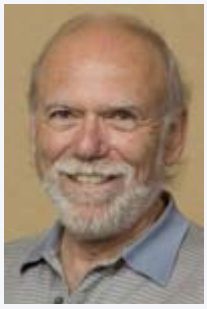
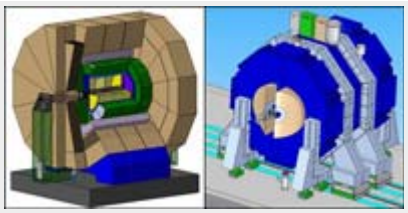
Director's Corner

7 January 2010


Barry Barish

Reflections on the New Year

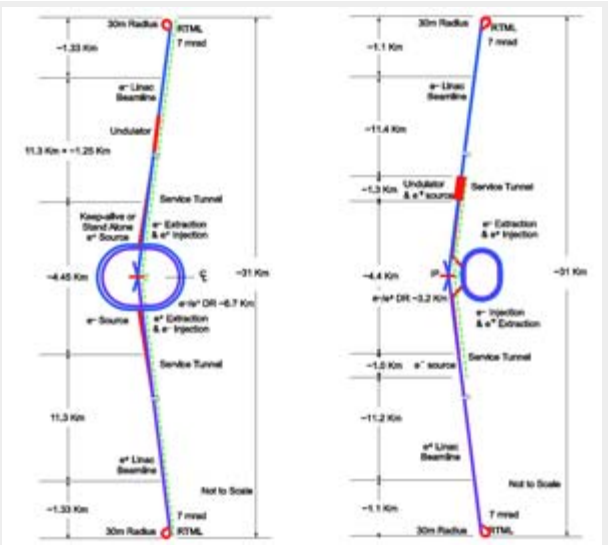
As we enter the New Year, it is a good time to review and reflect on our accomplishments during 2009, as well as the present status and prospects for the ILC. I wish I could boldly state that we have made big strides towards making the ILC a reality over the past year, but in reality it was a mixed year. Technically, we have made impressive progress in key areas, while some others areas are languishing due to limited resources. Overall support for the ILC or more generally a next–generation lepton collider remains strong. However, uncertainty regarding the future course of the ILC has created difficulties in planning, as well as some slowdown in our timescale. Our overall plan remains stable: to create a technical design mature enough to propose a global construction project to collaborating governments by the end of 2012. I remain confident we can achieve that goal.


Two ILC detector concepts, ILD and SiD, have been validated by the International Detector Advisory Group. (SiD CAD model rendering courtesy of Marco Oriunno)

The biggest step made towards a lepton collider, specifically the ILC, during the past year has been the very successful detector letters of intent (LOIs) validation process. An assessment committee, the International Detector Advisort Group (IDAG), reported to Sakue Yamada, the ILC Research Director, that two detectors, ILD and SiD, are qualified for validation. This meant they have passed the rigorous studies set to proceed with a technical design in conjunction with the Global Design Effort. What does "validation" mean? The committee defined this as, "*In very broad terms IDAG considers that a detector can be validated if (1) the overall concept has an expected performance suited to the physics program of ILC and (2) the proposing group has the scientific and technical ability to reach its goal, both through continued R&D and by investing enough resources to collaborate with the ILC project toward a detailed baseline study.*" The importance of this step is that two complementary detector proposals have succeeded in demonstrating that the ILC accelerator and detectors will be capable of accomplishing the ambitious science programme that we are anticipating follow up and complement the LHC discoveries with precision measurements and further discoveries by the ILC.

On the technical side, the ILC accelerator R&D programme has made important strides towards demonstrating the superconducting operating gradient, expanding the number of qualified cavity manufacturers, achieving higher gradient and globally standardising the analysis techniques. The important research programme at Cornell to study electron cloud effects and demonstrate mitigation techniques is well underway, and the ambitious studies are beginning at the KEK ATF–2 test facility to demonstrate that the required final focus parameters can be achieved. Unfortunately, we have lacked resources and progress has been slow in some other areas, like positron source studies and detailed technical designs and optimisation of the ILC conventional facilities.

We have made progress on the design of the ILC itself, where our project managers have led a top–down assessment of the reference design and have proposed a set of significant changes to the baseline (presently called Strawman Baseline or SB2009). These proposed changes have been written up and will now undergo a rigorous review process over the next couple of months leading up to decisions at the ILC meeting in Beijing in March on the baseline design that will serve as basis of the technical design work over the next three years.



On the left is the ILC layout from the Reference Design Report and on the right is the proposed new layout from SB2009

On the political side, support from our collaborating governments to carry out our R&D programme has been reasonably stable with a few exceptions. This gives us confidence that we can complete the programme we have undertaken both to demonstrate the technical key technical and cost risk areas and to complete a technical design by the end of 2012.

However, I cannot report much progress towards government support for a construction project, and in some cases, support is wavering. In the UK and in Japan there have been reductions of support for science, and in the U.S., vigorous and effective efforts have been made by Fermilab to promote a muon collider as an alternate future option for a multi–TeV lepton collider, and one that could fit onto the Fermilab site. They have proposed to begin an accelerated R&D programme that could enable this option to be considered, alongside the CLIC technique, if higher energies than can be achieved with ILC are required. The Department of Energy (DOE) apparently likes this idea, while at the same time showing doubts regarding the ILC, mostly due to their understanding of the escalated total costs of an ILC that would be completed in 15 years or so.

I might comment that I firmly support developing all options for a lepton collider, including a muon collider, in order that we will be able to make the most informed and reasoned decision as to which approach will best complement the Large Hadron Collider at CERN. However, at the same time, the muon collider option must be kept in perspective as an approach that still requires major advances in accelerator techniques that have not been demonstrated, plus the design and costing of such a machine remains for the future. Perhaps more importantly, there remains serious doubt whether a muon collider could ever provide a clean enough experimental environment to carry out the type of precision science program that has been demonstrated for the ILC through the LOI process, as discussed above.

In the present complicated environment, both in terms of technology and government support, our plans are to be ready with the most robust design we can achieve for the ILC on the time–scale of LHC results. Once LHC results have motivated a complementary future machine for particle physics, I am confident that the worldwide high–energy physics community will be prepared to make the best choice for a global project. At this point, there is no question that the ILC remains the leading and most realistic contender. For that reason, we continue to be committed to vigorously pursuing our goals!

-- Barry Barish