A good BaBar gain

The dedication of the BaBar detector for the recently commissioned PEP-II B factory at SLAC, Stanford, showed the increased international aspect of US particle physics.

The BaBar experiment represents "a new mode of US experimentation", said Stanford Linear Accelerator Center (SLAC) director Burt Richter at the experiment's formal dedication on 13 August. BaBar is the detector at the heart of the recently commissioned PEP-II B factory at SLAC, Stanford. Some 50% of the physicist participation and 40% of the hardware value come from outside the US.

Physicists habitually use an overstrike to denote an antiparticle. They talk about "p-bars" instead of antiprotons, and "B-bar" as the antiparticle of a B meson – hence BaBar, better known in certain circles as the friendly elephant in the stories by Jean de Brunhoff.

SLAC research director David Leith explained that BaBar is highly "non-SLACentric", with a spokesman (David Hitlin of Caltech) who is elected rather than appointed. "We went to school at CERN to learn how to manage large international projects," explained Leith.

SLAC, which was established to exploit the 2 mile linear electron accelerator, is no stranger to major projects. However, the more than 600 strong BaBar collaboration is the largest research group that SLAC has ever seen, with physicists from Canada, China, France, Germany, Italy, Norway, Russia and the UK, as well as the US.

The keynote speaker was director of the US Department of Energy's Office of Research, Martha Krebs, who underlined the role of PEP-II and BaBar in current US particle physics research. After the demise of the superconducting supercollider in 1993, a "future visions" panel, chaired by Sid Drell of SLAC, foresaw a US programme with significant US participation in the LHC collider at CERN. Also included was the SLAC B factory, initially green-lighted in the same wave of legislation that swamped the SSC.

Krebs went on to point out that no fewer than 8 of the 10 DOE labs in her portfolio had appointed new directors. She called for leadership during a difficult transition period.

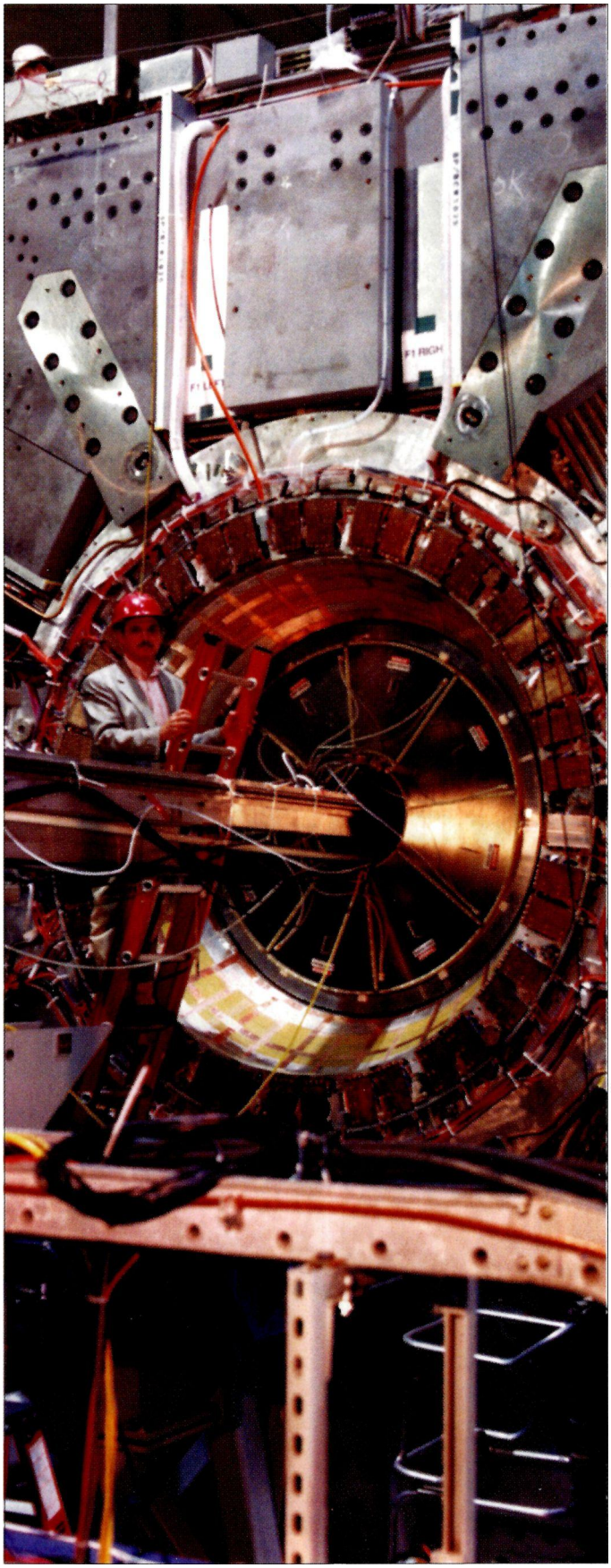
In a recent hiccup, a US Senate subcommittee explicitly recommended a reduction in research and development spending for the Next Linear Collider (NLC), an electron–positron machine being touted around the Pacific Rim to attack the next energy frontier. While physicists are gung-ho about the need for such electron–positron machines to explore fully the immediate energy frontier, the move is redolent of the early 1990s disfavour in certain political quarters that eventually torpedoed the SSC. "In staying at the energy frontier," said Krebs, "we cannot count on an orderly progression."

"They are not as ready to proceed with the NLC as we are," commented Richter, who stepped down as SLAC director at the end of August. He is succeeded by Jonathan Dorfan, formerly SLAC associate director and head of the PEP-II B factory project. Richter becomes chairman of the International Union of Pure and Applied Physics. Krebs paid tribute to Richter's exemplary role as a leader, both at SLAC and for the community.

The BaBar dedication fitted nicely into the programme for the International Lepton–Photon Symposium at Stanford (p6). □

The keynote speaker at the formal dedication of the BaBar experiment at the recently commissioned PEP-II B factory at SLAC, Stanford, on 13 August was director of the US Department of Energy's Office of Research, Martha Krebs. (Diana Rogers, SLAC.)

The podium at the BaBar dedication ceremony, with experiment spokesman David Hitlin at the microphone. At the event, everyone sported a BaBar baseball cap.



The BaBar detector at the heart of the PEP-II B factory at SLAC, Stanford.

Physicists focus on quest for Bs

The physics of B particles is a major new focus of world particle physics research. A session at the recent lepton–photon symposium provided a useful overview.

Both SLAC in Stanford and the Japanese KEK Laboratory are beginning physics research with new B factories. The electron–positron annihilations in these colliders are a copious source of B particles, so called because they contain the fifth "beauty", "bottom" or simply "b" quark. The decays of these B particles are expected to reveal new information about CP violation – the subtle symmetry breaking widely thought to be responsible for a Big Bang that was matter–antimatter symmetric, which eventually produced a visible universe composed entirely of matter.

The factories – PEP-II at SLAC and KEKB at KEK – use the BaBar and BELLE detectors respectively to study the decays of B particles.

This new effort for B physics was an overture for the International Lepton–Photon Symposium in Stanford (p6). Jonathan Dorfan, then SLAC director designate, described the PEP-II and BaBar programme. Fumihiko Takasaki of KEK described KEKB and BELLE.

However, there are other B physics players. Klaus Honscheid of Ohio State covered the programme at Cornell's CESR electron–positron collider equipped with the CLEO detector. CESR – whose collision rate has continually been boosted – and CLEO – now undergoing its third major facelift – have been working in tandem for some 20 years and have made pioneer contributions to B physics.

Warming up on the B touchline is the HERA-B experiment at DESY using the proton ring of the HERA collider. Michael Medinnis of DESY-Zeuthen outlined the detector effort under way en route to scheduled completion next year.

Manfred Paulini of Berkeley sketched the B physics potential of the big CDF and DO detectors at Fermilab's Tevatron proton–antiproton collider, now fed by the new Main Injector. Also from next year, detector upgrades and collision rate improvements are set to ensure that the Tevatron remains a focus of B physics.

Major contributions also come from LEP at CERN. Not described in the Lepton–Photon Symposium presentations but gearing up for longer-term contributions are the LHCb experiment at CERN's LHC collider and the BTeV project at Fermilab. □

Hands off

The International Committee for Future Accelerators (ICFA) is a platform for the world particle physics community, particularly where international collaboration on major machine projects is concerned. In the aftermath of a recent US Senate recommendation (p21) to reduce funding on the Next Linear Collider (NLC) – an electron–positron machine to attack the next energy frontier – the ICFA issued the following statement after its meeting during the International Lepton–Photon Symposium at Stanford (p6):

"Scientific panels charged with studying future directions for particle physics in Europe, Japan and the US have concluded that there would be compelling and unique scientific possibilities at a linear electron–positron collider in the TeV energy range. Such a facility is a necessary complement to the LHC hadron collider, now under construction at CERN. Experimental results over the last decade from the LEP and SLC electron–positron colliders, combined with those from the Tevatron – a hadron collider – have led to this worldwide consensus.

"The latest experimental results point ever more clearly to the conclusion that there is fundamentally new physics in the energy range just out of reach of existing colliders. At the very least we will find one or more Higgs scalar bosons or other structure that has the same effect as a Higgs boson. To explore and characterize fully the new physics that must exist will require the LHC plus an electron–positron collider with energy in the TeV range. Just as our present understanding of physics at the highest energy depends critically on combining results from LEP, the SLC and the Tevatron, a full understanding of new physics seen in the future will require both types of high-energy probes.

"Major laboratories around the world are presently conducting accelerator research and development that will lead to detailed designs of a linear electron collider capable of reaching this energy range. The technology being developed for this purpose will also have applications in other areas of science and technology through new generations of intense light sources. A worldwide group is studying the physics at an electron–positron collider and the detectors needed to observe that physics.

"ICFA recommends continued vigorous pursuit of the accelerator research and development on a linear collider in the TeV range, with the goal of having designs complete, with the most reliable cost estimates, in a few years. We believe that an electron collider optimized for the new physics should be built in a timely way with international participation."

ICFA is a working subcommittee of the International Union of Pure and Applied Physics.