audit certificate(s) cover only this Financial Statement per Activity? (Yes / No)			**YES**
If No, what are the periods covered by this(those) audit certificate(s) ?		From - to	
What is the total cost of this(those) audit certificate(s) (in €) per independent auditor(s) ?			

Audit certificate of the contractor (X)			
Legal name of the audit firm	**UNIAC**	**Cost of the certificate**	€ 800,00
Audit certificate(s) of the third party(ies) (Ys) *(if necessary)*			
Y1 : Legal name of the audit firm		**Cost of the certificate**	
Y2 : Legal name of the audit firm		**Cost of the certificate**	
Y3 : Legal name of the audit firm		**Cost of the certificate**	
Y4 : Legal name of the audit firm		**Cost of the certificate**	
If necessary add another Form C.		**Total (Z) = (X) + (Ys)**	

Reminders:
The cost of an audit certificate is included in the costs declared under the activity "Management of the Consortium". The required audit certificate (s) is (are) attached to this Financial Statement

7- Conversion rates
Costs incurred in currencies other than EURO shall be reported in EURO.
Please mention the conversion rate used (only one choice is possible) – Please note that the same principle applies for receipts.

Contractor	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party(ies) *(if necessary)*	
Third Party 1 (Y1)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 1 (Y2)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 3 (Y3)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	
Third Party 4 (Y4)	
- Conversion rate of the date of incurred actual costs? (YES / NO)	
- Conversion rate of the first day of the first month following the period covered by this Financial Statement? (YES/NO)	

If necessary add another Form C.

8- Contractor's Certificate
We certify that:
- the costs declared above are directly related to the resources used to reach the objectives of the project ;
- the receipts declared above are directly related to the resources used to reach the objectives of the project ;
- the costs declared above fall within the definition of eligible costs specified in Articles II.19, II.20, II.21, II.22 and II.25 of the contract, and, if relevant, in Annex III and Article 9 (special clauses) of the contract ;
- the receipts declared above fall within the definition of receipts specified in Article II.23 of the contract ;
- the interest generated by the pre-financing declared above falls within the definition of Article II.27 of the contract ;
- the necessary adjustments, especially to costs reported in previous Financial Statement(s) per Activity, have been incorporated in the above Statement ;
- the above information declared is complete and true ;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the Commission and in the event of an audit by the Commission and/or by the Court of Auditors and/or their authorised representatives.

Contractor's Stamp	**Name of the Person responsible for the work**	**Name of the duly authorised Financial Officer**
	Prof. Roger Barlow	**Elias Mungwala**
		Date
	Signature	**Signature**

3. Summary financial report

Summary financial report (Appendix 3).

Summary Financial Report

Type of Instrument	I3	Project Title (or Acronym)	CARE		Contract N°	RII3-CT-2003-506395
Reporting period number	3	From (dd/mm/yyyy)	01/01/2006	To (dd/mm/yyyy)	31/12/2006	Page 1/1

Contractor n°	Organisation Short Name	Cost model(s) used		Eligible costs (in €)	Type of activities: Research and Technological Development / Innovation (A)			Demonstration (B)			Management of the consortium (C)			Other Specific Activities: Coordination (D)			Other Specific Activities: Transnational Access (E)			Other Specific Activities (F)			Total eligible costs (G)=(A)+(B)+(C)+(D)+(E)+(F)			Receipts		
		For Transnational Access	For any other activities		Contractor	AC Third party(ies)	FC/FCF Third party(ies)	Contractor	AC Third party(ies)	FC/FCF Third party(ies)	Contractor	AC Third party(ies)	FC/FCF Third party(ies)	Contractor	AC Third party(ies)	FC/FCF Third party(ies)	Contractor	AC Third party(ies)	UF Third party(ies)	Contractor	AC Third party(ies)	FC/FCF Third party(ies)	Contractor	AC Third party(ies)	FC/FCF Third party(ies)	Contractor	AC Third party(ies)	FC/FCF Third party(ies)
1	CEA		FC	Direct eligible costs	1 113 276,95						132 177,03			4 541,25									1249995,23	0,00	0,00			
				of which direct eligible costs of subcontracting							0,00												*0,00*	*0,00*	*0,00*			
				Indirect eligible costs	532 580,63						79 258,85			0,00									611839,48	0,00	0,00			
				Adjustment on previous period(s)	-3 808,39																		-3808,39	0,00	0,00			
				Total eligible costs	*1 642 049,19*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*211 435,88*	*0,00*	*0,00*	*4 541,25*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	1858026,32	0,00	0,00			
2	UCLN		AC	Direct eligible costs										33,18									33,18	0,00	0,00			
				of which direct eligible costs of subcontracting																			*0,00*	*0,00*	*0,00*			
				Indirect eligible costs										6,63									6,63	0,00	0,00			
				Adjustment on previous period(s)																			0,00	0,00	0,00			
				Total eligible costs	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*39,81*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	39,81	0,00	0,00			
3	CNRS		FCF	Direct eligible costs	1 065 652,96		2 715,41							1 146,75		6 262,71							1066799,71	0,00	8 978,12			
				of which direct eligible costs of subcontracting																			*0,00*	*0,00*	*0,00*			
				Indirect eligible costs	213 130,59		543,08							229,35		1 252,54							213359,94	0,00	1 795,62			
				Adjustment on previous period(s)																			0,00	0,00	0,00			
				Total eligible costs	*1 278 783,55*	*0,00*	*3 258,49*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*1 376,10*	*0,00*	*7 515,25*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	1280159,65	0,00	10 773,74			
4	GSI		FC	Direct eligible costs	251 067,70									5 002,08									256069,78	0,00	0,00			
				of which direct eligible costs of subcontracting																			*0,00*	*0,00*	*0,00*			
				Indirect eligible costs	32 112,12																		32112,12	0,00	0,00			
				Adjustment on previous period(s)	-29 591,19									-225,94									-29817,13	0,00	0,00			
				Total eligible costs	*253 588,63*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*4 776,14*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	258364,77	0,00	0,00			
5	IAP-FU		AC	Direct eligible costs	67523,51																		67523,51	0,00	0,00			
				of which direct eligible costs of subcontracting																			*0,00*	*0,00*	*0,00*			
				Indirect eligible costs	13504,70																		13504,70	0,00	0,00			
				Adjustment on previous period(s)							566,94												566,94	0,00	0,00			
				Total eligible costs	*81 028,21*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*566,94*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	81595,15	0,00	0,00			
6	DESY		AC	Direct eligible costs	255 671,56									45 685,50									301357,06	0,00	0,00			
				of which direct eligible costs of subcontracting																			*0,00*	*0,00*	*0,00*			
				Indirect eligible costs	51 134,31									9 137,10									60271,41	0,00	0,00			
				Adjustment on previous period(s)	10 287,64						3 321,61			-658,19									12951,06	0,00	0,00			
				Total eligible costs	*317 093,51*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*3 321,61*	*0,00*	*0,00*	*54 164,41*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	374579,53	0,00	0,00			
7	FZJ		FC	Direct eligible costs	274 660,27									3 757,62									278417,89	0,00	0,00			
				of which direct eligible costs of subcontracting																			*0,00*	*0,00*	*0,00*			
				Indirect eligible costs	252 906,72									0,00									252906,72	0,00	0,00			
				Adjustment on previous period(s)	17 682,75									533,39									18216,14	0,00	0,00			
				Total eligible costs	*545 249,74*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*4 291,01*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	549540,75	0,00	0,00			
8	TUM		AC	Direct eligible costs										1 562,19									1562,19	0,00	0,00			
				of which direct eligible costs of subcontracting																			*0,00*	*0,00*	*0,00*			
				Indirect eligible costs										306,21									306,21	0,00	0,00			
				Adjustment on previous period(s)										-31,13									-31,13	0,00	0,00			
				Total eligible costs	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*1 837,27*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	1837,27	0,00	0,00			

9	FZR		AC	Direct eligible costs	50 853,41																		50853,41	0,00	0,00			
				of which direct eligible costs of subcontracting																			*0,00*	*0,00*	*0,00*			
				Indirect eligible costs	10 170,68																		10170,68	0,00	0,00			
				Adjustment on previous period(s)																			0,00	0,00	0,00			
				Total eligible costs	*61 024,09*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	61024,09	0,00	0,00			
10	INFN		AC	Direct eligible costs	219 435,33									14 443,06									233878,39	0,00	0,00			
				of which direct eligible costs of subcontracting	4 784,75																		*4784,75*	*0,00*	*0,00*			
				Indirect eligible costs	42 930,12									2 888,62									45818,74	0,00	0,00			
				Adjustment on previous period(s)	26 801,21									15 349,46									42150,67	0,00	0,00			
				Total eligible costs	*289 166,66*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*32 681,14*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	321847,80	0,00	0,00			
11	TEU		FC	Direct eligible costs	29 586,52									1 311,96									30898,48	0,00	0,00			
				of which direct eligible costs of subcontracting																			*0,00*	*0,00*	*0,00*			
				Indirect eligible costs	28 671,19																		28671,19	0,00	0,00			
				Adjustment on previous period(s)	380,52									1 966,34									2346,86	0,00	0,00			
				Total eligible costs	*58 638,23*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*3 278,30*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	61916,53	0,00	0,00			
12	TUL		AC	Direct eligible costs	28317,98																		28317,98	0,00	0,00			
				of which direct eligible costs of subcontracting																			*0,00*	*0,00*	*0,00*			
				Indirect eligible costs	5663,60																		5663,60	0,00	0,00			
				Adjustment on previous period(s)	8614,49																		8614,49	0,00	0,00			
				Total eligible costs	*42 596,07*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	42596,07	0,00	0,00			
13	IPJ		AC	Direct eligible costs	24116,49						1 000,00			1610,85									26727,35	0,00	0,00			
				of which direct eligible costs of subcontracting																			*0,00*	*0,00*	*0,00*			
				Indirect eligible costs	4823,30									322,17									5145,47	0,00	0,00			
				Adjustment on previous period(s)																			0,00	0,00	0,00			
				Total eligible costs	*28 939,79*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*1 000,00*	*0,00*	*0,00*	*1 933,03*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	31872,81	0,00	0,00			
14	WUT_ISE		AC	Direct eligible costs	21 032,30						340,16			229,09									21601,55	0,00	0,00			
				of which direct eligible costs of subcontracting																			*0,00*	*0,00*	*0,00*			
				Indirect eligible costs	4 206,46									45,81									4252,27	0,00	0,00			
				Adjustment on previous period(s)																			0,00	0,00	0,00			
				Total eligible costs	*25 238,76*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*340,16*	*0,00*	*0,00*	*274,90*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	25853,82	0,00	0,00			
15	WUT		AC	Direct eligible costs										2 139,53									2139,53	0,00	0,00			
				of which direct eligible costs of subcontracting										0,00									*0,00*	*0,00*	*0,00*			
				Indirect eligible costs										427,91									427,91	0,00	0,00			
				Adjustment on previous period(s)										0,00									0,00	0,00	0,00			
				Total eligible costs	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*2 567,44*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	2567,44	0,00	0,00			
16	CSIC		FC	Direct eligible costs										8100									8100,00	0,00	0,00			
				of which direct eligible costs of subcontracting																			*0,00*	*0,00*	*0,00*			
				Indirect eligible costs																			0,00	0,00	0,00			
				Adjustment on previous period(s)										5097,2									5097,20	0,00	0,00			
				Total eligible costs	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*13 197,20*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	13197,20	0,00	0,00			
17	CERN		AC	Direct eligible costs	462 978,26									56 670,04									519648,30	0,00	0,00			
				of which direct eligible costs of subcontracting	87 661,72									0,00									*87661,72*	*0,00*	*0,00*			
				Indirect eligible costs	75 063,31									11 334,01									86397,32	0,00	0,00			
				Adjustment on previous period(s)	-36 853,57									0,00									-36853,57	0,00	0,00			
				Total eligible costs	*501 188,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*68 004,05*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	569192,05	0,00	0,00			
18	UNIGE		AC	Direct eligible costs										3 838,89 €									3838,89	0,00	0,00			
				of which direct eligible costs of subcontracting																			*0,00*	*0,00*	*0,00*			
				Indirect eligible costs										186,61 €									186,61	0,00	0,00			
				Adjustment on previous period(s)																			0,00	0,00	0,00			
				Total eligible costs	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*4 025,50*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	4025,50	0,00	0,00			
19	PSI		FC	Direct eligible costs	25 314,00									5 584,87									30898,87	0,00	0,00			
				of which direct eligible costs of subcontracting																			*0,00*	*0,00*	*0,00*			
				Indirect eligible costs	2 725,05									1167,88									3892,93	0,00	0,00			
				Adjustment on previous period(s)																			0,00	0,00	0,00			
				Total eligible costs	*28 039,05*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*6 752,75*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	34791,80	0,00	0,00			

				Direct eligible costs	187 105,29						0,00			6 771,46									193876,75	0,00	0,00			
				of which direct eligible costs of subcontracting																			*0,00*	*0,00*	*0,00*			
20	CCLRC/STFC		FC	Indirect eligible costs	169 354,02																		169354,02	0,00	0,00			
				Adjustment on previous period(s)																			0,00	0,00	0,00			
				Total eligible costs	*356 459,31*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*6 771,46*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	363230,77	0,00	0,00			
				Direct eligible costs										21 383,61									21383,61	0,00	0,00			
				of which direct eligible costs of subcontracting																			*0,00*	*0,00*	*0,00*			
21	ICL		AC	Indirect eligible costs										4 276,72									4276,72	0,00	0,00			
				Adjustment on previous period(s)																			0,00	0,00	0,00			
				Total eligible costs	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*25 660,33*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	25660,33	0,00	0,00			
				Direct eligible costs							800,00			5 944,22									6744,22	0,00	0,00			
				of which direct eligible costs of subcontracting																			*0,00*	*0,00*	*0,00*			
22	UMA		AC	Indirect eligible costs										1 188,84									1188,84	0,00	0,00			
				Adjustment on previous period(s)																			0,00	0,00	0,00			
				Total eligible costs	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*800,00*	*0,00*	*0,00*	*7 133,06*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	*0,00*	7933,06	0,00	0,00			
Total eligible costs					5 509 082,79	0,00	3 258,49	0,00	0,00	0,00	217 464,59	0,00	0,00	243 305,14	0,00	7 515,25	0,00	0,00	0,00	0,00	0,00	0,00	5969852,52	0,00	10 773,74	0,00	0,00	0,00
							5 512 341,28			0,00			217 464,59			250 820,39			0,00			0,00			5 980 626,26			0,00
Requested EC contribution for the reporting period (in €) without taking into account receipts							0,00			0,00			0,00			0,00			0,00			0,00			2 587 779,39			
Requested EC contribution for the reporting period (in €) taking into account receipts [=Periodic Invoice]																									2 587 779,39			
Amount of the financial interests generated by the prefinancing																												

C. REPORT ON THE DISTRIBUTION OF THE COMMUNITY FINANCIAL CONTRIBUTION

Report on the distribution between contractors made during the reporting period of the Community financial contribution

Report on the Distribution of the Community's contribution

Type of Instrument	I3	Project Title (or Acronym)	CARE	Contract N°	RII3-CT-2003-506395

Part I — Community's prefinancing (or payment) sent to the coordinator *(1)*

	Reporting Period 1 *(2)*		Reporting Period 2 *(2)*		Reporting Period 3 *(2)*		Reporting Period 4 *(2)*		Reporting Period 5 *(2)*		Reporting Period 6 *(2)*		Reporting Period 7 *(2)*		Final payment		Total Amount (I) *(3)*
	From	To	From	To	From	To	From	To	From	To	From	To	From	To			
	EC	CEA	EC	CEA	EC	CEA	EC	CEA									
	Date	Amount (A)	Date	Amount (B)	Date	Amount (C)	Date	Amount (D)	Date	Amount (E)	Date	Amount (F)	Date	Amount (G)	Date	Amount (H)	
Total (X)	15/03/2004	5 235 000,00	24/06/2005	4 927 837,00	19/07/2006	2 605 444,45	6/08/2007	1 251 580,41									14 019 861,86

Part II — Distribution of the Community's prefinancing (or payment) between contractors according to the consortium decision(s) *(4)*

			Reporting Period 1		Reporting Period 2		Reporting Period 3		Reporting Period 4		Reporting Period 5		Reporting Period 6		Reporting Period 7		Final payment		Total Amount (I') *(6)*
Contractor n°	Organisation Short Name	Country Code	Date(s) *(5)*	Amount(s) (A') *(5)*	Date(s) *(5)*	Amount(s) (B') *(5)*	Date(s) *(5)*	Amount(s) (C') *(5)*	Date(s) *(5)*	Amount(s) (D') *(5)*	Date(s) *(5)*	Amount(s) (E') *(5)*	Date(s) *(5)*	Amount(s) (F') *(5)*	Date(s) *(5)*	Amount(s) (G') *(5)*	Date(s) *(5)*	Amount(s) (H') *(5)*	
1	CEA	F	9/04/2004	653 490,00 €	24/06/2005	1 253 107,00	21/07/2006	105 444,45	6/08/2007	148 118,16									2 160 159,61 €
									6/11/2007	416,25									416,25 €
																			0,00 €
																			0,00 €
			Total	653 490,00 €	Total	1 253 107,00	Total	105 444,45	Total	148 534,41	Total	0,00	Total	0,00	Total	0,00	Total	0,00	2 160 575,86 €
2	UCLN	B	19/04/02004	1 425,00 €	1/07/2005	1 200,00	21/07/2006	2 000,00	6/08/2007	1 200,00									5 825,00 €
																			0,00 €
																			0,00 €
																			0,00 €
			Total	1 425,00 €	Total	1 200,00	Total	2 000,00	Total	1 200,00	Total	0,00	Total	0,00	Total	0,00	Total	0,00	5 825,00 €
3	CNRS	F	30/04/2004	831 242,00 €	1/07/2005	746 540,00	21/07/2006	350 000,00	6/08/2007	140 000,00									2 067 782,00 €
																			0,00 €
																			0,00 €
																			0,00 €
			Total	831 242,00 €	Total	746 540,00	Total	350 000,00	Total	140 000,00	Total	0,00	Total	0,00	Total	0,00	Total	0,00	2 067 782,00 €
4	GSI	D	19/04/2004	133 554,00 €	1/05/2005	167 860,00	21/07/2006	50 000,00	6/08/2007	20 000,00									371 414,00 €
																			0,00 €
																			0,00 €
																			0,00 €
			Total	133 554,00 €	Total	167 860,00	Total	50 000,00	Total	20 000,00	Total	0,00	Total	0,00	Total	0,00	Total	0,00	371 414,00 €
5	IAP-FU	D	3/05/2004	108 732,00 €	1/07/2005	137 110,00	21/07/2006	120 000,00	6/08/2007	30 000,00									395 842,00 €
																			0,00 €
																			0,00 €
																			0,00 €
			Total	108 732,00 €	Total	137 110,00	Total	120 000,00	Total	30 000,00	Total	0,00	Total	0,00	Total	0,00	Total	0,00	395 842,00 €
6	DESY	D	19/04/2004	638 912,00 €	1/07/2005	234 790,00	21/07/2006	500 000,00	6/08/2007	160 000,00									1 533 702,00 €
									6/11/2007	79 000,00									79 000,00 €
																			0,00 €
																			0,00 €
			Total	638 912,00 €	Total	234 790,00	Total	500 000,00	Total	239 000,00	Total	0,00	Total	0,00	Total	0,00	Total	0,00	1 612 702,00 €
7	FZJ	D	22/04/2004	124 405,00 €	1/07/2005	214 400,00	21/07/2006	170 000,00	6/08/2007	40 000,00									548 805,00 €
																			0,00 €
																			0,00 €
																			0,00 €
			Total	124 405,00 €	Total	214 400,00	Total	170 000,00	Total	40 000,00	Total	0,00	Total	0,00	Total	0,00	Total	0,00	548 805,00 €
8	TUM	D	30/04/2004	2 325,00 €	1/07/2005	1 050,00	21/07/2006	3 000,00	6/08/2007	2 000,00									8 375,00 €
																			0,00 €
																			0,00 €
																			0,00 €
			Total	2 325,00 €	Total	1 050,00	Total	3 000,00	Total	2 000,00	Total	0,00	Total	0,00	Total	0,00	Total	0,00	8 375,00 €
9	FZR-ELBE	D	19/04/2004	147 726,00 €	1/07/2005	109 740,00	21/07/2006	105 000,00	6/08/2007	25 000,00									387 466,00 €
																			0,00 €
																			0,00 €
																			0,00 €
			Total	147 726,00 €	Total	109 740,00	Total	105 000,00	Total	25 000,00	Total	0,00	Total	0,00	Total	0,00	Total	0,00	387 466,00 €
10	INFN	I	19/04/2004	780 160,00 €	1/07/2005	345 570,00	21/07/2006	350 000,00	6/08/2007	300 000,00									1 775 730,00 €
																			0,00 €
																			0,00 €
																			0,00 €
			Total	780 160,00 €	Total	345 570,00	Total	350 000,00	Total	300 000,00	Total	0,00	Total	0,00	Total	0,00	Total	0,00	1 775 730,00 €

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11	TEU	PL	19/04/2004	111 545,00 €	1/07/2005	83 400,00	21/07/2006	40 000,00	6/08/2007	40 000,00									274 945,00 €
																			0,00 €
																			0,00 €
																			0,00 €
			Total	111 545,00 €	Total	83 400,00	Total	40 000,00	Total	40 000,00	Total	0,00	Total	0,00	Total	0,00	Total	0,00	274 945,00 €
12	TUL Lodz	PL	20/04/2004	100 904,00 €	1/07/2005	61 250,00	21/07/2006	60 000,00	6/08/2007	30 000,00									252 154,00 €
									6/11/2007	10 846,00									10 846,00 €
																			0,00 €
																			0,00 €
			Total	100 904,00 €	Total	61 250,00	Total	60 000,00	Total	40 846,00	Total	0,00	Total	0,00	Total	0,00	Total	0,00	263 000,00 €
13	IPJ	PL	20/04/2004	93 885,00 €	1/07/2005	86 640,00	21/07/2006	30 000,00	6/08/2007	25 000,00									235 525,00 €
									6/11/2007	9 475,00									9 475,00 €
																			0,00 €
																			0,00 €
			Total	93 885,00 €	Total	86 640,00	Total	30 000,00	Total	34 475,00	Total	0,00	Total	0,00	Total	0,00	Total	0,00	245 000,00 €
14	PW (WUT-ISE)	PL	20/04/2004	146 526,00 €	1/07/2005	134 830,00	21/07/2006	80 000,00	6/08/2007	10 000,00									371 356,00 €
									6/11/2007	6 644,00									6 644,00 €
																			0,00 €
																			0,00 €
			Total	146 526,00 €	Total	134 830,00	Total	80 000,00	Total	16 644,00	Total	0,00	Total	0,00	Total	0,00	Total	0,00	378 000,00 €
15	WUT	PL	20/04/2004	40 119,00 €	1/07/2005	12 000,00	21/07/2006	5 000,00	6/08/2007	3 000,00									60 119,00 €
									6/11/2007	881,00									881,00 €
																			0,00 €
																			0,00 €
			Total	40 119,00 €	Total	12 000,00	Total	5 000,00	Total	3 881,00	Total	0,00	Total	0,00	Total	0,00	Total	0,00	61 000,00 €
16	CSIC	SP	30/04/2004	11 473,00 €	1/07/2005	11 670,00	21/07/2006	14 000,00	6/08/2007	10 000,00									47 143,00 €
																			0,00 €
																			0,00 €
																			0,00 €
			Total	11 473,00 €	Total	11 670,00	Total	14 000,00	Total	10 000,00	Total	0,00	Total	0,00	Total	0,00	Total	0,00	47 143,00 €
17	CERN	CH	19/04/2004	1 069 328,00 €	1/07/2005	1 117 320,00	21/07/2006	400 000,00	6/08/2007	65 000,00									2 651 648,00 €
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			Total	1 069 328,00 €	Total	1 117 320,00	Total	400 000,00	Total	65 000,00	Total	0,00	Total	0,00	Total	0,00	Total	0,00	2 651 648,00 €
18	UNI-GE	CH		0,00		0,00		0,00		0,00									0,00 €
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			Total	0,00 €	Total	0,00	Total	0,00	Total	0,00	Total	0,00	Total	0,00	Total	0,00	Total	0,00	0,00 €
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			Total	0,00 €	Total	0,00	Total	0,00	Total	0,00	Total	0,00	Total	0,00	Total	0,00	Total	0,00	0,00 €
20	CCLRC/STFC	GB	20/04/2004	209 029,00 €	1/07/2005	189 990,00	21/07/2006	180 000,00	6/08/2007	70 000,00									649 019,00 €
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			Total	209 029,00 €	Total	189 990,00	Total	180 000,00	Total	70 000,00	Total	0,00	Total	0,00	Total	0,00	Total	0,00	649 019,00 €
21	ICL	GB	30/04/2004	20 472,00 €	1/07/2005	11 820,00	21/07/2006	30 000,00	6/08/2007	18 000,00									80 292,00 €
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			Total	20 472,00 €	Total	11 820,00	Total	30 000,00	Total	18 000,00	Total	0,00	Total	0,00	Total	0,00	Total	0,00	80 292,00 €
22	UMA	GB	20/04/2004	9 748,00 €	1/07/2005	7 550,00	21/07/2006	11 000,00	6/08/2007	7 000,00									35 298,00 €
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																			0,00 €
			Total	9 748,00 €	Total	7 550,00	Total	11 000,00	Total	7 000,00	Total	0,00	Total	0,00	Total	0,00	Total	0,00	35 298,00 €

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Total (Y)			Total	5 235 000,00 €	Total	4 927 837,00	Total	2 605 444,45	Total	1 251 580,41	Total	0,00	Total	0,00	Total	0,00	Total	0,00	14 019 861,86 €

Part III	Difference between Community's prefinancing (or payment) sent to the coordinator and Total Distribution of the Community's prefinancing (or payment) between contractors according to the consortium decision(s) *(4)*								
	Reporting Period 1	Reporting Period 2	Reporting Period 3	Reporting Period 4	Reporting Period 5	Reporting Period 6	Reporting Period 7	Final payment	Total Amount
Community's prefinancing (or payment) not yet distributed between contractors (Z) *(7)*	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00

I certify that the information set out in this(these) form(s) is accurate and correct and agreed by all contractors.

Name *(8)*	Surname *(8)*	Date (dd/mm/yyyy)	Signature of the administrative official authorised to commit the organisation of the coordinator *(8)*
Aleksan	Roy	30/01/2008	

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Explanatory notes
(1): To be filled in only by the Commission services.
(2): Established in conformity with articles 4.2 and 6 of the contract.
(3): (I) = (A) + (B) + (C) + (D) + (E) + (F) + (G) + (H)
(4): To be filled in only by the coordinator.
(5): Insert the dates (dd/mm/yyyy) and the amounts (x,xxx.xx €) transferred to a contractor (including the coordinator) for a reporting period. If there are more than one transfer to a contractor during a reporting period, identify each date and each relating transferred amount.
(6): (I') = (A') + (B') + (C') + (D') + (E') + (F') + (G') + (H')
(7): (Z) = (X) - (Y)
(8): One the following persons : authorised contact person or first or second administrative official authorised to sign the contract, as mentioned in your Contract Preparation Form (Form A2b)

D. Detailed Implementation Plan for the next 12 months

The following Gantt charts present the updated detailed implementation plan for the next 12 months for the three CARE networking activities and the four CARE joint research activities. They are supplemented by tables providing the corresponding financial information.

NETWORKING ACTIVITIES (other than Management)

N1 Electron Linear Accelerator Network (ELAN)

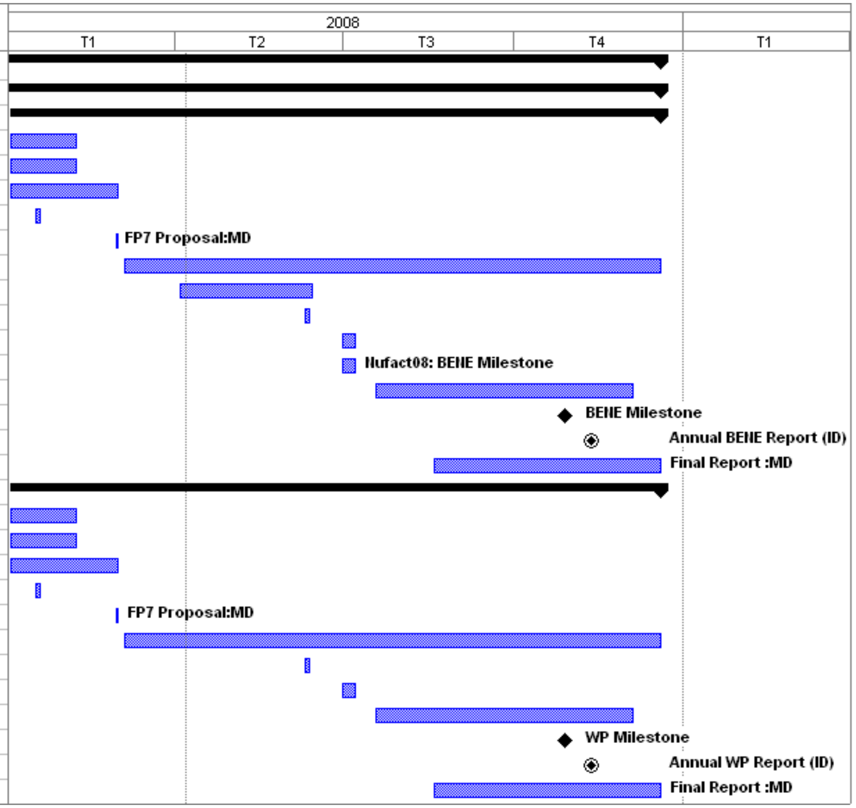
Workshops Supported by ELAN in 2008

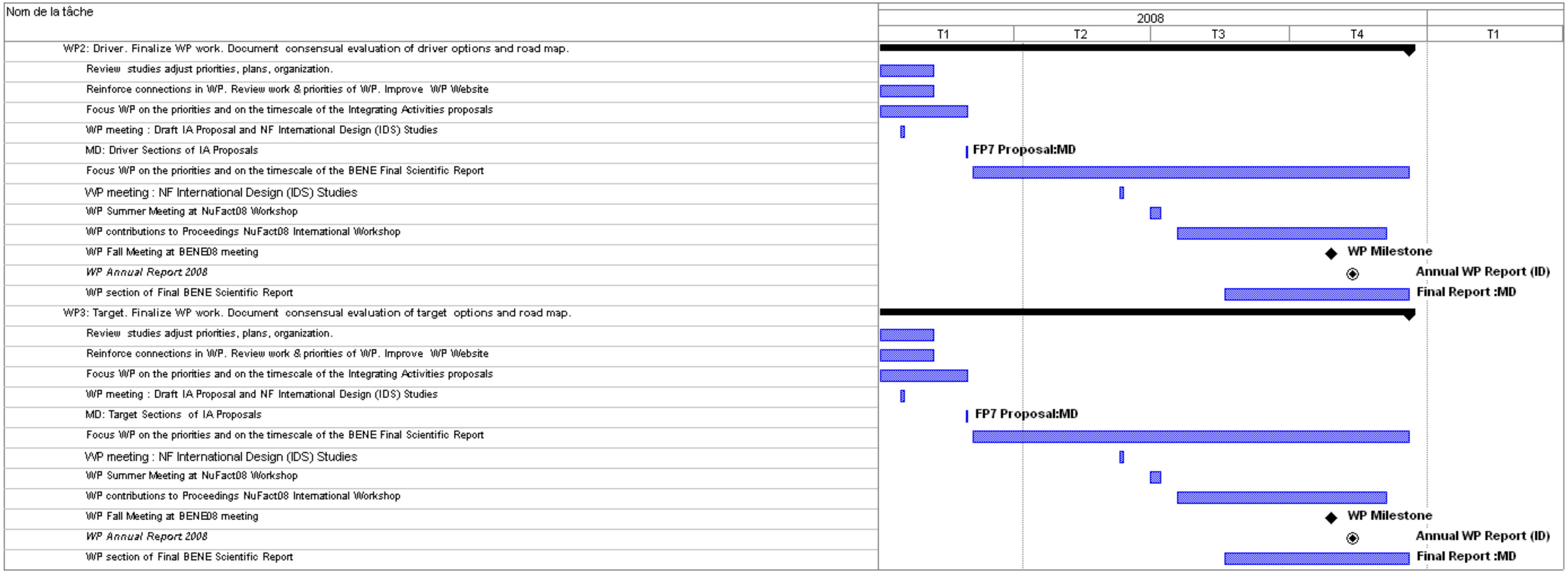
TILC08 Joint ACFA Physics and Detector Workshop and GDE meeting on International Linear Collider	**3-6 March**	**Sendai, Japan**
GDE Meeting	**3-7 June**	**Dubna, Russia**
ECFA2008 International Linear Collider Workshop	**9-12 June**	**Warsaw, Poland**
Posipol 2008	**16-18 June**	**Hiroshima, Japan**
CLIC08 Workshop	**14-17 October**	**CERN**
2008 LC School Third International Accelerator School for Linear Colliders	**19-29 October**	**Oak Brook, Illinois, USA**
Channeling 2008 Charged and Neutral Particles Channeling Phenomena	**25 October - 1 November**	**Erice, Italy**
LCWS08 & ILC08	**16-20 November**	**Chicago, USA**

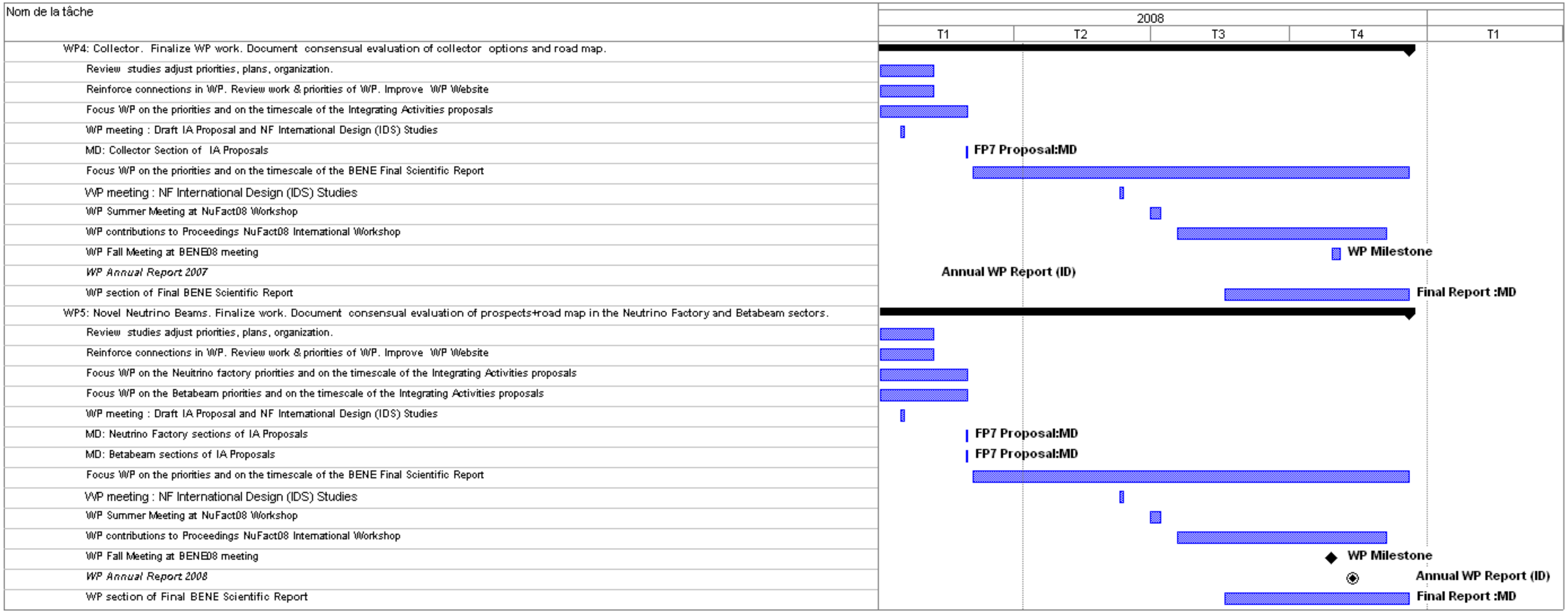
N2 Beam for European Neutrino Physics (BENE)

Nom de la tâche

- **N2: BENE Networking Activity**
  - **All Work Packages**
    - **Assemble FP7 Proposals and Final BENE Report of assessments and recommendations**
      - **Review results, state-of art of technologies. Review & adjust priorities, plans, organization.**
      - Reinforce connection between Labs & universities in all Work Packages. Improve Web Site
      - Focus WPs on the priorities and on the timescale of the FP7 Integrating Activities proposals
      - BENE meeting : Draft IA Proposal and NF International Design (IDS) Studies
      - **MD: Deliver FP7 IA Proposals**
      - Focus WPs on the priorities and on the timescale of the BENE Final Scientific Report
      - prepare BENE contribution to NuFact08 International Workshop
      - BENE meeting : NF International Design (IDS) Studies
      - BENE Summer Meeting at NuFact08 Workshop
      - **MS: NUFact08 Int. Workshop in Europe: propose NA draft conclusions and updated Road Map**
      - General editing and contributions to Proceedings NuFact08 International Workshop
      - **MS: Annual CARE08/BENE08 meeting**
      - **ID: BENE Annual Report 2008**
      - **MD: Final BENE Scientific Report**
    - WP1: Physics. Finalize WP work. Document consensual evaluation of phyics options and road map in the Final Report.
      - Review studies adjust priorities, plans, organization.
      - Reinforce connections in WP. Review work & priorities of WP. Improve WP Website
      - Focus WP on the priorities and on the timescale of the Integrating Activities proposals
      - WP meeting : Draft IA Proposal and NF International Design (IDS) Studies
      - MD: Physics and Detector Sections of IA Proposals
      - Focus WP on the priorities and on the timescale of the BENE Final Scientific Report
      - WP meeting : NF International Design (IDS) Studies
      - WP Summer Meeting at NuFact08 Workshop
      - WP contributions to Proceedings NuFact08 International Workshop
      - WP Fall Meeting at BENE08 meeting
      - *WP Annual Report 2008*
      - WP section of Final BENE Scientific Report

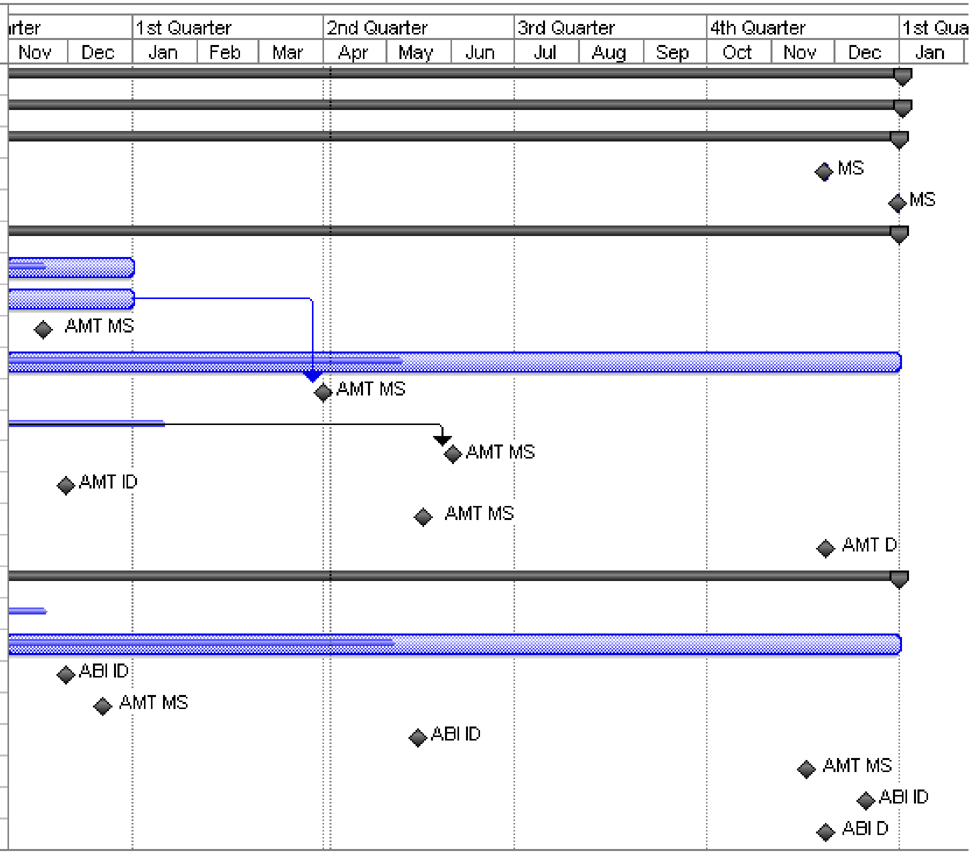


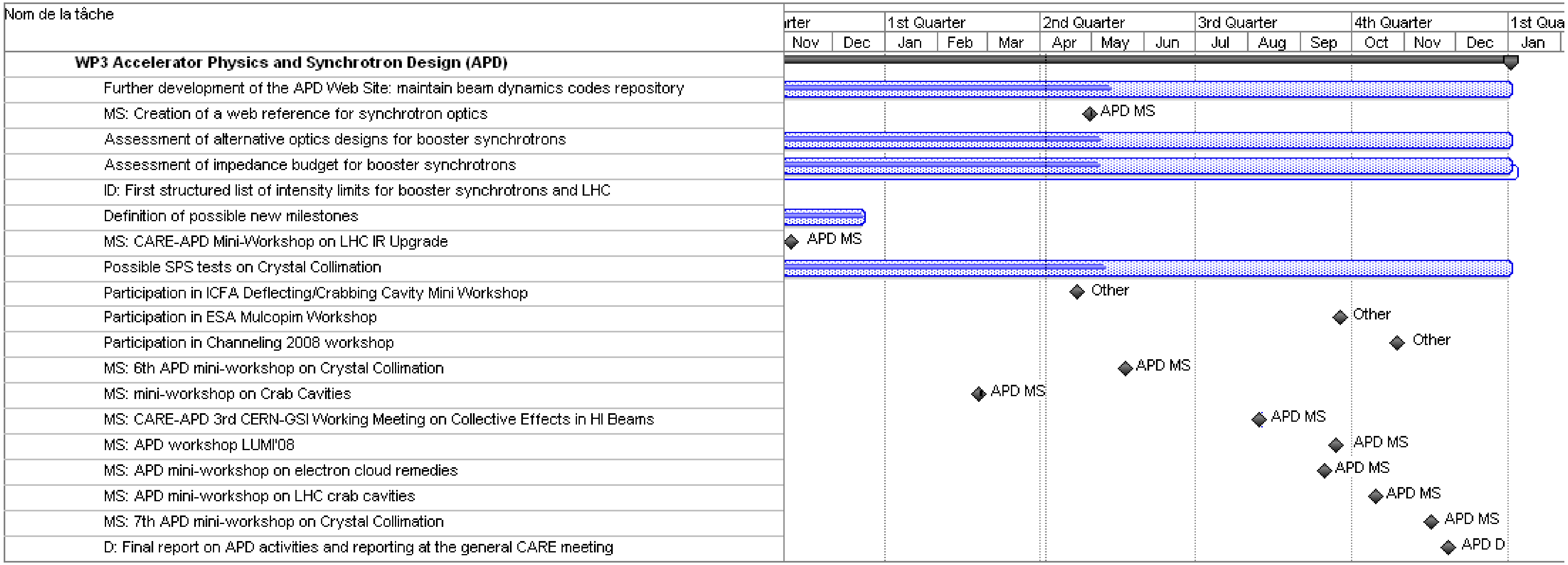

Nom de la tâche
2008
T1
T2
T3
T4
T1
WP2: Driver. Finalize WP work. Document consensual evaluation of driver options and road map.
Review studies adjust priorities, plans, organization.
Reinforce connections in WP. Review work & priorities of WP. Improve WP Website
Focus WP on the priorities and on the timescale of the Integrating Activities proposals
WP meeting : Draft IA Proposal and NF International Design (IDS) Studies
MD: Driver Sections of IA Proposals
Focus WP on the priorities and on the timescale of the BENE Final Scientific Report
WP meeting : NF International Design (IDS) Studies
WP Summer Meeting at NuFact08 Workshop
WP contributions to Proceedings NuFact08 International Workshop
WP Fall Meeting at BENE08 meeting
WP Annual Report 2008
WP section of Final BENE Scientific Report
FP7 Proposal:MD
WP Milestone
Annual WP Report (ID)
Final Report :MD
WP3: Target. Finalize WP work. Document consensual evaluation of target options and road map.
Review studies adjust priorities, plans, organization.
Reinforce connections in WP. Review work & priorities of WP. Improve WP Website
Focus WP on the priorities and on the timescale of the Integrating Activities proposals
WP meeting : Draft IA Proposal and NF International Design (IDS) Studies
MD: Target Sections of IA Proposals
Focus WP on the priorities and on the timescale of the BENE Final Scientific Report
WP meeting : NF International Design (IDS) Studies
WP Summer Meeting at NuFact08 Workshop
WP contributions to Proceedings NuFact08 International Workshop
WP Fall Meeting at BENE08 meeting
WP Annual Report 2008
WP section of Final BENE Scientific Report
FP7 Proposal:MD
WP Milestone
Annual WP Report (ID)
Final Report :MD


Nom de la tâche
2008
T1
T2
T3
T4
T1
WP4: Collector. Finalize WP work. Document consensual evaluation of collector options and road map.
Review studies adjust priorities, plans, organization.
Reinforce connections in WP. Review work & priorities of WP. Improve WP Website
Focus WP on the priorities and on the timescale of the Integrating Activities proposals
WP meeting : Draft IA Proposal and NF International Design (IDS) Studies
MD: Collector Section of IA Proposals
FP7 Proposal:MD
Focus WP on the priorities and on the timescale of the BENE Final Scientific Report
WP meeting : NF International Design (IDS) Studies
WP Summer Meeting at NuFact08 Workshop
WP contributions to Proceedings NuFact08 International Workshop
WP Fall Meeting at BENE08 meeting
WP Milestone
WP Annual Report 2007
Annual WP Report (ID)
WP section of Final BENE Scientific Report
Final Report :MD
WP5: Novel Neutrino Beams. Finalize work. Document consensual evaluation of prospects+road map in the Neutrino Factory and Betabeam sectors.
Review studies adjust priorities, plans, organization.
Reinforce connections in WP. Review work & priorities of WP. Improve WP Website
Focus WP on the Neuitrino factory priorities and on the timescale of the Integrating Activities proposals
Focus WP on the Betabeam priorities and on the timescale of the Integrating Activities proposals
WP meeting : Draft IA Proposal and NF International Design (IDS) Studies
MD: Neutrino Factory sections of IA Proposals
FP7 Proposal:MD
MD: Betabeam sections of IA Proposals
FP7 Proposal:MD
Focus WP on the priorities and on the timescale of the BENE Final Scientific Report
WP meeting : NF International Design (IDS) Studies
WP Summer Meeting at NuFact08 Workshop
WP contributions to Proceedings NuFact08 International Workshop
WP Fall Meeting at BENE08 meeting
WP Milestone
WP Annual Report 2008
Annual WP Report (ID)
WP section of Final BENE Scientific Report
Final Report :MD

N3 High Energy High Intensity Hadron Beams (HHH)

Nom de la tâche
N3: HHH Networking Activities
All Work Packages
Network coordination, dissemination, and outreach
MS: Annual HHH meeting
MS: final HHH report
WP1 Accelerator Magnet Technology (AMT)
Codes and models for design, stability and protection studies for AMT1 and AMT4
Comparison of different IR options (AMT4) and steering of LARP magnet developments
MS: AMT workshop on Coil Insulation & Impregnation Techniques (THERMOMAG)
Studies of pulsed SC magnets for GSI and LHC injectors
MS: AMT workshop on HF magnets
Determination of scaling law for magnet and cryogenic cost for AMT5
MS: Preliminary report on scaling law for magnet and cryogenic cost (roadmap)
ID: Interim report on AMT activities and reporting at the general CARE meeting
MS: AMT workshop on Accelerator Magnet, S.C., Design & Optimization WAMSDO'08
D: Final report on AMT activities and reporting at the general CARE meeting
WP2 Accelerator Beam Instrumentation (ABI)
Definition of possible new milestones
Contribution to beam measurements and preparation for LHC commissioning
ID: Interim report on ABI activities and reporting at the general CARE meeting
MS: ABI workshop on Schottky, tune and chromaticity diagnostic
ID: Proceedings of the 5th ABI topical workshop
MS: 6th and final ABI workshop
ID: Proceedings of the 6th ABI topical workshop
D: Final report on ABI activities and reporting at the general CARE meeting

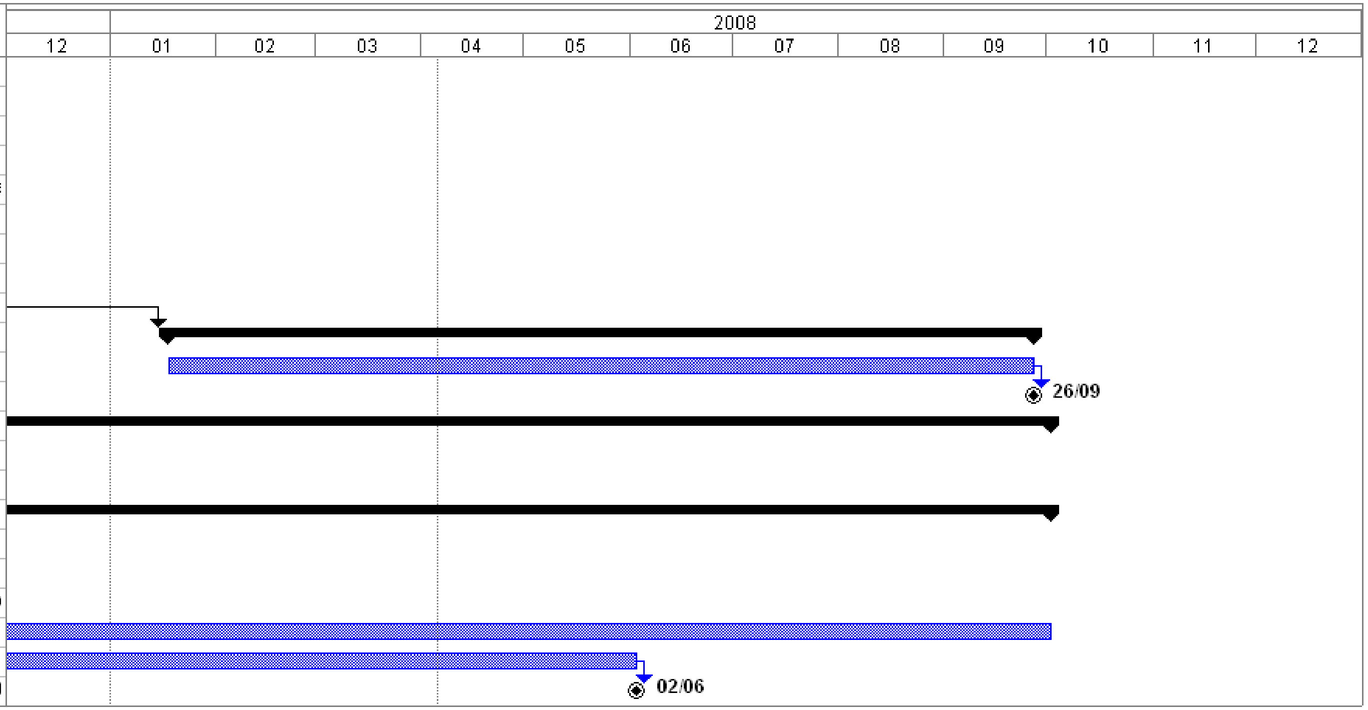



Nom de la tâche
rter
1st Quarter
2nd Quarter
3rd Quarter
4th Quarter
1st Qua
Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan
WP3 Accelerator Physics and Synchrotron Design (APD)
Further development of the APD Web Site: maintain beam dynamics codes repository
MS: Creation of a web reference for synchrotron optics
APD MS
Assessment of alternative optics designs for booster synchrotrons
Assessment of impedance budget for booster synchrotrons
ID: First structured list of intensity limits for booster synchrotrons and LHC
Definition of possible new milestones
MS: CARE-APD Mini-Workshop on LHC IR Upgrade
APD MS
Possible SPS tests on Crystal Collimation
Participation in ICFA Deflecting/Crabbing Cavity Mini Workshop
Other
Participation in ESA Mulcopim Workshop
Other
Participation in Channeling 2008 workshop
Other
MS: 6th APD mini-workshop on Crystal Collimation
APD MS
MS: mini-workshop on Crab Cavities
APD MS
MS: CARE-APD 3rd CERN-GSI Working Meeting on Collective Effects in HI Beams
APD MS
MS: APD workshop LUMI'08
APD MS
MS: APD mini-workshop on electron cloud remedies
APD MS
MS: APD mini-workshop on LHC crab cavities
APD MS
MS: 7th APD mini-workshop on Crystal Collimation
APD MS
D: Final report on APD activities and reporting at the general CARE meeting
APD D

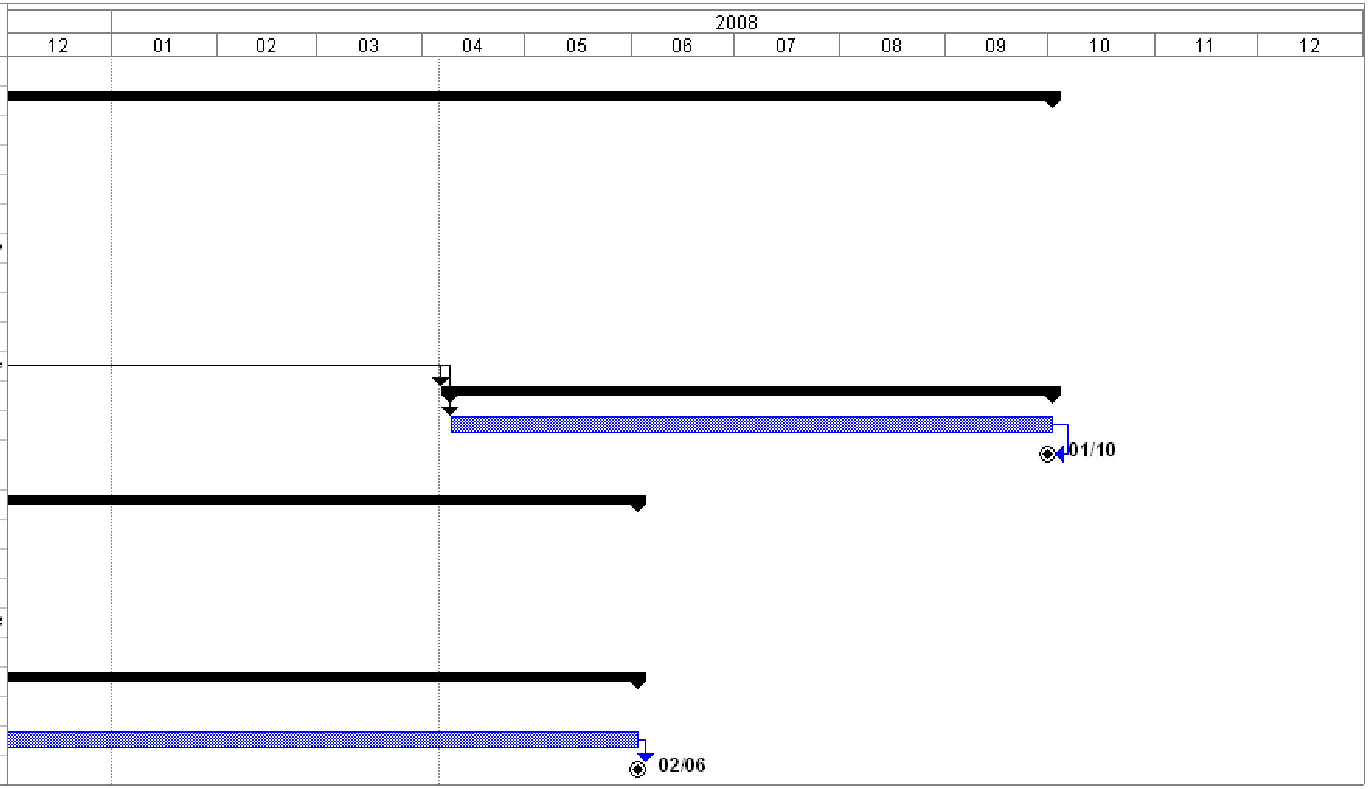
JOINT RESEARCH ACTIVITIES

JRA1: Superconducting Radio Frequency (SRF)

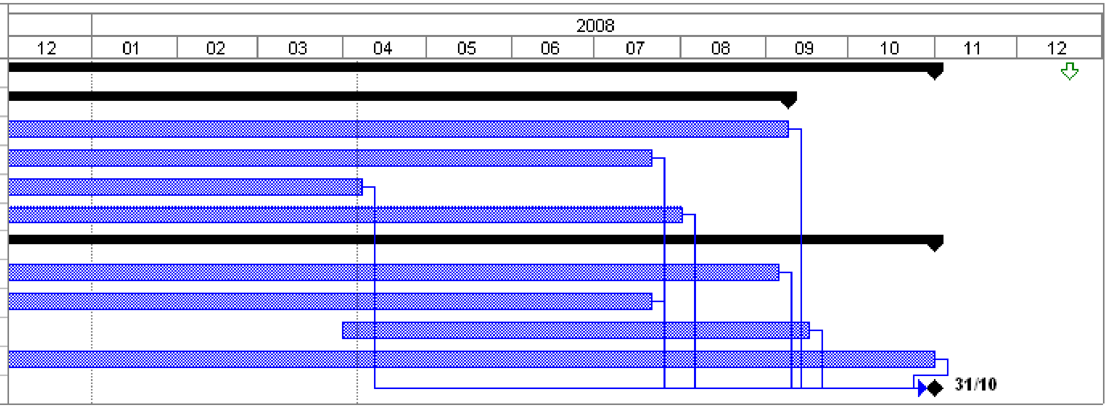
N°	Task Name
2	**WP 2 IMPROVED STANDARD CAVITY FABRICATION**
2.1	**Reliability Analysis**
2.2	**Improved component design**
2.2.1	**Documentation retrieving**
2.2.2	**Review of criticality in welding procedur**
2.2.3	**Finalize new component design**
2.2.4	**Finalize new cavity design**
2.2.4.1	Make drawings
2.2.4.2	**New cavity design finished**
2.2.5	**Fabrication of new cavity**
2.2.5.1	Fabrication
2.2.5.2	New cavity finished
2.3	**EB welding**
2.3.1	**Design tooling**
2.3.2	**Tools production**
2.3.3	**Welding**
2.3.3.1	Commissioning welding machine
2.3.3.2	Test welding
2.3.3.3	**Start production welding of compon**
2.3.3.4	Single cell welding
2.3.3.5	Multicell welding
2.3.3.6	**Welding of prototypes of component**



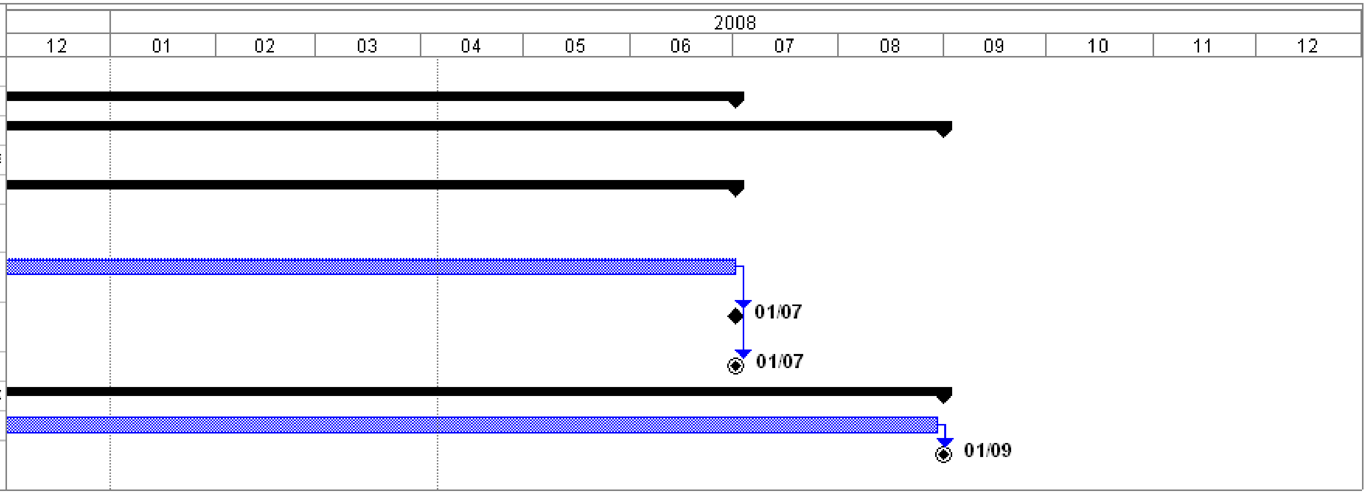
N°	Task Name
3	**WP3 SEAMLESS CAVITY PRODUCTION**
3.1	**Seamless by spinning**
3.1.1	**Design spinning machine**
3.1.2	**Fabrication of spinning machine**
3.1.3	**Evaluation of spinning parameters**
3.1.4	**Spinning of 1-celll cavities**
3.1.5	**Extension of spinning apparatus to multi**
3.1.6	**Spinning of multi-cell cavities cavities**
3.1.6.1	Computer simulation of the hydro forming
3.1.6.2	Hydro forming of bulk Nb 9-cell cavities
3.1.6.3	**Parameters of multi-cell spinning de**
3.1.7	**Series production of multi-cell cavities**
3.1.7.1	Spinning
3.1.7.2	**Multi-cell cavities finished**
3.2	**Seamless by hydro forming**
3.2.1	**Design hydro forming machine**
3.2.2	**Construction of hydro forming machine**
3.2.3	**Construction of tube necking machine**
3.2.4	**Development of seamless tubes for 9-ce**
3.2.5	**Development of tube necking**
3.2.6	**Hydro forming of seamless cavities**
3.2.6.1	Computer simulation of the hydro forming
3.2.6.2	Hydro forming of bulk Nb 9-cell cavities
3.2.6.3	**Hydro formed 9-cell cavities ready**



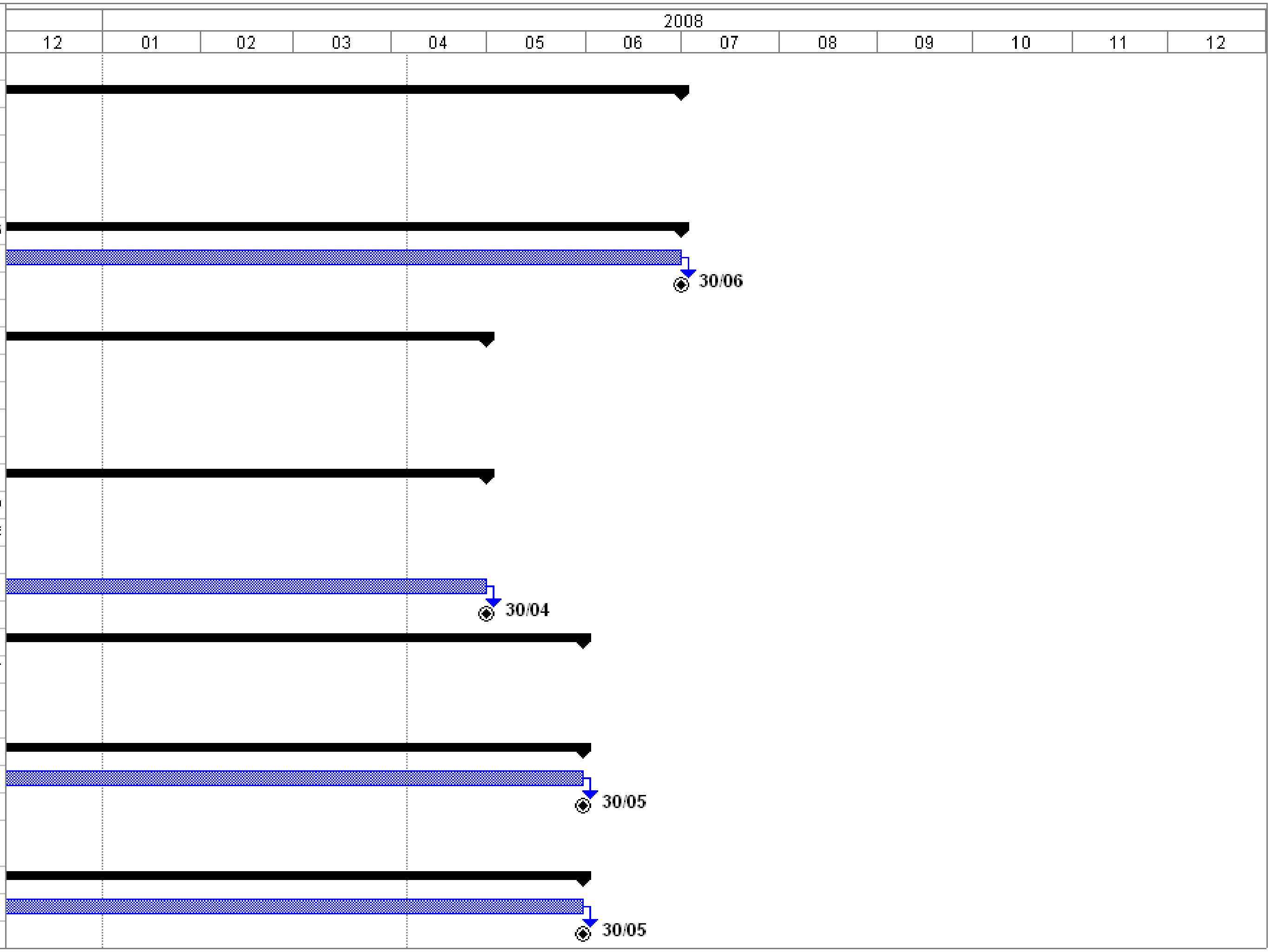
Vorgangsname
3.3 Development of large grain LG and single crystal SC Cavities
3.3.1 Material properties of LG/SC
Thermal and magnetic properties
Mechanical properties
Microstructure analysis
Surface investigation and processing
3.3.2 Fabrication and testing of single cell cavities
Analysis and optimization of the deep drawn shape accuracy
Cavity from large grain material
Cavity from single crystal material
RF tests and analysis
3.3.3 Summary report large grain / single crystal material / cavity



N°	Task Name
4	**WP4 THIN FILM CAVITY PRODUCTION**
4.1	**Linear-arc cathode coating**
4.2	**Planar-arc cathode coating**
4.2.1	**Modification of a planar-arc & trigger sys**
4.2.2	**Routine Operation of planar arc system**
4.2.2.1	Characterization of samples coated at different conditions
4.2.2.2	Quantitative investigation of the micro droplet problem
4.2.2.3	**Summary report on quality of planar arc coating**
4.2.2.4	
4.2.3	**Studies of other HTC superconducting co**
4.2.3.1	Study of superconducting properties
4.2.3.2	**Report on quality of superconducting properties**

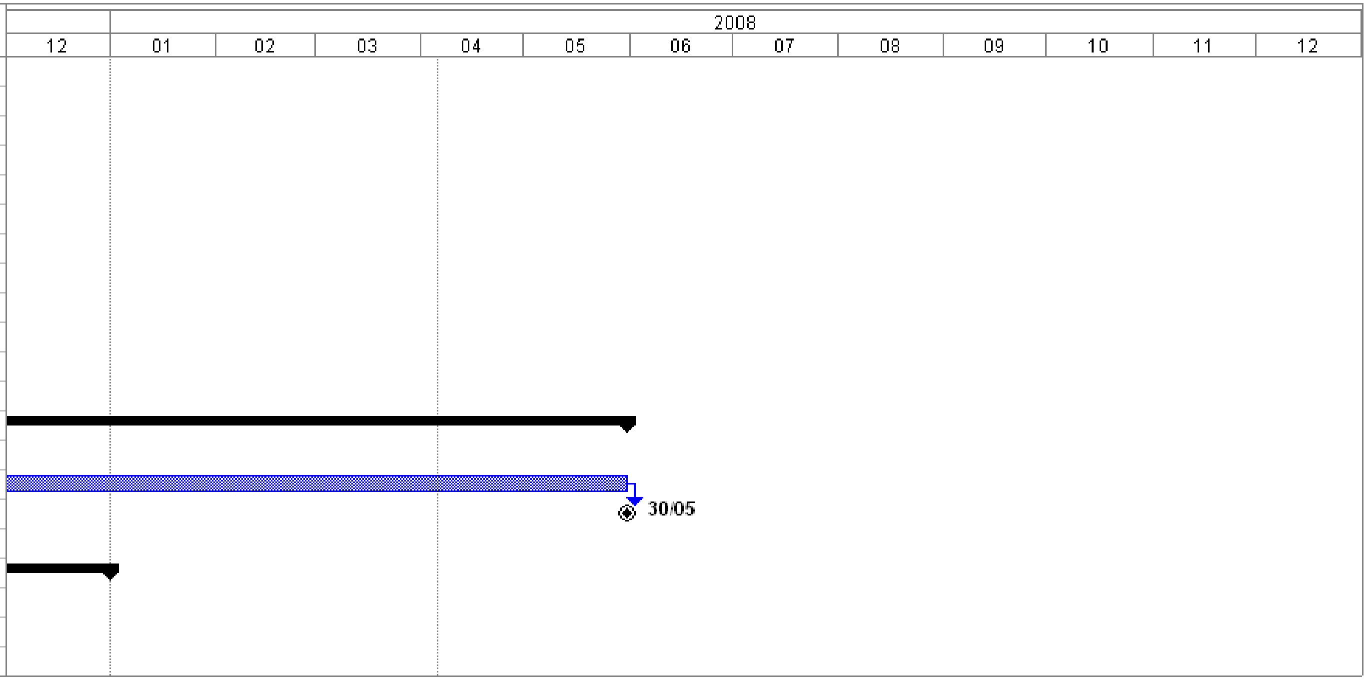


N°	Task Name
5	**WP5 SURFACE PREPARATION**
5.1	**EP on single cells**
5.1.1	**EP on samples**
5.1.2	**Single cell cavities**
5.1.3	**Build EP chemistry for single cells**
5.1.4	**Operation of single cell EP**
5.1.5	**Continuous operation, search for best pa**
5.1.5.1	Parametrising EP procedure
5.1.5.2	**EP parameters fixed**
5.2	**EP on multi-cells**
5.3	**Automated EP (AEP)**
5.3.1	**Prototype EP installation**
5.3.2	**EP computer control**
5.3.3	**Operation of AEP prototype**
5.3.4	**Alternative electrolytes**
5.3.5	**Define best AEP**
5.3.5.1	Compare standard/new electrolyte metho
5.3.5.2	Modify AEP installation for best electrolyte
5.3.5.3	Operate modified AEP
5.3.5.4	Design report on best AEP
5.3.5.5	**Conclude on best electrolyte**
5.4	**Dry ice cleaning**
5.4.1	**Installation of full system for 1-3 cell cavi**
5.4.2	**Optimization of cleaning parameters**
5.4.3	**VT 9-cell cleaning apparatus**
5.4.4	**VT Cleaning of 9-cell cavities**
5.4.4.1	Continuous cleaning
5.4.4.2	**Evaluation of experimental results**
5.4.5	**Design & construction of H 9-cell cleaning apparatus**
5.4.6	**Cleaning of horizontal nine-cell cavity**
5.4.6.1	Continuous cleaning
5.4.6.2	**Evaluation of experimental results**

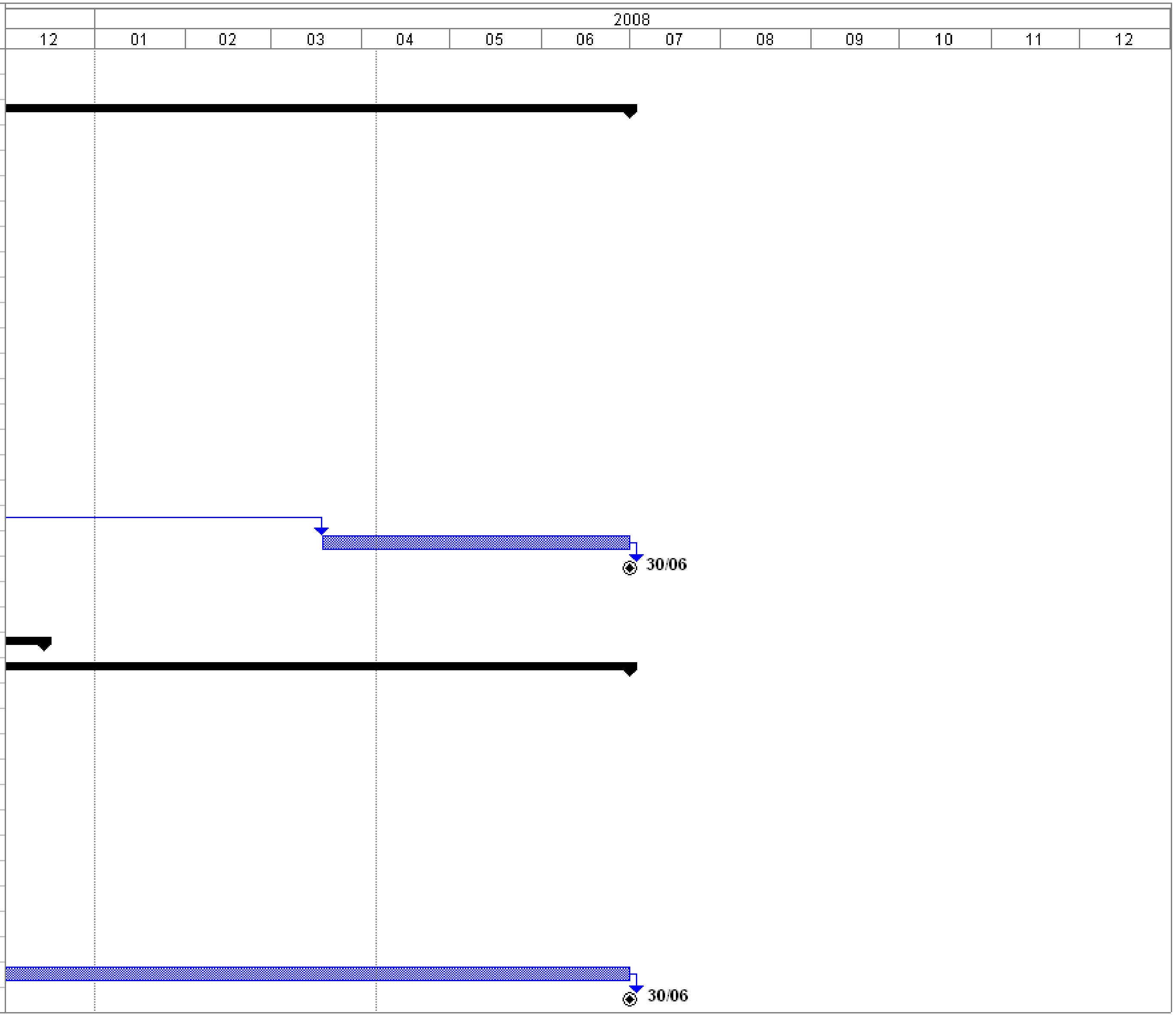


N°	Task Name	Milestone (2008: months 12, 01–12)
6	**WP6 MATERIAL ANALYSIS**	
6.1	**SQUID scanning**	
6.1.1	**Produce calibration defects**	
6.1.2	**Design components of Squid scanner**	
6.1.3	**Construction of scanning apparatus**	
6.1.4	**Scanning of sheets with artificial defects**	
6.1.5	**Scanning of production sheets**	
6.2	**Flux gate magnetometry**	
6.2.1	**Produce calibration defects**	
6.2.2	**Design components of flux gate head**	
6.2.3	**Fabrication of flux gate detector**	
6.2.4	**Commissioning of flux gate detector**	
6.2.5	**Operation of flux gate detector**	
6.2.5.1	Regular operation	
6.2.5.2	Report of operation	
6.2.5.3	**Conclusion of flux gate scanning ope**	
6.2.6	**Comparison with SQUID scanner**	
6.2.6.1	Compare measurements	
6.2.6.2	**Conclude SQUID scanner vs. flux gate detector**	30/05
6.3	**DC field emission studies of Nb samples**	
6.3.1	**Quality control scans**	
6.3.1.1	Modification of Scanning apparatus	
6.3.1.2	Calibration of Scanning apparatus	
6.3.1.3	**Start scanning activity**	
6.3.1.4	BCP and HPR samples	
6.3.1.5	EP and HPR samples	
6.3.1.6	BCP/EP and DIC samples	
6.3.1.7	**First report on BCP/EP and DIC surfac**	
6.3.1.8	Continue QA scanning	
6.3.1.9	**Evaluation of scanning results**	29/02
6.3.2	**Detailed measurements on strong emitt**	
6.3.2.1	Calibrate apparatus for high current	
6.3.2.2	**Start strong emitter evaluation**	
6.3.2.3	I/V curves and current limits	
6.3.2.4	SEM and AES	
6.3.2.5	Influence of heat treatment and ion impact	
6.3.2.6	**Evaluate strong emitter investigatio**	29/02

N°	Task Name
7	**WP7 COUPLERS**
7.1	**New Prototype Coupler**
7.2	**Fabrication of Till Coating System**
7.2.1	Mechanical design of vacuum chamber
7.2.2	Fabrication drawings
7.2.3	Construction of vacuum chamber
7.2.4	Define vacuum needs
7.2.5	Appropriation of vacuum equipment
7.2.6	Design of electronic circuitry
7.2.7	Fabrication of electronics in industry
7.2.8	Installation and Test at Orsay
7.2.9	**First Window Coating**
7.3	**Conditioning Studies of Proto-type Couplers**
7.3.1	Conditioning of couplers
7.3.2	Evaluate conditioning results
7.3.3	**Final report on conditioning**
8	**WP8 TUNERS**
9	**WP9 LOW LEVEL RF (LLRF)**

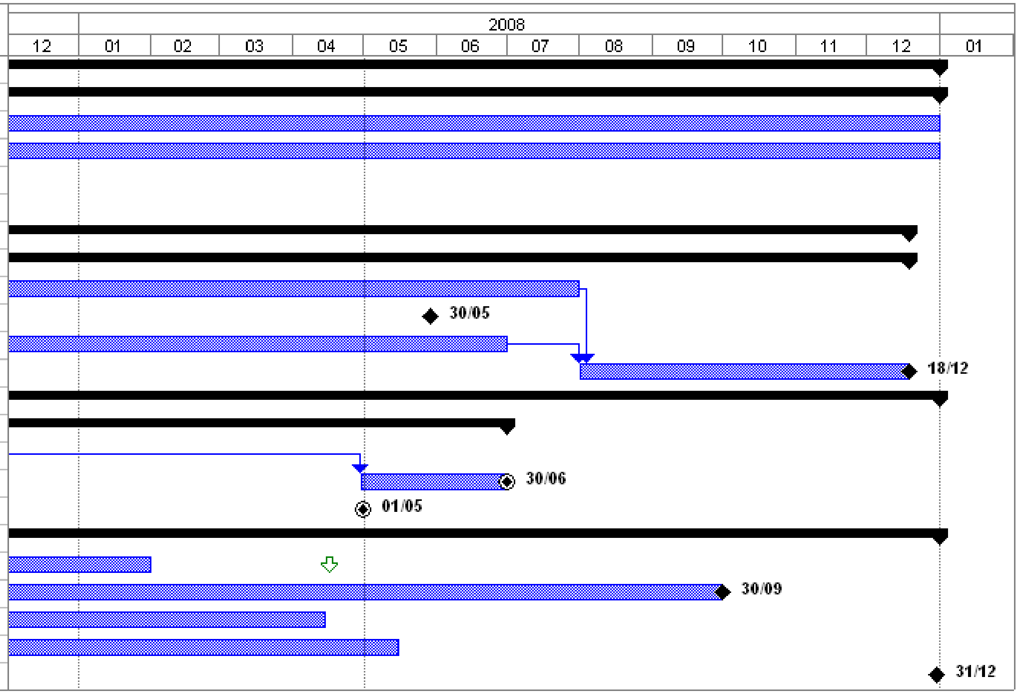


N°	Task Name
10	**WP10 CRYOSTAT INTEGRATION TESTS**
10.1	Displace CRYHOLAB
10.2	**Integration tests in Cryostat**
10.2.1	Test 1
10.2.2	Test 2
10.2.3	Test 3
10.2.4	Test 4
10.2.5	Test 5
10.2.6	**Evaluate experimental results**
10.2.7	Test 1
10.2.8	Test 2
10.2.9	Test 3
10.2.10	Test 4
10.2.11	Test 5
10.2.12	**Evaluate experimental results**
10.2.13	Test 1
10.2.14	Test 2
10.2.15	Test 3
10.2.16	Test 4
10.2.17	Test 5
10.2.18	**Final evaluation**
11	**WP 11 BEAM DIAGNOSTICS**
11.1	**Beam position monitor**
11.2	**Beam Emittance Monitor**
11.2.1	Slit width simulations
11.2.2	Slit design
11.2.3	Optics simulations
11.2.4	Optics appropriations
11.2.5	System assembly and tests
11.2.6	Mechanical assembly at TTF
11.2.7	Optical assembly at TTF
11.2.8	Integration of controls into TTF
11.2.9	**Ready for beam test in TTF**
11.2.10	Beam tests at TTF
11.2.11	Evaluate first beam test result
11.2.12	Successive measurements
11.2.13	**Final evaluation**



JRA2: Charge Production in Photo-Injector (PHIN)

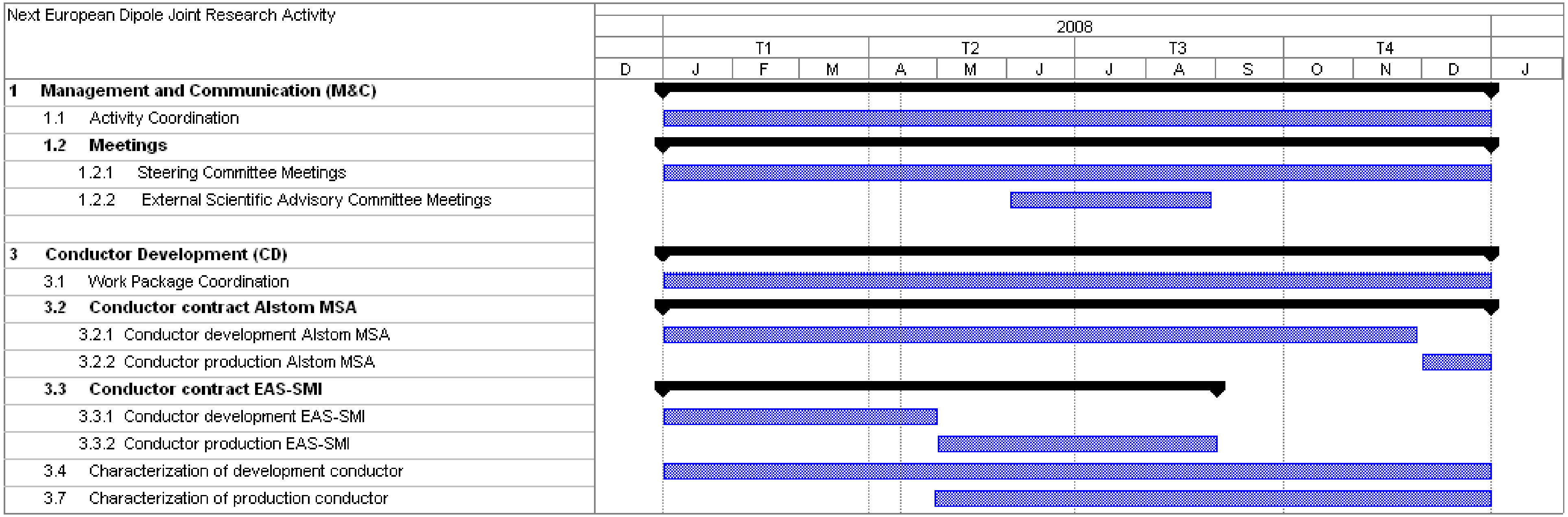
Task Name	Milestones (MS), Deliverables (D)
JRA2: PHIN	
WP2 Charge Production	
Photocathode high field R&D	
High charge PC devel. for SC cavity	
	D: Report on new photocathode materials
	D: Report on laser driven plasma source
WP3 Laser	
Laser System	
Test amplifier	
	D: Report on Laser amplifier
UV Harmonic generator test	
Test of the system	D: Test of the system at CERN
WP4 GUN	
SC RF gun	
SC RF gun realisation	
SC RF gun test	D: Report on SC RF gun test
	D: Report on PC test in SC cavity
3 GHz RF gun	
CTF3 3 GHz RF gun construction	
CTF3 3 GHz RF gun tests	MS: 3 GHz RF gun test results
NEPAL 3 GHz RF gun construction	
NEPAL 3 GHz RF gun delivery to CERN	MS: 3 GHz RF gun test results
	D: Report on RF guns of CTF3 and NEPAL



JRA3: High Intensity Proton injector (HIPPI)

N°	Task Name	
1	**WP2: NORMAL CONDUCTING STRUCTURES**	
2	**2.1 Drift Tube Linac**	
3	2.1.4 DTL beam dynamics design	RAL;CERN
4	**2.2 H-mode Drift Tube Linac**	
5	2.2.7 CH-prototype construction, tests	IAP-FU
6	2.2.8 CH-DTL beam dynamics study	
7	**2.3 Side Coupled Linac**	
8	2.3.4 RF model testing	LPSC;CERN
9	**2.4 Cell Coupled Drift Tube Linac**	
10	2.4.5 Testing of ISTC prototype	CERN
11	**WP3: SUPERCONDUCTING STRUCTURES**	
12	**3.1 ELLIPTICAL CAVITIES**	
13	3.1.12 High power pulsed tests	CEA;INFN-MI
14	**3.2 SPOKE CAVITIES**	
15	3.2.10 Manufacturing of 352MHz multi-gap prototype	FZJ
16	3.2.11 Evaluation of 352MHz multi-gap prototype	FZJ;IN2P3-Orsay
17	**3.3 CH RESONATOR**	
18	3.3.3 Measurement of tuning system	
19	**WP4: CHOPPING**	
20	**4.1 CHOPPER STRUCTURE A**	
21	4.1.7 Prototype testing	CERN
22	**4.2 CHOPPER LINE**	
23	4.2.3 Beam line assembling	
24	**4.3 CHOPPER STRUCTURE B**	
25	4.3.4 Prototype testing	RAL
26	**WP5: BEAM DYNAMICS**	
27	**5.1 Code development**	
28	5.1.3 Neutralization and ECR source modelization study	CEA
29	5.1.8 Code benchmarking with experiment	
30	**5.3 Diagnostics and collimation**	
31	5.3.7 Beam profile monitor design	FZJ

JRA4: New European Dipole (NED)



Estimated breakdown of the EC contribution per reporting period

Contract Preparation Forms

EUROPEAN COMMISSION 6th Framework Programme on Research, Technological Development and Demonstration

Support for Research Infrastructures
Integrating Activities / Communication Network Development

Integrated Infrastructure Initiative

A3.2a

Proposal Number	506395	Proposal Acronym	CARE

Estimated breakdown of the EC contribution per reporting period

Reporting Periods	Start month	End month	Estimated Grant to the Budget	
			Total	in which first six months
Reporting Period 1	1	12	3 795 200,00	,00
Reporting Period 2	13	24	4 457 400,00	2 195 000,00
Reporting Period 3	25	36	3 855 000,00	2 653 000,00
Reporting Period 4	37	48	2 524 400,00	1 881 000,00
Reporting Period 5	49	60	568 000,00	568 000,00
Reporting Period 6			,00	,00
Reporting Period 7			,00	,00

Financial information for the duration of the detailed implementation plan (per activity)

N0 Management

Man	Participant (cost model)	Permanent Staff direct cost ONLY (Euros)	Elligible Staff direct cost ONLY (Euros)	Durable Equipment direct cost ONLY (Euros)	Consumables and Prototyping direct cost ONLY (Euros)	Travel direct cost ONLY (Euros)	All Direct cost	Subcontract	Indirect cost	Expected costs including indirect cost (Euros)	Requested funding (Euros)
1	CEA(FC)	0	155 500	0	0	10 000	165 500	0	129 500,00	295 000,00	4 967
	Grand total	**0**	**155 500**	**0**	**0**	**10 000**	**165 500**	**0**	**129 500,00**	**295 000,00**	**4 967**

N1 Electron Linear Accelerator Network (ELAN)

N1	Participant (cost model)	Permanent Staff direct cost ONLY (Euros)	Elligible Staff direct cost ONLY (Euros)	Durable Equipment direct cost ONLY (Euros)	Consumables and Prototyping direct cost ONLY (Euros)	Travel including direct cost ONLY (Euros)	All Direct cost	Subcontract	Indirect cost	Expected costs including indirect cost (Euros)	Requested funding (Euros)
1	CEA(FC)	0	0	0	0	5 000	5 000	0	0,00	5 000,00	5 000
3	CNRS(FCF)	0	0	0	0	10 000	10 000	0	2 000,00	12 000,00	6 000
6	DESY(AC)	0	0	0	0	0	0	0	0,00	0,00	0
7	FZJ(FC)	0	0	0	0	3 500	3 500	0	0,00	3 500,00	3 500
9	FZR(AC)	0	0	0	0	5 000	5 000	0	1 000,00	6 000,00	6 000
10	INFN(AC)	0	0	0	0	15 000	15 000	0	3 000,00	18 000,00	8 000
11	TEU(FC)	0	0	0	0	1 500	1 500	0	0,00	1 500,00	1 500
12	TUL(AC)	0	0	0	0	2 400	2 400	0	480,00	2 880,00	0
13	IPJ(AC)	0	0	0	0	2 500	2 500	0	500,00	3 000,00	0
14	WUT-ISE(AC)	0	0	0	0	0	0	0	0,00	0,00	0
16	CSIC(FC)	0	0	0	0	2 000	2 000	0	0,00	2 000,00	2 000
17	CERN(AC)	0	0	0	0	20 000	20 000	0	4 000,00	24 000,00	10 000
19	PSI(FC)	0	0	0	0	3 000	3 000	0	0,00	3 000,00	0
20	STFC(FC)	0	0	0	0	2 000	2 000	0	0,00	2 000,00	2 000
21	ICL(AC)	0	0	0	0	2 000,00	2 000	0	400,00	2 400,00	2 400
22	UMA(AC)	0	0	0	0	10 000	10 000	0	2 000,00	12 000,00	12 000
	Grand total	**0**	**0**	**0**	**0**	**83 900**	**83 900**	**0**	**13 380,00**	**97 280,00**	**58 400**

N2 Beam in Europe for Neutrino Experiments (BENE)

N2	Participant (cost model)	Permanent Staff direct cost ONLY(Euros)	Elligible Staff direct cost ONLY (Euros)	Durable Equipment direct cost ONLY (Euros)	Consumables and Prototyping direct cost ONLY (Euros)	Travel direct cost ONLY (Euros)	All direct Cost	Subcontract	Indirect cost	Expected costs including indirect cost (Euros)	Requested funding (Euros)
1	CEA(FC)	0	0	0	0	8 000	8 000	0	0,00	8 000,00	8 000
2	UCLN(AC)	0	0	0	0	2 000	2 000	0	400,00	2 400,00	2 400
3	CNRS(FCF)	0	0	0	0	0	0	0	0,00	0,00	0
4	GSI(FC)	0	0	0	0	1 000	1 000	0	0,00	1 000,00	1 000
7	FZJ(FC)	0	0	0	0	10 000	10 000	0	0,00	10 000,00	5 000
8	TUM(AC)	0	0	0	0	3 000	3 000	0	600,00	3 600,00	3 600
10	INFN(AC)	0	0	0	0	15 000	15 000	0	3 000,00	18 000,00	8 000
16	CSIC(FC)	0	0	0	0	6 000	6 000	0	0,00	6 000,00	6 000
17	CERN (AC)	0	0	0	0	10 000	10 000	0	2 000,00	12 000,00	10 000
18	UNI-GE(AC)	0	0	0	0	22 000	22 000	0	4 400,00	26 400,00	0
19	PSI(FC)	0	0	0	0	5 220	5 220	0	0,00	5 220,00	0
20	TFC-RAL (F	0	0	0	0	8 000	8 000	0	0,00	8 000,00	4 000
21	ICL(AC)	0	0	0	0	8 000,00	8 000	0	1 600,00	9 600,00	9 600
	Grand total	**0**	**0**	**0**	**0**	**98 220**	**98 220**	**0**	**12 000,00**	**110 220,00**	**57 600**

N3 High-Energy High-Intensity Hadron Beams (HHH)

N3	Participant (cost model)	Permanent Staff direct cost ONLY (Euros)	Elligible Staff direct cost ONLY (Euros)	Durable Equipment direct cost ONLY (Euros)	Consumables and Prototyping direct cost ONLY (Euros)	Travel direct cost ONLY (Euros)	All Direct cost	Subcontract	Indirect cost	Expected costs including indirect cost (Euros)	Requested funding (Euros)
1	CEA(FC)	0	0	0	0	3 000	3 000	0	0,00	3 000,00	3 000
4	GSI(FC)	0	0	0	0	5 000	5 000	0	0,00	5 000,00	5 000
6	DESY(AC)	0	0	0	0	8 000	8 000	0	1 600,00	9 600,00	5 000
10	INFN(AC)	0	0	0	0	10 000	10 000	0	2 000,00	12 000,00	7 000
11	TEU(FC)	0	0	0	0	2 000	2 000	0	0,00	2 000,00	2 000
15	WUT(AC)	0	0	0	0	1 000	1 000	0	200,00	1 200,00	1 200
16	CSIC(FC)	0	0	0	0	2 000	2 000	0	0,00	2 000,00	2 000
17	CERN(AC)	0	0	0	0	40 000	40 000	0	8 000,00	48 000,00	20 000
19	PSI(FC)	0	0	0	0	0	0	0	0,00	0,00	0
20	STFC(FC)	0	0	0	0	2 000	2 000	0	0,00	2 000,00	2 000
	Grand total	**0**	**0**	**0**	**0**	**73 000**	**73 000**	**0**	**11 800,00**	**84 800,00**	**47 200**

JRA1 Superconducting Radio-Frequency (SRF)

JRA1	Participant (cost model)	Permanent Staff direct cost ONLY (Euros)	Elligible Staff direct cost ONLY (Euros)	Durable Equipment direct cost ONLY (Euros)	Consumables and Prototyping direct cost ONLY (Euros)	Travel direct cost ONLY (Euros)	All Direct Cost	Subcontract	Indirect cost	Expected costs including indirect cost (Euros)	Requested funding (Euros)
1	CEA(FC)	194 000	115 000	0	20 000	10 000	339 000	0	160 000,00	499 000,00	5 000
3	CNRS(FCF)	80 000	30 000	0	1 500	2 500	114 000	0	22 800,00	136 800,00	10 000
6	DESY(AC)		90 000	0	40 000	10 000	140 000	0	28 000,00	168 000,00	80 000
10	*INFN-LNL*	*0*	*30 000*	*0*	*0*	*5 000*	*35 000*	*0*	*7 000,00*	42 000,00	*15 000*
	INFN-LNF	*0*	*30 000*	*0*	*10 000*	*10 000*	*50 000*	*0*	*10 000,00*	60 000,00	*20 000*
	INFN-Mi	*0*	*20 000*	*0*	*10 000*	*5 000*	*35 000*	*0*	*7 000,00*	42 000,00	*15 000*
	INFN-Ro2	*0*	*20 000*	*0*	*10 000*	*5 000*	*35 000*	*0*	*7 000,00*	42 000,00	*15 000*
	INFN(AC)	0	100 000	0	30 000	25 000	155 000	0	31 000,00	186 000,00	65 000
12	TUL(AC)	0	0	0	0	0	0	0	0,00	0,00	0
13	IPJ(AC)	16 000	0	2 000	6 000	6 000	30 000	0	6 000,00	36 000,00	0
14	VUT-ISE(AC	0	5 000	0	0	0	5 000	0	1 000,00	6 000,00	0
19	PSI(FC)	0	0	0	0	0	0	0	0,00	0,00	0
	Grand total	**290 000**	**340 000**	**2 000**	**97 500**	**53 500**	**783 000**	**0**	**248 800,00**	**1 031 800,00**	**160 000**

JRA2 Charge Production with Photo-Injectors (PHIN)

JRA2	Participant (cost model)	Permanent Staff direct cost ONLY (Euros)	Elligible Staff direct cost ONLY (Euros)	Durable Equipment direct cost ONLY (Euros)	Consumables and Prototyping direct cost ONLY (Euros)	Travel direct cost ONLY (Euros)	All Direct Cost	Subcontract	Indirect cost	Expected costs including indirect cost (Euros)	Requested funding (Euros)
3	*CNRS-Orsay*	*50 000*	*35 000*	*30 000*	*20 000*	*15 000*	*150 000*	*0*	*30 000,00*	*180 000,00*	*20 000*
	CNRS-LOA	*50 000*	*0*	*0*	*10 000*	*10 000*	*70 000*	*0*	*14 000,00*	*84 000,00*	*15 000*
	CNRS(FCF)	100 000	35 000	30 000	30 000	25 000	220 000	0	44 000,00	264 000,00	35 000
9	FZR(AC)	0	0	0	0	0	0	0	0,00	0,00	0
10	*INFN-LNF*	*0*	*20 000*	*0*	*10 000*	*10 000*	*40 000*	*0*	8 000,00	*48 000,00*	*15 000,00*
	INFN-Mi	*0*	*20 000*	*0*	*10 000*	*5 000*	*35 000*	*0*	7 000,00	*42 000,00*	*15 000,00*
	INFN(AC)	0	40 000	0	20 000	15 000	75 000	0	15 000,00	90 000,00	30000
11	TEU(FC)	35 000	0	0	35 000	10 000	80 000	0	0,00	80 000,00	20 000
17	CERN (AC)	0	20 000	0	100 000	10 000	130 000	0	26 000,00	156 000,00	0
20	TFC-RAL (F(	0	0	0	0	0	0	0	0,00	0,00	0
	Grand total	**135 000**	**95 000**	**30 000**	**185 000**	**60 000**	**505 000**	**0**	**85 000,00**	**590 000,00**	**85 000**

JRA3 High Intensity Pulsed Proton Injectors (HIPPI)

JRA3	**Participant (cost model)**	**Permanent Staff direct cost ONLY (Euros)**	**Elligible Staff direct cost ONLY (Euros)**	**Durable Equipment direct cost ONLY (Euros)**	**Consumables and Prototyping direct cost ONLY (Euros)**	**Travel direct cost ONLY (Euros)**	**All Direct Cost**	**Subcontract**	**Indirect cost**	**Expected costs including indirect cost (Euros)**	**Requested funding (Euros)**
1	CEA (FC)	117 000	0	0	100 000	0	217 000	0	80 000,00	297 000,00	9 000
3	*CNRS-IN2P*	*70 000*	*44 000*	*0*	*10 000*	*0*	*124 000*	*0*	*24 800,00*	148 800,00	*3 000*
	CNRS-LPSC	*12 000*	*0*	*0*	*0*	*0*	*12 000*	*0*	*2 400,00*	14 400,00	*1 000*
	CNRS(FCF)	82 000	44 000	0	10 000	0	136 000	0	27 200,00	163 200,00	4 000
4	GSI(FC)	0	100 000	0	40 000	8 000	148 000	0	0,00	148 000,00	10 000
5	IAP-FU(AC)	0	60 000	0	20 000	6 000	86 000	0	17 200,00	103 200,00	40 000
7	FZJ(FC)	130 000		0	30 000	4 000	164 000	0	110 000,00	274 000,00	10 000
10	NFN-Mi(AC	0	0	0	20 000	5 000	25 000	0	5 000,00	30 000,00	10 000
17	CERN (AC)	0	160 000	50 000	50 000	10 000	270 000	0	54 000,00	324 000,00	0
20	STFC (FC)	100 000	0	0	20 000	10 000	130 000	0	0,00	130 000,00	35 000
	Grand total	**429 000**	**364 000**	**50 000**	**290 000**	**43 000**	**1 176 000**	**0**	**293 400,00**	**1 469 400,00**	**118 000**

JRA4 Next European Dipole (NED)

JRA4	Participant (cost model)	Permanent Staff including indirect cost (Euros)	Elligible Staff including indirect cost (Euros)	Durable Equipment including indirect cost (Euros)	Consumables and Prototyping including indirect cost (Euros)	Travel including indirect cost (Euros)	All direct cost	Subcontract	Indirect cost	Expected costs including indirect cost (Euros)	Requested funding (Euros)
1	CEA (FC)	55 000	0	0	0	5 000	60 000	0	43 600,00	103 600,00	5 000
10	INFN (AC)	0	0	0	0	0	0	0	0,00	0,00	0
11	TEU (FC)	0	0	0	0	0	0	0	0,00	0,00	0
15	WUT (AC)	0	0	0	0	0	0	0	0,00	0,00	0
17	CERN (AC)	0	0	0	200 000	0	200 000	0	40 000,00	240 000,00	0
20	STFC (FC)	0	0	0	0	0	0	0	0,00	0,00	0
	Grand total	**55 000**	**0**	**0**	**200 000**	**5 000**	**260 000**	**0**	**83 600,00**	**343 600,00**	**5 000**

Financial information for the duration of the detailed implementation plan (per contractor)

Proposal Number	506395	Proposal Acronym	CARE

Financial information – "Reporting period 5"

Partici-pant n°	Organi-sation short name	Cost model used: For transnational Access	Cost model used: For any other activities	Estimated eligible costs and requested EC contribution (first 18 months of the project)		Costs and EC contribution per type of activities: RTD activities (1)	Demonstration activities (2)	Consortium Management activities (3)	Other specific activities: Coordination/Networking (4)	Other specific activities: Transnational access (5)	Other specific activities: Connectivity (6)	Other specific activities: Other including Specific Service Activities for CND (7)	Total (8)=(1)+(2)+(3)+(4)+(5)+(6)+(7)	Total receipts
1	CEA		FC	Eligible costs	*Direct costs (a)*	616 000,00		165 500,00	16 000,00				797 500,00	
					of which subcontracting	0,00		0,00	0,00				0,00	
					Indirect costs (b)	283 600,00		129 500,00	0,00				413 100,00	
					Total eligible costs (a)+(b)	899 600,00		295 000,00	16 000,00				1 210 600,00	
				Requested EC contribution		19 000,00		4967.36	16 000,00				**39 967.36**	
2	UCLN		AC	Eligible costs	*Direct costs (a)*	0,00			2 000,00				2 000,00	
					of which subcontracting	0,00			0,00				0,00	
					Indirect costs (b)	0,00			400,00				400,00	
					Total eligible costs (a)+(b)	0,00			2 400,00				2 400,00	
				Requested EC contribution		0,00			2 400,00				**2 400,00**	
3	CNRS		FCF	Eligible costs	*Direct costs (a)*	470 000,00			10 000,00				480 000,00	
					of which subcontracting	0,00			0,00				0,00	
					Indirect costs (b)	94 000,00			2 000,00				96 000,00	
					Total eligible costs (a)+(b)	564 000,00			12 000,00				576 000,00	
				Requested EC contribution		49 000,00			6 000,00				**55 000,00**	
4	GSI		FC	Eligible costs	*Direct costs (a)*	148 000,00			6 000,00				154 000,00	
					of which subcontracting	0,00			0,00				0,00	
					Indirect costs (b)	0,00			0,00				0,00	
					Total eligible costs (a)+(b)	148 000,00			6 000,00				154 000,00	
				Requested EC contribution		10 000,00			6 000,00				**16 000,00**	
TOTAL				Eligible costs										
				Requested EC contribution										

Please use as many copies of form A3.3 as necessary for the number of participants	***Form A3.3 page***	*1*	***of***	*6*

Proposal Number	506395	Proposal Acronym	CARE

Financial information – "Reporting period 5"														
Partici-pant n°	Organi-sation short name	Cost model used		Estimated eligible costs and requested EC contribution (first 18 months of the project)		Costs and EC contribution per type of activities							Total (8)= (1)+(2)+(3)+(4)+(5)+(6)+(7)	Total receipts
		For transnational Access	For any other activities			RTD activities (1)	Demonstration activities (2)	Consortium Management activities (3)	Other specific activities					
									Coordination/Networking (4)	Transnational access (5)	Connectivity (6)	Other including Specific Service Activities for CND (7)		
5	IAP-FU		AC	Eligible costs	*Direct costs (a)*	86 000,00			0,00				86 000,00	
					of which subcontracting	0,00			0,00				0,00	
					Indirect costs (b)	17 200,00			0,00				17 200,00	
					Total eligible costs (a)+(b)	103 200,00			0,00				103 200,00	
				Requested EC contribution		40 000,00			0,00				**40 000,00**	
6	DESY		AC	Eligible costs	*Direct costs (a)*	140 000,00			8 000,00				148 000,00	
					of which subcontracting	0,00			0,00				0,00	
					Indirect costs (b)	28 000,00			1 600,00				29 600,00	
					Total eligible costs (a)+(b)	168 000,00			9 600,00				177 600,00	
				Requested EC contribution		80 000,00			5 000,00				**85 000,00**	
7	FZJ		FC	Eligible costs	*Direct costs (a)*	164 000,00			13 500,00				177 500,00	
					of which subcontracting	0,00			0,00				0,00	
					Indirect costs (b)	110 000,00			0,00				110 000,00	
					Total eligible costs (a)+(b)	274 000,00			13 500,00				287 500,00	
				Requested EC contribution		10 000,00			8 500,00				**18 500,00**	
8	TUM		AC	Eligible costs	*Direct costs (a)*	0,00			3 000,00				3 000,00	
					of which subcontracting	0,00			0,00				0,00	
					Indirect costs (b)	0,00			600,00				600,00	
					Total eligible costs (a)+(b)	0,00			3 600,00				3 600,00	
				Requested EC contribution		0,00			3 600,00				**3 600,00**	
TOTAL				Eligible costs										
				Requested EC contribution										

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Proposal Number	506395	Proposal Acronym	CARE

Financial information – "Reporting period 5"

Partici-pant n°	Organi-sation short name	Cost model used		Estimated eligible costs and requested EC contribution (first 18 months of the project)		Costs and EC contribution per type of activities							Total (8)= (1)+(2)+(3)+(4)+(5)+(6)+(7)	Total receipts
									Other specific activities					
		For transnational Access	For any other activities			RTD activities (1)	Demonstration activities (2)	Consortium Management activities (3)	Coordination/Networking (4)	Transnational access (5)	Connectivity (6)	Other including Specific Service Activities for CND (7)		
9	FZR		AC	Eligible costs	*Direct costs (a)*	0,00			5 000,00				5 000,00	
					of which subcontracting	0,00			0,00				0,00	
					Indirect costs (b)	0,00			1 000,00				1 000,00	
					Total eligible costs (a)+(b)	0,00			6 000,00				6 000,00	
				Requested EC contribution		0,00			6 000,00				**6 000,00**	
10	INFN		AC	Eligible costs	*Direct costs (a)*	255 000,00			40 000,00				295 000,00	
					of which subcontracting	0,00			0,00				0,00	
					Indirect costs (b)	51 000,00			8 000,00				59 000,00	
					Total eligible costs (a)+(b)	306 000,00			48 000,00				354 000,00	
				Requested EC contribution		105 000,00			23 000,00				**128 000,00**	
11	TEU		FC	Eligible costs	*Direct costs (a)*	80 000,00			3 500,00				83 500,00	
					of which subcontracting	0,00			0,00				0,00	
					Indirect costs (b)	0,00			0,00				0,00	
					Total eligible costs (a)+(b)	80 000,00			3 500,00				83 500,00	
				Requested EC contribution		20 000,00			3 500,00				**23 500,00**	
12	TUL		AC	Eligible costs	*Direct costs (a)*	0,00			2 400,00				2 400,00	
					of which subcontracting	0,00			0,00				0,00	
					Indirect costs (b)	0,00			480,00				480,00	
					Total eligible costs (a)+(b)	0,00			2 880,00				2 880,00	
				Requested EC contribution		0,00			0,00				**0,00**	
TOTAL				Eligible costs										
				Requested EC contribution										

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Proposal Number	506395	Proposal Acronym	CARE

Financial information – "Reporting period 5"

Partici-pant n°	Organi-sation short name	Cost model used: For transnational Access	Cost model used: For any other activities	Estimated eligible costs and requested EC contribution (first 18 months of the project)		Costs and EC contribution per type of activities: RTD activities (1)	Demonstration activities (2)	Consortium Management activities (3)	Other specific activities: Coordination/Networking (4)	Other specific activities: Transnational access (5)	Other specific activities: Connectivity (6)	Other specific activities: Other including Specific Service Activities for CND (7)	Total (8)= (1)+(2)+(3)+(4)+(5)+(6)+(7)	Total receipts
13	IPJ		AC	Eligible costs	*Direct costs (a)*	30 000,00			2 500,00				32 500,00	
					of which subcontracting	0,00			0,00				0,00	
					Indirect costs (b)	6 000,00			500,00				6 500,00	
					Total eligible costs (a)+(b)	36 000,00			3 000,00				39 000,00	
				Requested EC contribution		0,00			0,00				**0,00**	
14	WUT-ISE		AC	Eligible costs	*Direct costs (a)*	5 000,00			0,00				5 000,00	
					of which subcontracting	0,00			0,00				0,00	
					Indirect costs (b)	1 000,00			0,00				1 000,00	
					Total eligible costs (a)+(b)	6 000,00			0,00				6 000,00	
				Requested EC contribution		0,00			0,00				**0,00**	
15	WUT		AC	Eligible costs	*Direct costs (a)*	0,00			1 000,00				1 000,00	
					of which subcontracting	0,00			0,00				0,00	
					Indirect costs (b)	0,00			200,00				200,00	
					Total eligible costs (a)+(b)	0,00			1 200,00				1 200,00	
				Requested EC contribution		0,00			1 200,00				**1 200,00**	
16	CSIC		FC	Eligible costs	*Direct costs (a)*	0,00			10 000,00				10 000,00	
					of which subcontracting	0,00			0,00				0,00	
					Indirect costs (b)	0,00			0,00				0,00	
					Total eligible costs (a)+(b)	0,00			10 000,00				10 000,00	
				Requested EC contribution		0,00			10 000,00				**10 000,00**	
TOTAL				Eligible costs										
				Requested EC contribution										

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Proposal Number	506395	Proposal Acronym	CARE

Financial information – "Reporting period 5"

Partici-pant n°	Organi-sation short name	Cost model used: For transnational Access	Cost model used: For any other activities	Estimated eligible costs and requested EC contribution (first 18 months of the project)		Costs and EC contribution per type of activities: RTD activities (1)	Demonstration activities (2)	Consortium Management activities (3)	Other specific activities: Coordination/Networking (4)	Other specific activities: Transnational access (5)	Other specific activities: Connectivity (6)	Other specific activities: Other including Specific Service Activities for CND (7)	Total (8)= (1)+(2)+(3)+(4)+(5)+(6)+(7)	Total receipts
17	CERN		AC	Eligible costs	*Direct costs (a)*	600 000,00			70 000,00				670 000,00	
					of which subcontracting	0,00			0,00				0,00	
					Indirect costs (b)	120 000,00			14 000,00				134 000,00	
					Total eligible costs (a)+(b)	720 000,00			84 000,00				804 000,00	
				Requested EC contribution		0,00			40 000,00				**40 000,00**	
18	UNI-GE		AC	Eligible costs	*Direct costs (a)*	0,00			22 000,00				22 000,00	
					of which subcontracting	0,00			0,00				0,00	
					Indirect costs (b)	0,00			4 400,00				4 400,00	
					Total eligible costs (a)+(b)	0,00			26 400,00				26 400,00	
				Requested EC contribution		(0,00)*			(26 400)*				**(26 400,00)***	
19	PSI		FC	Eligible costs	*Direct costs (a)*	0,00			8 220,00				8 220,00	
					of which subcontracting	0,00			0,00				0,00	
					Indirect costs (b)	0,00			0,00				0,00	
					Total eligible costs (a)+(b)	0,00			8 220,00				8 220,00	
				Requested EC contribution		0,00			(8 220)*				**(8 220,00)***	
20	STFC		FC	Eligible costs	*Direct costs (a)*	130 000,00			12 000,00				142 000,00	
					of which subcontracting	0,00			0,00				0,00	
					Indirect costs (b)	0,00			0,00				0,00	
					Total eligible costs (a)+(b)	130 000,00			12 000,00				142 000,00	
				Requested EC contribution		35 000,00			8 000,00				**43 000,00**	
TOTAL				Eligible costs										
				Requested EC contribution										

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Proposal Number	506395	Proposal Acronym	CARE

Financial information – "Reporting period 5"

Partici-pant n°	Organi-sation short name	Cost model used: For transnational Access	Cost model used: For any other activities	Estimated eligible costs and requested EC contribution (first 18 months of the project)		Costs and EC contribution per type of activities: RTD activities (1)	Demonstration activities (2)	Consortium Management activities (3)	Other specific activities: Coordination/Networking (4)	Other specific activities: Transnational access (5)	Other specific activities: Connectivity (6)	Other specific activities: Other including Specific Service Activities for CND (7)	Total (8)= (1)+(2)+(3)+(4)+(5)+(6)+(7)	Total receipts
21	ICL		AC	Eligible costs	*Direct costs (a)*	0,00			10 000,00				10 000,00	
					of which subcontracting	0,00			0,00				0,00	
					Indirect costs (b)	0,00			2 000,00				2 000,00	
					Total eligible costs (a)+(b)	0,00			12 000,00				12 000,00	
				Requested EC contribution		0,00			12 000,00				**12 000,00**	
22	UMA		AC	Eligible costs	*Direct costs (a)*	0,00			10 000,00				10 000,00	
					of which subcontracting	0,00			0,00				0,00	
					Indirect costs (b)	0,00			2 000,00				2 000,00	
					Total eligible costs (a)+(b)	0,00			12 000,00				12 000,00	
				Requested EC contribution		0,00			12 000,00				**12 000,00**	
TOTAL				Eligible costs		**3 434 800,00**		**295 000,00**	**292 300,00**				**4 022 100,00**	
				Requested EC contribution		**911 000,00 (0,00)***		**20 000,00**	**248 800,00 (34 620)***				**536 167,36 (34 620)***	

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**Since the contract with EU has been signed in 2003 and the agreement on Swiss participation in the 6th FP wasl not yet in force , Swiss Partners should be funded by the Swiss Government)*