Research Director's Report

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François Richard

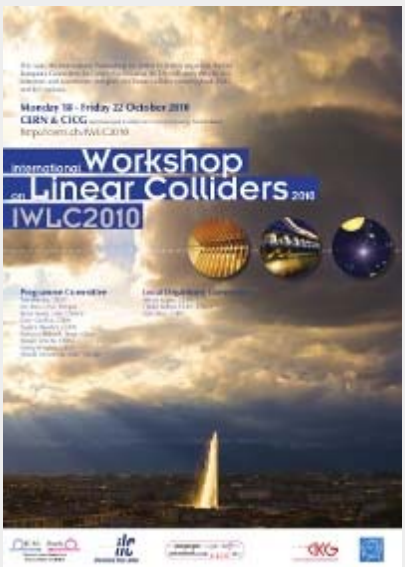
A linear collider workshop at CERN

This month's Research Director's Report was written by François Richard, co–chair of the Worldwide Study, regional detector contact for Europe

The linear collider community will meet at CERN from 18 October to 22 October. This workshop which deals with all aspects of our future project – Physics, Detectors and Machine – appears timely given the present linear collider strategy with the Compact Linear Collider (CLIC) Study and the International Linear Collider milestones for 2011 and 2012. This week, I recall the general context of this workshop, as seen from the European Committee for Future Accelerators (ECFA) Study's point of view, and discuss some of its contents, while Barry Barish is covering the machine aspects of this workshop in the Director's Corner.

The preparation of this workshop illustrates the progress achieved in unifying the linear collider (LC) community to avoid duplications of efforts which is vital given the scarce resources available in the world on this topic. For the first time, the Program Organising Committee (POC) was composed of CLIC and ILC representatives in equal numbers and so far we have been able to surmount the complexity of the organisation of such an event. The worldwide LC community is very welcome to participate and the POC comprised the two worldwide study chairs from Asia and North America which demonstrates the wish to maintain the worldwide aspect of this regional meeting.

What are the main goals of this meeting? The two ILC detector groups, ILD and SiD, are actively preparing a *Detailed Baseline Design* (DBD) under the supervision of the Research Director Sakue Yamada and with the advice of the international advisory panel IDAG. The due date is end of 2012 in conjunction with the *Technical Design Report* (TDR) of the ILC machine. In parallel, but in close collaboration, there is an intense effort towards a CLIC detector concept based on SiD and ILD with the aim of producing a *Conceptual Design Report* (CDR) beginning of 2011. Both efforts heavily rely on an intense R&D performed by worldwide collaborations which include the CLIC and ILC groups. Test beam aspects of these activities play a critical role. The purpose of the workshop is to insure a well-planned and well-organised detector effort for the preparation of the CLIC CDR and the ILC DBD. There are many aspects to this preparation which include feasibility studies of the proposed detectors, with possible sub-detector options, basic mechanical integration of the baseline design including push-pull mechanism and integration of the machine, realistic simulation for these detectors including machine backgrounds, dead regions and effect of material on particle reconstruction.



The first joint ILC-CLIC workshop will be held in Geneva in October.

Re-stating the physics case for a linear collider is essential, in particular now that the LHC has started. Of great importance for a decision on the future linear collider are the LHC/Tevatron discovery prospects. Our phenomenology colleagues are organising a plenary session in the afternoon of 20 October to discuss possible LHC discovery scenarios given the present expectations of the machine's successful runs. We also hope that theory working group will point out recent progress in theoretical ideas and their relevance to the LC programme. A linear collider will provide the best tool to measure precisely the masses and couplings of new particles. To achieve this, a LC needs to be able to perform threshold scans, which sets serious constraints on machine operation, in particular for preserving luminosity at low energy. These aspects will be thoroughly discussed at this workshop for CLIC and ILC in a plenary meeting held on the second day in the Conference Center in Geneva.

Time for a decision on the construction of a LC heavily relies on physics results expected from the LHC and the Tevatron. Discussions for prolonging the Tevatron runtime by three years may converge by the time of our workshop. The calendar for discoveries cannot be decided by any human authority, but we already know that the LHC, after a successful but progressive start, has good chances to enter in a hot phase by end of 2011 with the

collection of one inverse femtobarn of data at 7 TeV collision energy. Prospects of discoveries evidently depend on the type of model at stake: pure Standard Model, supersymmetry (in its various incarnations), extra dimensions, compositeness etc... As a gluon collider, the LHC will soon surpass the Tevatron but it is fair to say that the Tevatron, as a quark-antiquark collider, will remain, in the near term, the best machine to observe a light Higgs within the Standard Model.

Discussions on governance and siting aspects for the construction of an international linear collider are progressing well and a consensus is building up to define the organisation of the international effort beyond 2012. These aspects will be reported at this workshop. The European strategy on future machines will be updated during 2011-2012 with the participation of the high-energy physics community (see slides). We therefore need to think in which way can the LC option can be presented during this important debate. This workshop should be useful to trigger discussions on these various political aspects.

We hope to see you in Geneva to participate in this important event. Registration and information concerning the programme can be found at: http://espace.cern.ch/LC2010/

-- François Richard