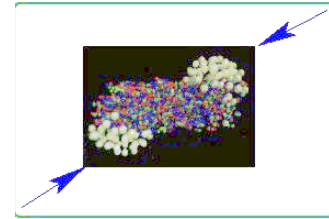




High Energy
High Intensity
Hadron Beams



CARE-HHH Network: First Quarterly Report 2007

W. Scandale and F. Zimmermann, 15 May 2007

In the first four months of 2007, efforts on developing high-performance interaction regions (IRs) for the LHC upgrade and associated contacts with the LHC experiments have greatly intensified. These efforts were paralleled by progress on the design of a new higher-energy injector storage ring “PS2” which is meant to replace the venerable CERN PS, and by the creation of a new study team for the SPS upgrade. A new activity in the AMT work package studied the design of pulsed superferric magnets. In addition, s.c. and n.c. options were compared for the fast cycling PS2. Early in 2007, a new bunch pattern for the upgraded LHC was conceived which would be transparent for the two main experiments LHC and ATLAS while, by means of additional dedicated satellite bunches, delivering the target luminosity to an upgraded Super-LHCb detector. Various types of luminosity levelling for the high-luminosity experiments were also explored as interesting options for several of the proposed upgrade scenarios. Studies of heat load and energy deposition in the interaction region were strongly pursued for different interaction-region (IR) layouts by three groups of experts, including visitor exchanges in Europe and with the US. In response to a recent proposal for an LHC “phase-I” upgrade, foreseen already around 2012, detailed investigations of dynamic aperture, correction schemes, and beam-beam performance were launched for several IR options based on Nb-Ti magnets. Early in March, an APD mini-workshop on electron-cloud suppression was held at CERN, with considerable involvement from German industry. At this workshop three novel countermeasures against electron build up were proposed and discussed. Organized in March as well was a workshop on crystal challenging for large colliders, in which the 2007 crystal experiments at the CERN SPS and applications of crystals for an LHC collimator upgrade were the key topics. In April discussions were launched with INFN Frascati on the possible implementation of crab-waist collisions for the upgraded LHC. Concrete plans have been established for completing the AMT superconductor database by late summer, and for finalizing a structured list of intensity limitations in the LHC injector complex. The 4th ABI topical workshop on beam-position monitors was a success, and proceedings are close to completion. Preparation has started for several HHH workshops and meetings to be held in fall 2007. Throughout this period, dissemination activities retained a high priority. Short-term exchanges of scientific staff between European laboratories participating in HHH are being planned, in order to reinforce synergies within the network.

Overall CARE-HHH Network Activities in the First Quarter 2007

- 21 November: F. Zimmermann and W. Scandale presented “[Accelerators Options for the LHC Luminosity Upgrade: Status after LUMI06](#),” in a joint meeting of the Proton Accelerators for the Future (PAF) and the Physics Opportunities at Future Proton Accelerators (POFPA Meeting) working groups, with about 30 participants at CERN. The presentation focused on upgrade beam parameters and integrated luminosity.
- 28 November: W. Scandale presented results from the “[H8-RD22 Experiment to test Crystal Collimation for the LHC](#),” at an INFN CSN1 Meeting in Frascati.

- 30 November -1 December: The 4th CARE-HHH-ABI workshop on [Simulation of BPM Front-End Electronics and Special Mechanical Designs](#), was held in Lüneburg, Germany. The 27 participants were distributed as follows: 6 CERN, 7 DESY, 5 GSI, 1 CEA, 2 RAL, 2 Globes Electronics, 3 Kyocera, 1 FNAL. The workshop treated the following topics: BPM sensors, BPM electronics, cold BPMs. The workshop proceedings were published as CARE-Conf-06-087-HHH.
- January – April 2007: A new activity in HHH-AMT named “OSOM” studied the design of 2-T pulsed superferric magnets as a follow-up of the ECOMAG workshop; the cable and coil in the iron were configured to minimize losses; a conceptual design that dissipates less than 10 W/m in the superconducting coil, and uses a warm iron (i.e. negligible loss power) was established; two variants are wide iron and a compact version with correction coil, both suitable for a PS upgrade. Other options were also examined, such as transmission-line magnets using large current (typically 100 kA), and open gap magnets; these options were discarded because of practical issues (bending radius, magnet size); a summary report will be published within next few weeks. Also ongoing is a comparison of s.c. and n.c. options for the fast cycling “PS2”.
- 5 January 2007: F. Zimmermann presented the “[LHC Status, Commissioning and Upgrade](#),” to an audience of about 25 experts at the Accelerator Seminar of KEK, Tsukuba, Japan.
- 11 January 2007: F. Zimmermann discussed “[LHC Upgrade Plan and Ideas - Scenarios and Constraints from the Machine Side](#),” in an invited talk at the [1st LHCb Collaboration Upgrade Workshop](#), Edinburgh, UK, with about 150 particle physicists.
- 18 January 2007: W. Scandale and F. Zimmermann presented “[Baseline Scenarios for the LHC Luminosity Upgrade](#)”, a summary of the CARE-HHH [LHC-LUMI-06](#) workshop ([Interaction Region + Beam Parameters](#) and [Intensity Limitations + Injector Upgrade](#)), at a Joint AB & LHC Project Seminar, CERN, attended by close to 100 accelerator physicists.
- 30 January 2007: At a CERN Magnet Seminar J.-P. Koutchouk described “[A Strongly Focused High-Luminosity Insertion for the LHC Upgrade](#),” to about 50 specialists.
- 13 February 2007: F. Zimmermann and W. Scandale, discussed “[Two Scenarios for the LHC Luminosity Upgrade](#)” (pdf), in a joint meeting of the Proton Accelerators for the Future (PAF) and the Physics Opportunities at Future Proton Accelerators (POFPA Meeting) working groups, with about 30 participants at CERN.
- 1-2 March; The joint CARE-ELAN, EUROTeV and [CARE-HHH mini-Workshop on E-Cloud Cloud Clearing \(ECL2\)](#), was held at CERN, Geneva. This workshop addressed all methods for suppressing the electron build up. It was attended by 35 participants from 16 institutions in Europe, Asia, and America, including 3 representatives from the German industry, or in detail: 16 CERN (4 AB/ABP, 1 AB/OP, 7 AB/RF, 2 AT-VAC, 2 TS), 3 German enamel industry (Eisenwerke Dueker, Wendel Email), 4 US (BNL, Cornell, LBNL & SLAC), 1 KEK, others from European institutes (Astec, LNF, DESY, ANKA, U. Rostock, CELLS, U. Sannio, ESRF). Topics treated were: 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 electrete inserts. The organizers dedicated the workshop to the memory of Francesco Ruggiero (1957-2007), who had been instrumental in setting up and directing the electron cloud research program at CERN.
- 15 March 2007: W. Scandale reviewed results of the “[H8-RD22 Experiment to Test Crystal Collimation for the LHC](#),” in an LHC Seminar, in front of about 50 experts.

- 19 March: W. Scandale and F. Zimmermann discussed LHC “[Upgrade Scenarios](#),” in an invited presentation for the common ATLAS & CMS Electronics Workshop at CERN, with about 230 participants.
- 21 March: F. Zimmermann presented “[Possible Solutions for the Electron Cloud Problem](#),” – the outcome of the HHH ECL2 workshop – at the first SPS Upgrade Meeting, held in CERN with about 15 participants.
- 22-23 March: The [CARE-HHH mini-Workshop on Crystal Channeling for Large Colliders: Machine and Physics Applications \(CC-2007\)](#), was held at CERN. The workshop was attended by 45 participants, from INFN Genova, U. Ferrara, INFN Legnaro, PNPI Gatchina, IHEP Protvino, FNAL, JINR Dubna, INFN Frascati, INFN Roma, U. Manchester, and U. Texas. The workshop was co-sponsored by INTAS. Topics:
 - critical review of experimental results
 - crystal production technologies
 - application of bent crystals to LHC collimation system
 - assessment of new crystals through experiments at SPS and Tevatron use of crystals for diffractive physics

For 2007, seven weeks of SPS runs are allocated to the collaboration. 2007 goals:

- test multi-strip crystals
- check the effect on ions
- verify their fragmentation and e.-m. dissociation inside the crystal,
- test the effectiveness of crystal collimation for ILC

Support comes from CARE-HHH, INTAS-CERN, INFN-NTA, Russian Foundation for Basic Research, CERN AB and AT Departments

- 30 March: E. Todesco presented “[Parametric Studies for a Phase-One LHC Upgrade Based on Nb-Ti](#),” at a CERN Magnet Seminar to an audience of about 50 specialists.
- 30 March: W. Scandale and F. Zimmermann attended a discussion meeting on crab-waist collisions for high-luminosity e⁺/e⁻ factories and for the LHC upgrade, which was held in Frascati. About 20 accelerator physicists and particle physicists participated in this event, which also discussed the preparation and submission of a crab-waist proposal for FP7.
- 10 April: W. Scandale and F. Zimmermann prepared a presentation on “[Two Scenarios for the LHC Luminosity Upgrade](#),” for a special PAF meeting with the LHC Project Leader Lyn Evans and about six other expert participants.
- 13 April: R. Aleksan presented slides for the “[HHH-Network Mid-Term Review: 2004-2006/07 Achievements and Status](#),” in Brussels, which were prepared by W. Scandale and F. Zimmermann.
- 17 April: F. Zimmermann delivered a presentation “[News from HHH](#)” (the 1st Quarterly Status Report 2007), at the CARE Steering and Dissemination Board Meeting, in LPNHE, Paris.
- 18-20 April: O. Bruning, J.-P. Koutchouk, L. Rossi, and H. Schmickler attended the US-LARP collaboration meeting at FNAL. The workshop goals were to identify and attempt to resolve current challenges and difficulties, to entertain and discuss new task proposals, to agree on the technical and financial planning for FY08 (and FY09), and most importantly to discuss potential U.S. contributions to a "full upgrade" of the IRs in about 2015 and LARP R&D strategy in support. The total number of participants was 77.
- 30 April: W. Scandale discussed the “[H8-RD22 Experiment: Progress on Ion Beam Focusing with Bent Crystals](#),” for an audience of about 30 particle physicists at an ALICE Seminar in CERN.

Planning of Future CARE-HHH Workshops in 2007

- 1-5 October: **CARE-HHH-APD** event **BEAM'07**, at CERN, comprising:
 - mini-workshop on **LHC Injectors Upgrade & FAIR**. Topics: PS2, SPS enhancements, GSI upgrades
 - mini-workshop on **LHC Beam Parameters Upgrade**. Topics: beam parameters and upgrade scenarios; e.g. bunch spacing, operation with large Piwinski angle, luminosity performance
 - **Francesco Ruggiero Memorial Symposium** (3 October) Tentative speakers: include S. Berg, C. Biscari, O. Bruning, W. Chou, M. Furman, K. Hirata, A. Mostacci, L. Palumbo, C. Petit-Jean-Genaz, S. Petracca, E. Picasso, W. Scandale, J. Thomashausen, and F. Zimmermann
- September or October: **CARE-HHH-APD CERN-GSI** bi-lateral working meeting on **Collective Effects–Coordination of Theory and Experiments**, CERN, Geneva, Switzerland.
- 7-9 November: **CARE-HHH-APD** workshop on **LHC IR Upgrade (LUMI'07)**, INFN Frascati, Italy. Topics:
 - new low-beta quadrupoles, detector-integrated dipoles and quadrupoles, crab cavities, wire compensation, experience with new DAFNE IR
- 19-20 November: **CARE-HHH-AMT** workshop on **Heat Generation and Heat Transfer in Superconducting Magnets (THERMOMAG'07)**, Paris, 2 days. Topics:
 - minimize and evacuate the heat in the next generation of superconducting magnets for high intensity particle accelerators, such as the IR magnet for the LHC luminosity upgrade and the fast cycling magnets for FAIR and for the LHC injector chain upgrade
 - 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; identify a common set of thermal design criteria
- December 2007: **CARE-HHH-ABI** annual workshop on **Tools for Diagnostic Systems at High-Intensity (Pre-) Accelerators; Emittance Preservation and Measurements in the Accelerator Chain**, GSI, Germany

Dissemination and outreach:

- **presentations** on LHC upgrade scenarios at **2 LHC-detector upgrade workshops (LHCb and ATLAS&CMS)**, at **3 CERN & INFN management meetings**, and **4 departmental/project/experimental seminars**
- **3 HHH workshop proceedings close to completion**
- **2 articles published in the CERN Courier:** LUMI'06 takes strides towards LHC upgrade (vol. 47, issue 2), obituary for Francesco Ruggiero (vol. 47, issue 2); **1 article published in Physical Review Letters:** High-Efficiency Volume Reflection of an Ultrarelativistic Proton Beam with a Bent Silicon Crystal, PRL 98, 154801 (2007)
- **HHH web sites** maintained & developed

Exchanges and education:

- several Russian, 2 US, and 1 EU accelerator physicist plus 3 representatives of European industry supported for HHH workshops

- 1 EU scientist (F. Broggi / Milan) supported for a 2-week visit to CERN for studies related to heat deposition in the low-beta region
- W. Scandale visited FNAL for 1 week to participate in a Tevatron crystal experiment
- **5 doctoral students**; 1 doctoral student, E. Laface, visited FNAL & BNL for 1 week to coordinate work on s.c. database; another doctoral student, R. De Maria visited FNAL for 1 month in February-March to work on heat deposition in the low-beta region for NbTi “low-gradient” IR optics solutions; it is planned that two other graduate students (U. Dorda, G. Sterbini) will participate in RHIC beam-beam compensation experiments for two weeks in June, as part the HHH/US-LARP collaboration
- **recruited for summer 2007: 3 EU summer students**

Deliverables and milestones:

The web based database for s.c. cables and magnets (SDB) is about 40% complete. The database structure is fully operational, and so are the web interfaces. In January'07 a collaboration was established with FNAL and BNL on magnet & cable data sharing. The main work left to do is the creation of automatic tools which import data from existing databases, e.g., for LHC, Tevatron and RHIC, to the SDB core. This last task will be finalized with the help of two summer students in 2007. The web reference for IR optics is up to date. Development of various booster synchrotron optics is ongoing. A final choice of optics is delayed to 2007. The structured list of intensity limits is nearing completion. One summer student will contribute to this task. Scaling laws for magnet and cryogenic cost will be completed in 2007.

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).

Table 1: Overview of meetings, workshops and events (co-)organized by the HHH Network or with HHH contributions in 2007 through April.

HHH Activity 2007	January	February	March	April
Activity yearly and/or steering meeting				17 Talk LPNHE Paris
Meeting/Workshop WP1 AMT	30 Talk AT/MCS CERN		30 Talk AT/MCS CERN	
Meeting/Workshop WP2 ABI				
Meeting/Workshop WP3 APD			22–23 mini- workshop crystal channelling “CC-2007”., CERN (CH);	
Joint workshop with other CARE activities			1-2 mini- workshop on electron cloud clearing “ECL2” , CERN	
Working groups				
SPS Upgrade			21 Talk CERN	
PAF/POFPA		13 Invited Talk CERN		10 Presentation CERN
Conferences & workshops				
LHCb Upgrade	11 Invited Talk Edinburgh			
ATLAS & CMS Electronics			19 Invited Talk CERN	
Collaboration Meetings			30 Crab-Waist Collaboration Meeting Frascati	
US-LARP Meeting				18-20 Collaboration Meeting FNAL
Dissemination				
Seminars	5 Talk : KEK; 18 Talk :AB&LHC CERN		15 Talk LHC CERN	30 Talk ALICE CERN

Table 2: List of meetings, workshops and events (co-)organized by the HHH Network or with HHH contributions in 2007 through April.

Date	Title/subject	location	Main organizer	Number of participants	Comments and Web site
5 Jan	KEK Accelerator Seminar	KEK (J)	KEK	25	LHC Status, Commissioning and Upgrade, http://care-hhh.web.cern.ch/CARE-HHH/Literature/LHC-KEK-Seminar-January2007.ppt
11 Jan	LHCb Upgrade	Edinburgh (UK)	LHCb Collaboration	150	LHC Upgrade Plan and Ideas - Scenarios and Constraints from the Machine Side, http://care-hhh.web.cern.ch/CARE-HHH/Literature/LHC_upgrade_plan_and_ideas_-_Zimmermann.pdf
18 Jan	Joint AB & LHC Seminar	CERN (CH)	AB and AT seminar-coordinators	100	Baseline Scenarios for the LHC Luminosity Upgrade , a summary of the CARE-HHH LHC-LUMI-06 workshop (Interaction Region + Beam Parameters and Intensity Limitations + Injector Upgrade)
30 Jan	AT/MCS Seminar	CERN (CH)	AT-MCS Seminar coordinator	50	A Strongly Focused High-Luminosity Insertion for the LHC Upgrade, http://care-hhh.web.cern.ch/CARE-HHH/Literature/MCS-seminar-JPK.pdf
13 Feb	PAF/POFPA Meeting	CERN (CH)	PAF and POFPA WG Leaders	30	Two Scenarios for the LHC Luminosity Upgrade, http://care-hhh.web.cern.ch/CARE-HHH/Literature/PAFPOFPA_13.02.2007_-_Two_Scenarios_for_the_LHC_Luminosity_Upgrade_-_Zimmermann_&_Scandale.ppt
1-2 Mar	HHH-APD mini-workshop ECL2	CERN (CH)	HHH-APD coordinators plus workshop committee	35	CARE-HHH mini-Workshop on E-Cloud Cloud Clearing (ECL2), http://care-hhh.web.cern.ch/CARE-HHH/ECL2/default.html
15 Mar	LHC Seminar	CERN (CH)	AT seminar coordinator	50	H8-RD22 Experiment to Test Crystal Collimation for the LHC, http://care-hhh.web.cern.ch/CARE-HHH/Literature/07-03-16Scandale_crystal.pdf
19 Mar	ATLAS & CMS Electronics Workshop	CERN (CH)	ATLAS & CMS workshop organizers	230	LHC Upgrade Scenarios, http://care-hhh.web.cern.ch/CARE-HHH/Literature/Scenarios_WS.ppt
21 Mar	SPS Upgrade Meeting	CERN (CH)	SPSU Leader	15	Possible Solutions for the Electron Cloud Problem, http://care-hhh.web.cern.ch/CARE-HHH/Literature/SPS-Chamber-Upgrade-March21-FrankZimmermann.ppt
22-23 Mar	HHH-APD mini-workshop CC-2007	CERN (CH)	HHH-APD coordinators plus workshop committee	45	CARE-HHH mini-Workshop on Crystal Channeling for Large Colliders: Machine and Physics Applications (CC-2007) , http://care-hhh.web.cern.ch/CARE-HHH/CrystalCollimation2007/default.html
30 Mar	AT/MCS Seminar	CERN (CH)	AT-MCS Seminar coordinator	50	Parametric Studies for a Phase-One LHC Upgrade Based on Nb-Ti, http://care-hhh.web.cern.ch/CARE-HHH/Literature/et_nbti_0307.ppt
30 Mar	Meeting on Crab-Waist Collisions	INFN-LNF (I)	INFN Frascati	20	Crab-waist collisions for high-luminosity e+/e-factories and for the LHC upgrade, which was held in Frascati; preparation and submission of a crab-waist proposal for FP7

10 Apr	Special PAF Meeting	CERN (CH)	PAF WG Leader	8	Two Scenarios for the LHC Luminosity Upgrade, http://care-hhh.web.cern.ch/CARE-HHH/Literature/PAF_10.04.2007 - Two Scenarios for the LHC Luminosity Upgrade - Zimmermann & Scandale.ppt
17 Apr	CARE Steering and Dissemination Board	LPNHE (F)	CARE Steering Board	10	News from HHH – 1 st Quarterly Status Report , http://care-hhh.web.cern.ch/CARE-HHH/Literature/CARE-HHH-April-2007-HHH-FZ-short.ppt
18-20 Apr	US-LARP Meeting	FNAL (USA)	LARP Coordinators	77	LARP Collaboration Meeting April 2007, http://larp.fnal.gov/Apr07Collaboration/ , Presentation 'The CERN View on Accelerator Physics R&D' (O. Bruning)
30 Apr	ALICE Seminar	CERN (CH)	ALICE Seminar Organizer	30	H8-RD22 Experiment: Progress on Ion Beam Focusing with Bent Crystals, http://care-hhh.web.cern.ch/CARE-HHH/Literature/07-04-30ALICE_crystal.ppt

Table 3: List of talks to workshops and conferences made by HHH members and which are about (or include) activities carried within HHH

#	Subject	Speaker/Lab	Event	Date	Talk Web site	CARE-Conf
1	LHC Status, Commissioning and Upgrade	F. Zimmermann / CERN	KEK Accelerator Seminar	05/01/2007	http://care-hhh.web.cern.ch/CARE-HHH/Literature/LHC-KEK-Seminar-January2007.ppt	
2	LHC Upgrade Plan and Ideas - Scenarios and Constraints from the Machine Side	F. Zimmermann / CERN	1 st LHCb Upgrade Collaboration Meeting	11/01/2007	http://care-hhh.web.cern.ch/CARE-HHH/Literature/LHC upgrade plan and ideas - Zimmermann.pdf	
3	Baseline Scenarios for the LHC Luminosity Upgrade, Summary of LUMI'06	W. Scandale, F. Zimmermann / CERN	Joint AB & LHC Seminar	18/01/2007	http://care-hhh.web.cern.ch/CARE-HHH/Literature/AB-Seminar-LUMI06-18January2007-Scandale-Zimmermann.ppt and http://care-hhh.web.cern.ch/CARE-HHH/Literature/07-01-18 LUMI06-Scandale-Zimmermann.ppt	
4	A Strongly Focused High-Luminosity Insertion for the LHC Upgrade	J.-P. Koutchouk /CERN	CERN AT-MCS Seminar	30/01/2007	http://care-hhh.web.cern.ch/CARE-HHH/Literature/MCS-seminar-JPK.pdf	
5	Two Scenarios for the LHC Luminosity Upgrade	F. Zimmermann / CERN	PAF/POFPA MEeting	13/02/2007	http://care-hhh.web.cern.ch/CARE-HHH/Literature/PAFPOFPA 13.02.2007 - Two Scenarios for the LHC Luminosity Upgrade - Zimmermann & Scandale.ppt	
6	Motivation & Workshop Organization, E-Cloud Instability in the SPS and SPS+, Impedance of Clearing Electrodes	F. Caspers, T. Kroyer, G. Rumolo, F. Zimmermann / CERN	HHH-APD mini-workshop ECL2	01/03/2007	http://indico.cern.ch/conferenceOtherViews.py?view=standard&confId=11937	
7	H8-RD22 Experiment to Test Crystal Collimation for the LHC	W. Scandale / CERN	LHC Seminar	15/03/2007	http://care-hhh.web.cern.ch/CARE-HHH/Literature/07-03-16Scandale_crystal.pdf	
8	LHC Upgrade Scenarios	W. Scandale / CERN	ATLAS & CMS Electronics Workshop	19/03/2006	http://care-hhh.web.cern.ch/CARE-HHH/Literature/Scenarios_WS.ppt	
9	Possible Solutions for the Electron Cloud Problem	F. Zimmermann / CERN	SPS Upgrade Meeting	21/03/2007	http://care-hhh.web.cern.ch/CARE-HHH/Literature/SPS-Chamber-Upgrade-March21-FrankZimmermann.ppt	
10	Meeting Scope and Role of F. Ruggiero, Main Outcomes of H8 Runs in 2006, Possible Implementation of	V. Previtoli, W. Scandale, F. Zimmermann / CERN	HHH-APD mini-workshop CC-2007	22/03/2007	http://indico.cern.ch/conferenceOtherViews.py?view=standard&confId=12959	

	Crystals on LHC Collimation System					
11	Parametric Studies for a Phase-One LHC Upgrade Based on Nb-Ti	E. Todesco / CERN	CERN AT-MCS Seminar	30/03/2007	http://care-hhh.web.cern.ch/CARE-HHH/Literature/et_nbti_0307.ppt	
12	Two Scenarios for the LHC Luminosity Upgrade	F. Zimmermann / CERN	Special PAF Meeting	29/06/2006 , 10/04/2007	http://care-hhh.web.cern.ch/CARE-HHH/Literature/PAF_10.04.2007 - Two Scenarios for the LHC Luminosity Upgrade - Zimmermann & Scandale.ppt	
13	News from HHH – 1st Quarterly Status Report	F. Zimmermann / CERN	CARE Steering and Dissemination Board Meeting	17/04/2007	http://care-hhh.web.cern.ch/CARE-HHH/Literature/CARE-HHH-April-2007-HHH-FZ-short.ppt	
14	The CERN View on Accelerator Physics R&D	O. Bruning /CERN	US-LARP Collaboration Meeting	18/04/2007	http://larp.fnal.gov/Apr07Collaboration/	
15	H8-RD22 Experiment: Progress on Ion Beam Focusing with Bent Crystals,	W. Scandale / CERN	ALICE Seminar	30/04/2007	http://care-hhh.web.cern.ch/CARE-HHH/Literature/07-04-30ALICE_crystal.ppt	

Table 4: List of documents issued by HHH participants in 2007 through April

#	CARE document type and number	Title	Authors and Labs	Date
1	CARE-Report-07-008-HHH	Annual Report 2006 of the CARE-HHH Network	Editors W. Scandale, F. Zimmermann	December 2006
2	CARE-Conf-07-008-HHH	Proceedings of the HHH-APD LHC-LUMI-06 Workshop	Editors W. Scandale, T. Taylor, F. Zimmermann / CERN	April 2007
3	CARE-pub-07-001	High-Efficiency Volume Reflection of an Ultrarelativistic Proton Beam with a Bent Silicon Crystal, Phys. Rev. Lett. 98, 154801	W. Scandale / CERN, et al	April 2007
4	CARE-Note-2007-006-HHH	A Solution for Phase-One Upgrade of the LHC Low-Beta Quadrupoles Based on Nb-Ti,	E. Todesco, J.-P. Koutchouk, L. Rossi./ CERN	April 2007
5	CARE-Note-2007-007-HHH	Low Gradient, Large Aperture IR Upgrade Options for the LHC Compatible with Nb-Ti Magnet Technology	O. Brüning, R. De Maria, R. Ostojic / CERN	April 2007

Table 5: Temporary staff hiring

#	Lab	Job Type	Duration	Work subject	Status
1	CERN	PhD student	3 y (part time)	Database for superconducting cables and magnets	CERN doctoral student

Table 6: Status of the lowest Sub tasks level in the WP which are supposed to have started according to the MS project breakdown

WBS #	Title	Original begin date (Annex 1)	Original end date (Annex1)	Estimated Status	Revised end date
General	MS: annual HHH meeting	T1-2007	T4-2007	0%	On time: T4-2007
	HHH coordination meeting (ID)	T4-2007	T4-2007	0 %	On time: T4-2007
WP1-AMT	Coordinate conductor development and tests	T4-2005	T2-2007	85 %	Delayed to: T2-2007
	Web based database for SC Cables and Magnets	T3-2004	T4-2006	40 %	Delayed to T3-2007
	Catalogue of numerical codes for AMT1 and AMT4	T1-2004	T4-2005	55 %	Delayed to T4-2007
	Comparison of codes for AMT1 and AMT4	T1-2004	T2-2004	70 %	Delayed to T4-2007
	Identifications of main limiting issues	T2-2004	T4-2004	60 %	Delayed to T4-2007
	Comparison of different IR options (AMT4) and steering of LARP magnet developments	T4-2005	T2-2007	75%	Delayed to: T2-2007
	MS: AMT workshop on Coil Insulation and Impregnation Techniques (THERMOMAG)	T3-2007	T4-2007	0%	On time: T4-2007
	Studies of pulsed SC magnets for GSI and LHC injectors	T4-2005	T2-2007	70%	Delayed to: T4-2008
	Comparative studies of alternatives using low field magnets for AMT2 and AMT3	T3-2004	T4-2004	90 %	Delayed to T2-2007
	Determination of scaling law for magnets and cryogenic cost for AMT5	T4-2004	T2-2006	30 %	Delayed to T1-2008
	MS: preliminary report on scaling law for magnets and cryogenic cost for AMT5	T2-2006	T2-2006	0%	Delayed to: T1-2008
	ID: Interim report on AMT activities ad reporting at general CARE meeting	T4-2007	T4-2007	0%	On time: T4-2007
WP2-ABI	Definition of possible new milestones	T4-2006	T1-2007	100 %	On time: T1-2007
	ID: proceedings of the fourth ABI workshop	T4-2006	T1-2007	90 %	Delayed to T2-2007
	Contribution to beam measurements and preparation for LHC commissioning	T1-2007	T2-2007	70%	On time: T2-2007
WP3-APD	MS: 5th APD mini-workshop on Crystal	T1-2007	T1-2007	100%	On time: T1-2007

	Channelling and Collimation				
	ID: Proceedings of the 3rd APD topical workshop (LUMI-06)	T1-2007	T2-2007	100%	On time: T2-2007
	Further development of the APD Web Site: maintain beam dynamics codes repository	T1-2007	T2-2007	90%	On time: T2-2007
	Compare and further document benchmarked codes and alternative IR optics	T1-2007	T2-2007	90 %	On time: T2-2007
	MS: Creation of a web reference for alternative synchrotron optics	T2-2006	T2-2006	0 %	Delayed to T4-2007
	Assessment of alternative optics designs for booster synchrotrons	T4-2005	T3-2006	30 %	Delayed to T4-2007
	Assessment of impedance budget for booster synchrotrons	T4-2005	T3-2006	10 %	Delayed to T2-2008
	ID: First structured list of intensity limits for booster synchrotrons and LHC	T2-2006	T2-2006	50 %	Delayed to T3-2007
	Definition of possible new milestones	T4-2006	T1-2007	100%	On time: T1-2007
	MS: APD mini-workshop on technological solutions for electron cloud	T1-2007	T1-2007	100%	On time: T1-2007
	MS: CERN-GSI working meeting on collective effects in high-intensity beams	T2-2007	T4-2007	0%	Delayed to T4-2007
	MS: APD mini-workshop on LHC beam performance upgrade	T4-2007	T4-2007	0%	On time: T4-2007
	MS: APD mini-workshop on LHC injector upgrade	T4-2007	T4-2007	0%	On time: T4-2007
	MS: APS mini-workshop on LHC IR upgrade	T4-2007	T4-2007	0%	On time: T4-2007
	Possible SPS tests on crystal collimation	T3-2006	T4-2007	40%	On time: T4-2007
	Preparation of beam measurements for SPS+LARP high intensity tests and LHC commissioning	T2-2006	T2-2007	80%	On time: T2-2007

Table 7: Status with respect to the interim reports and deliverables to be done in 2007 according to the MS project breakdown

WBS #	Title	Due date	Status	Revised delivery date	
General					
10	MS: annual HHH meeting	T4-2007	0%	T4-2007	
WP1-AMT					
24	MS: AMT workshop on Coil Insulation and Impregnation Techniques (THERMOMAG)	T4-2007	0%	T4-2007	
31	MS: preliminary report on scaling law for magnets and cryogenic cost for AMT5	T2-2006	0%	T1-2008	
32	ID: Interim report on AMT activities and reporting at the general CARE meeting	T4-2007	0%	T4-2007	
WP2-ABI					
41	ID: Proceedings of the 4th ABI topical workshop	T1-2007	90 %	T2-2007	
45	ID: Interim report on ABI activities and reporting at the general CARE meeting	T4-2007	0%	T4-2007	
W3-APD					
51	MS: 5th APD mini-workshop on Crystal Channeling and Collimation	T1-2007	100 %	T1-2007	
56	MS: Creation of a web reference for alternative synchrotron optics	T2-2006	0 %	T4-2007	
60	ID: First structured list of intensity limits for booster synchrotrons and LHC	T2-2006	50 %	T3-2007	
65	ID: Proceedings of the 3rd APD topical workshop (LUMI-06)	T2-2007	100%	T2-2007	
68	MS: APD mini-workshop on technological solutions for electron cloud	T1-2007	100%	T1-2007	
69	MS: CERN-GSI working meeting on collective effects in high-intensity beams	T2-2007	0%	T4-2007	
70	MS: APD mini-workshop on LHC beam performance upgrade	T4-2007	0%	T4-2007	
71	MS: APD mini-workshop on LHC injector upgrade	T4-2007	0%	T4-2007	0

72	MS: APS mini-workshop on LHC IR upgrade	T4-2007	0%	T4-2007
76	ID: Interim report on APD activities and reporting at the general CARE meeting	T4-2007	0%	T4-2007

NOTE: The development of the web-based database for SC cables and magnets (SDB) was delayed due to unavailability of budget to hire a dedicated fellow in T2-2005 and later due to difficulties in recruiting an adequate candidate. Now the database structure and the web interfaces are complete. The main outstanding work is the creation of automatic tools which import data from existing databases, e.g., for LHC, Tevatron and RHIC, to the SDB core. This will be completed with the help of two summer students in 2007.

Table 8 Gantt table of the HHH Network for the next 18 months – AMT and ABI

ID	Task Name	% Complete	2007				2008	
			Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2
1	N3: HHH Networking Activities	66%						
2	All Work Packages	66%						
3	Network coordination, dissemination, and outreach	99%						
10	MS: Annual HHH meeting	0%						
11	WP1 Accelerator Magnets & Technology (AMT)	67%						
14	Coordinate conductor development and tests	85%						
16	Development of Web based database for SC Cables and Magnets	75%						
20	Codes and models for design, stability and protection studies for AMT1 and AMT4	55%						
23	Comparison of different IR options (AMT4) and steering of LARP magnet developments	70%						
24	MS: AMT workshop on Coil Insulation & Impregnation Techniques (THERMOMAG)	0%						
25	Studies of pulsed SC magnets for GSI and LHC injectors	70%						
28	Comparative studies of alternatives using low field magnets for AMT2 and AMT3	90%						
30	Determination of scaling law for magnet and cryogenic cost for AMT5	30%						
31	MS: Preliminary report on scaling law for magnet and cryogenic cost (roadmap)	0%						
32	ID: Interim report on AMT activities and reporting at the general CARE meeting	0%						
33	WP2 Accelerator Beam Instrumentation (ABI)	95%						
41	ID: Proceedings of the 4th ABI topical workshop	90%						
43	Definition of possible new milestones	100%						
44	Contribution to beam measurements and preparation for LHC commissioning	70%						
45	ID: Interim report on ABI activities and reporting at the general CARE meeting	0%						

Table 9 Gantt table of the HHH Network for the next 18 months – APD

ID	Task Name	% Complete	2007				2008			
			Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2		
46	WP3 Accelerator Physics and Synchrotron Design (APD)	59%								
51	MS: 5th APD mini-workshop on Crystal Collimation	100%	◆ APD MS							
53	Further development of the APD Web Site: maintain beam dynamics codes repository	90%								
54	Compare and further document benchmarked codes and alternative IR optics	90%								
56	MS: Creation of a web reference for synchrotron optics	0%	◆ APD MS							
58	Assessment of alternative optics designs for booster synchrotrons	30%								
59	Assessment of impedance budget for booster synchrotrons	9%								
60	<i>ID: First structured list of intensity limits for booster synchrotrons and LHC</i>	50%	◆ APD ID							
65	<i>ID: Proceedings of the 3rd APD topical workshop (LUMI-06)</i>	100%	◆ APD ID							
67	Definition of possible new milestones	100%								
68	MS: APD Mini-Workshop on Technological Solutions for E-Cloud	100%	◆ APD MS							
69	MS: CARE-APD CERN-GSI Working Meeting on Collective Effects in HI Beams	0%	◆ APD MS							
70	MS: CARE-APD Mini-Workshop on LHC IR Upgrade	0%	◆ APD MS							
71	MS: CARE-APD Mini-Workshop on LHC Beam Performance Upgrade	0%	◆ APD MS							
72	MS: CARE-APD Mini-Workshop on Injector Upgrade	0%	◆ APD MS							
73	Preparation of beam measurements for SPS+LARP HI tests and LHC commissioning	80%								
74	Possible SPS tests on Crystal Collimation	40%								
76	<i>ID: Interim report on APD activities and reporting at the general CARE meeting</i>	0%	◆ APD ID							