Don't panic

Whether to build the International Linear Collider is an open question, but R&D on it should be supported.

Big science has taken a hit in recent budget cuts both in the United States, where significant lay-offs at Fermilab in Batavia, Illinois, are now threatened, and in the United Kingdom, which is to chop tens of millions of pounds over the next few years from astronomy and high-energy physics (HEP) budgets. In both cases, one significant casualty has been participation in the development of the International Linear Collider (ILC; see page 112), the envisaged successor to CERN's Large Hadron Collider (LHC). The latter has suffered delays; and is not likely to see its first useful collisions until 2009. Time to take stock.

The ILC as currently proposed will collide electrons with positrons at energies up to 500 GeV. This is only half of the collision energy originally espoused for such a machine, a reduction necessitated by technological and financial realism. But that reduction has an impact on the machine's potential. The ILC could provide observations that are critical in understanding what the LHC might uncover, but it will not greatly expand the frontiers of the unknown that can be explored.

The HEP community is well experienced at managing costs within budgets and coordinating activities internationally. Based near Geneva, CERN, for example, is the most expensive of the world's three major HEP accelerator centres, and has an annual budget of about US$1 billion. This journal believes that such sums constitute money well spent in principle. That's because these efforts provide the only means to explore in depth ultimate questions about the fundamental matter and forces that make the Universe behave as it does, because such questions inspire many citizens and also because they give rise to technological skills and spin-offs that contribute to nations' economies.

Now imagine three alternative requests for funds in 2011.

- The dream scenario: "The LHC has seen signs of the Higgs sector predicted by well-established models and has also detected a plethora of new particles that indicate that our ideas about deeper symmetries were only partly right, and point the way to understanding the mysterious dark matter and energy that make up most of our Universe. Please give us $X billion over ten years for a machine to explore further."

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- The sleepless-nights scenario: "The LHC has seen signs of the Higgs sector but hasn't found the predicted signatures of deeper symmetries. Please give us…"
- The nightmare scenario: "The LHC has seen nothing new. Please give us…"

Each is likely to stimulate very different responses from physicists' paymasters and from citizens at large.

The HEP community has perhaps rashly developed a substantial sub-community of physicists actively developing the ILC concept. But the community as a whole has weathered strong turbulence from the ups and downs of national budgets over past decades. It is robust enough to do what it now should: cut back but not abandon its futuristic efforts and bide its time for a few years, in the hope and faith that imminent experiments will make a powerful case for long-term investment in whatever machine is appropriate. And countries rightly motivated to support continued R&D on future colliders should seize the unexpected opportunity to take the lead. ■