Physics and Experiment Board Meeting

November 24, 2009 1400 GMT
Minutes (prepared by J. Brau)

Present via Webex: Catherine Clerc, Marcel Demarteau, John Jaros, Akiya Miyamoto, Francois Richard, Yasuhiro Sugimoto, Sakue Yamada, Hitoshi Yamamoto, Jim Brau.

Absent: Ties Behnke, Karsten Buesser, Michael Peskin, Harry Weerts.

PAC Meeting at Pohang

The detector presentations at the Pohang PAC meeting on November 2-3 were:

November 2
LOI Validation --- Michel Davier (by telephone/video)

November 3
RD Report (including detector activity plan) --- Sakue Yamada
Physics Common Task Group --- Michael Peskin (by telephone/video)
Detector R&D Common Task Group --- Marcel Demarteau
Software Common Task Group --- Akiya Miyamoto
MDI-D Common Task Group --- Karsten Buesser (by telephone/video)
Detector Cooperation with CLIC --- Francois Richard (by telephone/video)

The PAC applauded the progress on detectors. Sakue stressed the need for resources to support the detector work of the next three years, and the PAC agreed it was needed. The PAC will recommend to the ILCSC that they support increased funding for the detector efforts. The incoming ILCSC chair (Jon Bagger) was present in Pohang, and heard this discussion.

SB2009 Common Task Working Group

Following the discussion of the SB2009 parameters at the ALCPG meeting in Albuquerque, Sakue set up an SB2009 working group, composed of Jim Brau (convener), Karsten Buesser, Keisuke Fujii, Tom Markiewicz, Akiya Miyamoto, and Mark Thomson. The charge to the working group was to review the design of SB2009, and to prepare comments and questions to the GDE based on concerns of the physics and detector community. The SB2009 working group prepared the following:

Concerns:
o The main concern is the impact of SB2009 on the potential physics programme of the ILC. In particular the possibility of studying a low mass Higgs boson at the optimal centre-of-mass energy of sqrt(s) ~ 250 GeV. Understanding the nature of the Higgs boson is

central to the ILC and reduced luminosity at low energies could significantly damage the physics reach of the ILC.

- o Increased beamstrahlung reduces the useful luminosity at given centre-of-mass energy.
- o Beam energy spread is also important; in the Higgs recoil mass analysis, this is the limiting factor for the LoI studies (RDR parameters).
- o Increased backgrounds will impact on detector performance, e.g.
  - may imply moving VTX inner radius out to 20mm, which will degrade (somewhat) flavour tagging performance and may have a large impact on the ability to reconstruct the charge of displaced vertices.
  - increased background levels may result in moving the inner acceptance of the forward calorimeters (LumiCAL/BCAL) which will reduce the hermeticity of the detector.
- o The above effects will degrade the physics reach of the ILC; we are concerned about the impact on the competitiveness of the ILC compared to the LHC and CLIC.
- o There are concerns about the impact of the reduction of the size of the damping rings on possible upgrade options for the ILC.
- o The narrowed margin for performance raises concerns regarding the risk for delivering the design luminosity; concerns include kicker jitter, collimation tolerances & jitter, traveling focus feasibility, and others.
- o There were also questions about the economics of cost saving on the machine and longer ILC operation to reach the same integrated luminosity.

Specific questions for the GDE:

- o to assess the physics impact, we need beam parameters at several key energies:
  - 250 GeV (to compare with LoI),
  - 350 GeV (a likely operating energy for SB2009),
  - 500 GeV (again to compare with the LoI).
- o beam parameters should include electron/positron beam energy spread.
- o we would like to understand the effect on backgrounds/luminosity spectrum for SB2009 with vs without traveling focus.
- o for low energy operation, we would like to understand the GDEs position on a conventional positron source.
- o how stable would the Luminosity, Energy spread, and positron polarization be during a threshold scan, for example for ttbar or susy?
- o can you provide a rough sketch of L(Ecm), Energy spread(Ecm), and Pol e+(Ecm) showing how they might be expected to vary between Ecm=91 and 500 GeV?

This was sent to Barry on November 6.
Barry created a GDE Physics Questions Committee, chaired by Brian Foster and Andrei Seryei, which subsequently asked for clarification of the question on the conventional positron source. The following clarification was sent:

> Despite the questions of feasibility, the conventional positron source remains very interesting in order to maximize yield and therefore luminosity. Please provide estimates of the expected luminosity and beam energy spread that would be possible with either a conventional positron source, or an undulator source, at cms energies between 200 and 300 GeV. Will the conventional source possibility remain an option in the re-baselined design? What R&D will be pursued either within the GDE or by other groups to ensure its development?

On November 19, the GDE Committee asked for further specification of the question on stability.

The LOI groups are planning to execute the studies to inform the impact of SB2009 on physics as soon as the questions to the GDE have been answered. In fact, preparation work for these studies is underway.

It was agreed that the SB2009 Working Group should be expanded by about 4-5 people to coordinate the next phase, which is to plan and complete the studies.

Joint Working Group with CLIC

The mandate statement of the joint working group on detectors has not yet formally been approved by the ILCSC. Some minor changes in the draft were suggested by Bagger in Pohang, and with these changes, the document was finalized.

Regarding the makeup of the joint working group, and agreement has been reached with the CLIC people. The working group will be consist of seven members: the ILC Research Director, one of the ILC Detector Regional Contacts, someone representing ILC Detector R&D (presumably the convener of the R&D Common Task Working Group), one member representing each of the ILC LOI groups (ILD and SiD), and two members representing the CLIC detectors (one from CERN, and one from outside CERN). This working group should become functional early next year. Sakue asked the ILD and SiD leadership to propose names.

SiD (John)
SiD is refining its work plan. An update based on better information should be completed by the end of the year, and delivered to Sakue. There is progress on PFA, specifically integrating Thomson's Pandora into the SiD framework. There was also progress recently on the SiD Monte Carlo development, and continued R&D efforts.

ILD (Yasuhiro)
ILD is preparing for a workshop in Paris in January. A representative for the joint ILC-CLIC Working Group is nearly selected. The work plan will be updated during the Paris workshop.

MDI Common Task Working Group
No report.

Engineering Tools Common Task Working Group (Catherine Clerc)
Work is underway for a common breakdown structure for ILD and SiD. The Working Group will soon propose the addition of two additional members, one from each of the two LOI groups.

Detector R&D Common Task Working Group (Marcel Demarteau)
The preliminary report of the Detector R&D Common Task Working Group was presented to the PAC, where it was well received. It should be available for the Physics and Experiment Board soon. The Board is very anxious to see and review the document. In particular, how does it synch with the plans of the two LOI groups. It is important that it does. Marcel reported that the current draft uses the term priority in listing efforts which are agreed to need boosted funding. It was proposed that it may be better to use a different term than priority to characterize these projects, in order not to suggest that other on-going R&D efforts are not priorities. What the Working Group is trying to highlight are urgent efforts needing increase support soon. The basis for this is to show that the understanding is in hand in 2012 to build the detectors.

Software Tools Common Task Working Group (Akiya Miyamoto)
The Software experts are eager to receive the formal statement of parameters for SB2009 so that studies can begin to assess the impact on physics. Background samples and physics samples are needed. The specific physics processes to consider need to be defined. This work will be done by the LOI groups. In order to coordinate these studies with the SB2009 Working Group, Jim proposes adding 4 or 5 more people to the Working Group. Sakue said he thought this was a good proposal.

Physics Common Task Working Group (Michael Peskin)
No report.

Other Business
Akiya raised the question of benchmark processes for 1 TeV. After the meeting, Sakue distributed the Physics Common Task Working Group document of November 13 (*Benchmarks for the ILC Physics Studies - 2009-10*) which recommends the 1 TeV benchmarks.

Next meeting

The next meeting will be on Tuesday, December 22 at 1400 GMT.