



## **Progress Report on ELAN**

By **F. Richard**<sup>1</sup> on behalf of the **ELAN Steering Committee** (May 2005-August 2005)

1) CNRS-IN2P3-LAL, Orsay, France

### **Abstract**

This Report intends to describe the recent progress of ELAN in the second quarter of 2005

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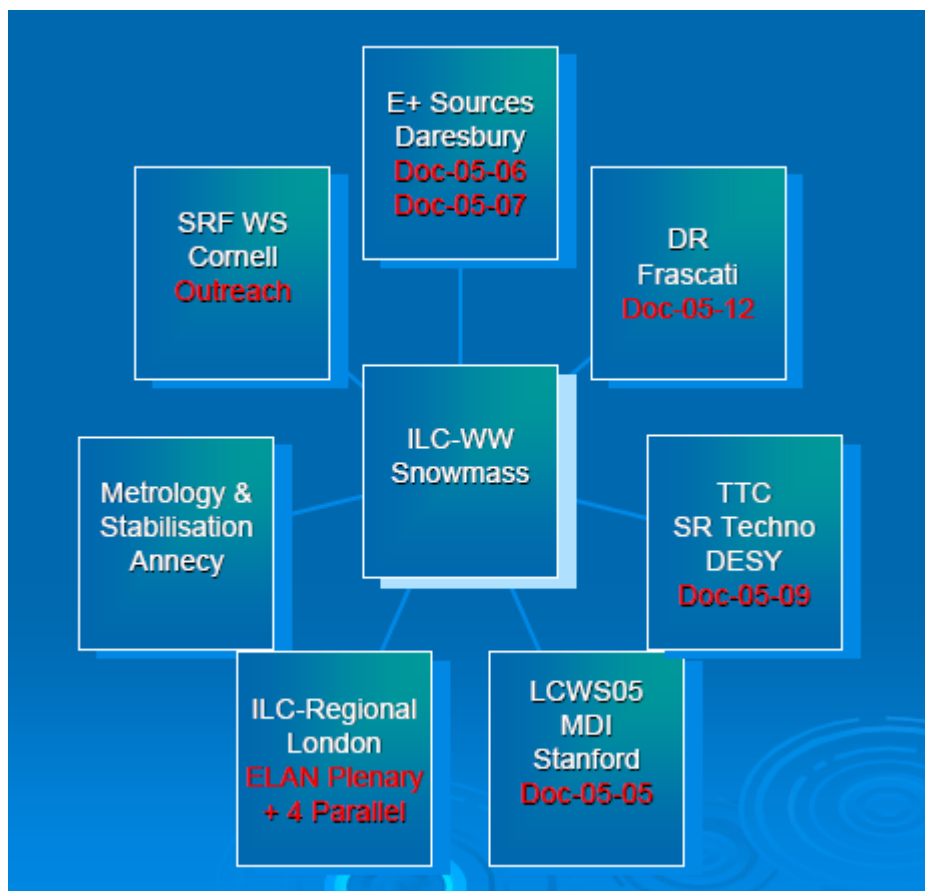
## INTRODUCTION

During this period, ELAN has been concerned with the following topics:

- Participation to specialized workshops in preparation of the ILC meeting in Snowmass
- Organization of the ELAN workshop embedded in the European meeting on ILC in London
- Participation to the Snowmass meeting

## ILC MEETINGS

The list of meetings supported by ELAN was given in the previous quarterly report. With the exception of the Paris meeting on new techniques of acceleration, they were all focused on ILC and the preparation of the international meeting held in the US at Snowmass. A synoptic view of these meetings together with some of their outputs is shown below.



ELAN has provided resources for the organization of these meeting and ELAN participants have given several contributions to these meeting, some of them resulting in ELAN-Documents. Previous meetings and their attendance were described in the previous quarterly report. Here we would like to focus only on the most recent ones and give an example of the incidence they had on ILC.

### **The Compton e+ source**

For the positron sources, a key element for ILC, ELAN has been instrumental in favoring new ideas. In the past, positron sources have delivered unpolarized particles. In the TESLA TDR a solution based on a undulator using the main linac beam has been proposed to produce polarized positrons. This solution will be tested with beam at SLAC. An alternate solution uses an autonomous electron beam, at low energy, with Compton back-scattering on powerful lasers. Serious limitations were so far encountered to reach the very high yield needed for ILC. In the Daresbury WS a scheme was proposed (ELAN-Document-05-06) which combines a Fabry Perrot cavity (developed for polarimetry within EUROTEV) to increase the effective laser power and an auxiliary storage ring to recycle the electron beam. This idea has to be implemented in detail before constituting a baseline for ILC but has already been actively discussed at Snowmass and is studied at Orsay, KeK and Frascati. ELAN has been instrumental in promoting these exchanges of ideas.

### **The ELAN/ILC workshop in London (May 4-6 2004)**

The London meeting was the regional meeting in the preparation of the Snowmass meeting [Snowmass 2005](#). There were 134 participants.

There were, in parallel, the following international workshops:

- ILC-BDIR WG4 Interim Workshop
- Annual EUROTeV Workshop
- CARE/ELAN Workshop

The goal of the parallel workshops was to maximise the efficiency of information exchange across the various groups within these three overlapping programmes.

The format of the workshop was built around 4 days of parallel working groups.

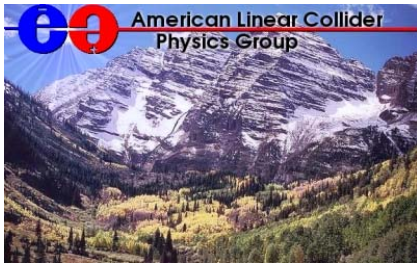
The meeting started by the following ELAN plenary talks:

- |  |                         |
|--|-------------------------|
| • Introduction: Future plans of ELAN                   | F. Richard (Orsay)      |
| • Issues related to normal conducting linear colliders | G.Guignard (CERN)       |
| • Recent devel. on SRF Techno in view of Snowmass      | L.Lilje (DESY)          |
| • New techniques of acceleration                       | B.Cros (Orsay)          |
| • The Frascati workshop                                | M.E. Biagini (Frascati) |

ELAN has also organized a special presentation on the GDE (Global Design Effort) for ILC with a presentation of the European GDE Director B. Foster.

There were several ELAN parallel sessions:

- SCRF technology by L. Lilje
- Instrumentation-Beam dynamics common session by G. Blair and D. Schulte
- Instrumentation for luminosity P. Bambade, D. Schulte
- Codes and Interfaces by D. Schulte

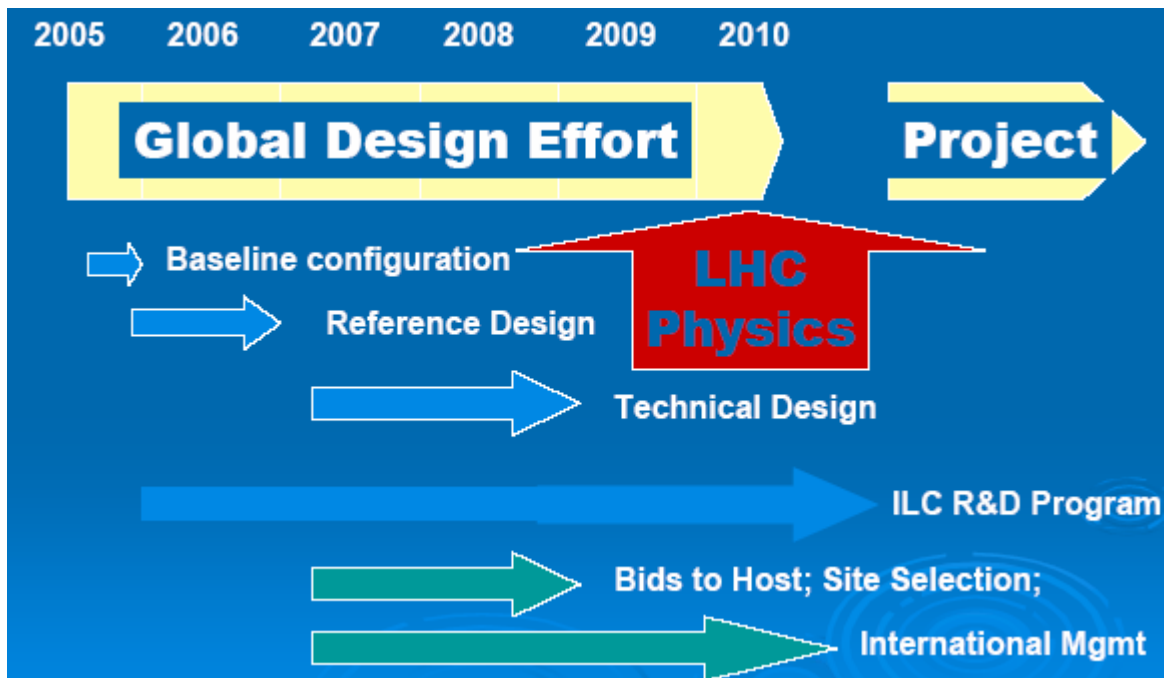


**The Snowmass workshop (Snowmass, Colorado August 14-27)**

A worldwide organization, called the GDE, has been set up in view of ILC. B. Barish, from Caltech, is the head of this GDE with 3 regional Directors. About 20 FTE will form the design team of ILC constituted by about 40 individuals remaining in their laboratories. 4 members of the ELAN management belong to the GDE.

On the European side, this organization will be largely based on EU instruments like CARE and EUROTEV. ELAN can play an important role in promoting new ideas, new initiatives as was exemplified in the case of the positron source.

The Snowmass workshop was the first ILC meeting held with the GDE in place. Below is indicated the GDE chart with the main milestones.



There were 640 physicists participating to this meeting, 1/3 of them being machine experts the rest was involved in physics and detector studies.

The main focus of this meeting was to reach a Baseline Configuration. It soon appeared that there were 10 major 'difficult' decisions to be made:

- 1 beam and luminosity parameters
- 2 main linac starting gradient, upgrade gradient, and upgrade path
- 3 straight or follow earth's curvature?
- 4 1 or 2 IRs, if two, run interleaved?
- 5 1, 1.5, or 2 tunnel
- 6 DR size and shape
- 7 e+ source type conv/undulator/Compton
- 8 is there an e+ pre damping ring
- 9 DR location: 1st half tunnel, 2nd half, ceiling, under cryomodules, separate tunnel
- 10 cavity shape/material/processing

There was a very active participation from ELAN experts to these discussions in particular for the positron source issue and for the SC RF technology. Most of these topics had already been prepared in the various workshops supported by ELAN.

For what concerns the SC RF see:

- Summary Talk London (L. Lilje)

[https://ilcsupport.desy.de/cdsagenda/askArchive.php?base=agenda&categ=a0522&id=a0522s53t3/transparencies/Summary\\_of\\_SRF\\_WG\\_LL\\_.pdf](https://ilcsupport.desy.de/cdsagenda/askArchive.php?base=agenda&categ=a0522&id=a0522s53t3/transparencies/Summary_of_SRF_WG_LL_.pdf)

- BCD Proposal for Cavity preparation (short)

[http://alcp2005.colorado.edu:8080/alcp2005/program/accelerator/WG5/helen\\_edwards20050821164419.ppt](http://alcp2005.colorado.edu:8080/alcp2005/program/accelerator/WG5/helen_edwards20050821164419.ppt)

- BCD Proposal for Cavity preparation (long)

[http://alcp2005.colorado.edu:8080/alcp2005/program/accelerator/WG5/helen\\_edwards20050819140512.ppt](http://alcp2005.colorado.edu:8080/alcp2005/program/accelerator/WG5/helen_edwards20050819140512.ppt)

## Next steps

In a near future, the European component of the GDE will meet in Oxford, October 25, to evaluate the impact of Snowmass on our R&D efforts. It is also felt that, in view of FP7, we should already envisage the future of this activity.

The final presentation of the GDE decisions on the baseline will take place in Frascati, December 8, contiguous to the TTC (ex-TESLA) collaboration meeting.

ELAN intends to participate to these meetings.

## ILC and Outreach

The GDE will thoroughly develop outreach activities. A web site has already been created during Snowmass, [www.linearcollider.org](http://www.linearcollider.org), and is actively developed. ELAN intends to help in this domain in many ways. As an example, during the Caltech and the Snowmass workshops, lectures were given on SCRF technology by L. Lilje for a wide public. See:

- Snowmass SRF Cavity tutorial (L. Lilje)

[http://alcp2005.colorado.edu:8080/alcp2005/program/ENO/Superconductingcavitiestutorial\\_new.pdf](http://alcp2005.colorado.edu:8080/alcp2005/program/ENO/Superconductingcavitiestutorial_new.pdf)

- Srf Tutorials at SRF 2005

<http://www.lns.cornell.edu/public/SRF2005/>

- Tutorial session on Sunday

<http://www.lns.cornell.edu/public/SRF2005/program.html>

- Talk by D. Reschke on cleaning (paid by ELAN)

[http://www.lns.cornell.edu/public/SRF2005/talks/sunday/SuP03\\_talk\\_srf2005.pdf](http://www.lns.cornell.edu/public/SRF2005/talks/sunday/SuP03_talk_srf2005.pdf)



## The Paris workshop on new techniques of Acceleration (June 2005)

The Work Package ANAD has actively been involved in this international workshop. B. Cros, the ANAD convener, was head of the organizing committee. The goal was:

- to review standard acceleration techniques
- to have a critical discussion on new techniques based on laser+plasma acceleration
- to discuss beam+plasma acceleration operated at SLAC.

This meeting (<http://polywww.in2p3.fr/actualites/congres/heeaup2005/>) had 73 participants and 21 presentations and led to very lively discussions between top-experts in standard acceleration techniques coming from CERN, Saclay and Orsay and experts in laser acceleration from various parts of the world. Clearly most techniques encounter severe limitations when it comes to design a multi-TeV collider. Progress in laser performances, very spectacular, still need major improvements. Interesting suggestions were made to use fiber-based laser to improve the energy and the efficiency.

For what concerns beam-based techniques, it was suggested that the high bunch intensity needed is such that it would disrupt completely the plasma. Doc-05-10 contains a summary of this workshop.

In practice, EUROLEAP, a NEST project, intends to achieve a laser-plasma accelerator to test the issues related to the control of the properties of an electron beam accelerated to the GeV in a plasma wave. The EUROLEAP outline proposal has been submitted on April 13, 2005 for the first step of evaluation and was recently approved for the second step.

B. Cros has given a presentation of this project at an ESGARD meeting held in Paris (Sept 7).