

## Director's Corner

6 January 2011



Mike Harrison

### As the New Year dawns ...

*Today's issue features a Director's Corner from Mike Harrison, GDE Americas Regional Director.*

It is traditional at this time of year to take stock and assess not just the preceding year but the prospects for the upcoming one too. It appears that I'm not immune to that sentiment.

Is there ever a good time to be proposing the creation of a large and complex science facility? Probably not, but at face value we seem to have chosen a particularly inopportune moment to be raising this issue. Reading newspapers today it is impossible to avoid noticing the state of public finances around the world. The 2008 credit crisis in the financial markets created a severe economic downturn, which affected many countries

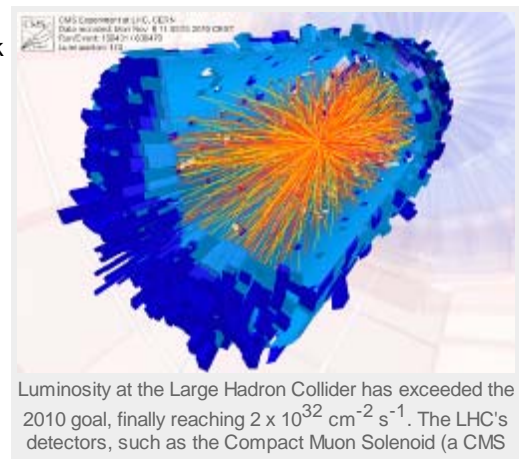
and resulted in large governmental budget deficits. Governments responded to this situation in different ways: severe budget cuts in many EU countries, stimulus spending in the US leading to concerns about runaway government budget deficits and more-of-the-same credit creation in Japan. Details aside, suffice it to say that government spending is presently under very close scrutiny in those countries, which are the traditional backers of high-energy physics.

Large international projects haven't been exactly covering themselves in glory recently either. The International Thermonuclear Experimental Reactor (ITER) in Cadarache, France, has experienced cost and schedule problems that not so long ago engendered a change in upper management. The James Webb space telescope isn't looking too happy in this regard either and, in deference to my colleagues in the US, I won't mention the cost history of the ill-fated Superconducting Super Collider (SSC) project. The common feature of these projects is the impact of the technical complexity on its cost and schedule. The ILC is hardly without its own issues in this regard.

Another problem we have to deal with is the lack of any direct evidence for "new physics" beyond the standard model. Indirect evidence abounds of course, but it is generally accepted that exciting new discoveries from the LHC are vital to justify the ILC project as well as to determine its final collision energy. The LHC start-up was delayed significantly by the interconnect incident and to date only a small data set exists. Unfortunately Fermilab's Tevatron, which is running wonderfully well, struggles to reach these mass ranges.

So we have worldwide budget austerity, no supporting physics results, and international science projects that continue to demonstrate just how difficult such enterprises are to manage effectively. Not promising at first sight. In spite of these events, however, it looks as though 2011 is poised to be an interesting year for the ILC programme.

The first cause for optimism is the LHC operation. Although delayed, the initial commissioning and physics operation that took place during the past twelve months has gone very well. The commissioning proceeded smoothly with machine luminosity increasing continuously throughout the period of operations, exceeding the 2010 goal and finally reaching  $2 \times 10^{32} \text{ cm}^{-2} \text{ s}^{-1}$ . The detector operation has also been first-rate with data-taking efficiency, detector resolution and rapid initial analysis capability all better than could have been anticipated. Indeed, the overall situation is so encouraging that it appears that the first running period is likely to be extended into 2012 with integrated luminosity estimates sufficient to produce a physics data set capable of covering the anticipated Higgs particle mass range. This data set will also greatly extend the mass range for discovery of possible supersymmetry physics. A highly



significant physics result in the time scale of 2012 would be a tremendous boost for the ILC programme and is now increasingly probable.

event is pictured here), have been taking data with good resolution and excellent analysis capability.

Avoiding the pitfalls encountered by the existing international projects is built into the GDE programme. Addressing technical and cost risks is the main priority of the R&D programme and again here the outlook is bright. Under the auspices of the Global Design Effort (GDE), and with the talents of the worldwide lab collaboration, the progress in regard to superconducting radiofrequency technology has been remarkable. It is worth remembering that only a few short years ago the 35-megavolts-per-metre accelerating gradient chosen for the baseline design was viewed as hugely challenging. Recently we were seriously asking ourselves whether we should go higher (a challenge graciously declined by Akira Yamamoto). The [new baseline design](#), recently described by Barry Barish, has better performance, is cheaper, and possesses more upgrade potential than that used in the reference design. Technology improvements do not appear to be slowing down and there is little doubt that by the end of the R&D programme in 2012 we will have compelling support for the *Technical Design Report*. While nobody can completely guarantee the cost and performance of something as big and complex as the ILC, 2011 will be the year when many of the questions are answered.

Probably the most difficult question to assess is whether (multi-) government funding will be available to move forward into ILC construction. If I could answer this question with any certainty I would probably be in a different profession. What I do know is that a project of the scale and scope of the ILC will not "fly under the radar" and will need to proceed on its merits. In this regard a harsher overall government-spending environment with increased oversight could actually help. Any rational analysis of a developed economy must note the role of science and technology in promoting a high-wage environment. Science spending typically holds up quite well in difficult conditions and a project like the ILC can easily become a highly desirable science opportunity for a potential host rather than a mere physicist sandbox. The decision to proceed to construction for the ILC has a major political component and governments move in mysterious ways. We'll see.

Time alone will tell how events transpire but 2011 promises much for high-energy physics as well as the ILC programme. We hope we can fulfil that promise.

I wish everyone the very best for the New Year.

-- Mike Harrison