

HIGH-ENERGY PHYSICS

U.S. and Europe Close In on LHC Deal

For U.S. high-energy physicists still reeling from the cancellation of the Superconducting Super Collider (SSC) in 1993, it's the best news in years. And it's also a reason for their cash-strapped European colleagues to celebrate. Last week, U.S. and European negotiators said they have the outlines of a deal in which the United States would pump about half a billion dollars into an accelerator that would have rivaled the SSC, the Large Hadron Collider (LHC) at CERN, Europe's particle physics laboratory near Geneva. If the proposed arrangement wins support from politicians on both sides of the Atlantic, it would allow CERN to speed up construction of the facility and give U.S. physicists a major role in the project.

For the past year, the two sides have been gingerly negotiating the terms of U.S. participation in the LHC, which will collide protons and antiprotons at energies tens of times higher than those of today's most powerful machines. CERN managers want to start work on the \$2.3 billion accelerator and its \$1 billion detectors in 1998, and complete the project by 2004. But without substantial help from outside Europe, they would have to stretch out that timetable by at least 5 years and build the facility in two stages rather than one. Meanwhile, U.S. Department of Energy (DOE) officials want to do what they can to make up for the loss of the SSC by providing U.S. physicists access to the LHC, but they are under tight budget constraints. If the deal goes through, it would mark the largest U.S. contribution ever made to a foreign science project.

"It is a very important step for everyone: for the Americans who will get to participate, and for the Europeans who will get to build the machine faster," says Lorenzo Foa, CERN's research director. DOE's energy research chief, Martha Krebs, is equally enthusiastic. "This will enable the U.S. high-energy physics community to contribute" to both the construction of the LHC and the science it will do, she says.

Under the tentative deal announced on 28 March, DOE would put up \$450 million, give or take \$50 million, over 8 to 10 years to assist in the construction of the accelerator and its ATLAS and CMS detectors. The National Science Foundation (NSF) would also chip in, committing \$80 million for work on the detectors—\$60 million for ATLAS and \$20 million for CMS. The exact ratio of DOE spending on the accelerator and detectors would depend on the results of studies by U.S. technical teams that should be completed by June, in time for the next round of talks between senior DOE and CERN officials. "Our job is to get into the details," says Dan Green



Light at the end? The LHC, shown here in mock-up, would be built faster with U.S. funds.

of the Fermi National Accelerator Laboratory, who is U.S. spokesperson for the team overseeing work on the CMS detector. He adds that U.S. scientists already make up about 20% of the scientific collaborators involved in the two detector projects, and would continue to do so.

Project officials are also hoping that an agreement with the United States will pave the way for other international partners to join the project. The CERN Council has been wooing potential partners, including Japan, Russia, and Canada. Foa says if CERN can rope in more international partners, "it should allow us to complete the project in one step."

Meanwhile, the National Science Board has given NSF the green light to spend up to \$7.9 million over the next 3 years to plan the

research and development for the two detectors. "I take that as a very positive sign. What they told us was, 'This is important science, and we think NSF grantees should be participating in it,'" says Robert Eisenstein, director of NSF's physics division. "It means that money is now flowing, and that's obviously an important indication of progress."

Krebs warns that many hurdles lie ahead before a deal with CERN can be sealed by the end of the year. "This is only the first milestone in what I expect to be intense negotiations," she says. "We are far from finished." To sweeten the pot for Congress, for example, DOE likely will insist on a made-in-the-USA policy so that U.S. contributions will support work by U.S. universities, labs, and companies. Congressional staffers say support in the House Science Committee for U.S. participation in the LHC is strong, but that House appropriators and the Senate may be harder to convince.

Krebs says the Administration backs the tentative deal, but White House budget projections show DOE's overall energy research spending will decline from 1997 to 2000—just when the department would step up LHC spending. Krebs says she hopes she can renegotiate those figures for the 1998 budget request, and adds she is optimistic that the money can be found without sacrificing other research programs. The U.S. proposal, she says, "was driven by what we thought we could afford."

—Andrew Lawler

With reporting by Jeffrey Mervis and Daniel Clery.

TECHNOLOGY POLICY

Report Backs Industry-Government Ties

A panel of industry and academic leaders is scheduled to issue a report next week that will make the case for government-industry research partnerships, a pillar of the Clinton Administration's technology strategy but a favorite target for Republican budget cutters. The report, to be released on 10 April, also urges politicians to stop bickering over definitions of basic and applied research, saying the distinction is meaningless in setting public policy.

The report—"Endless Frontier, Limited Resources"—was written by a nonpartisan panel assembled by the Council on Competitiveness. Chaired by Erich Bloch, a former director of the National Science Foundation, it calls for the government to fund those areas of research that industry cannot finance itself. The report cites three current programs as models of such partnerships—the Advanced Technology Program (ATP), the Partnership for a New Generation of Vehicles (PNGV), and cooperative research agreements that allow companies to capital-

ize on government-funded research.

ATP and PNGV have come under intense fire from House Republicans, who argue that such efforts amount to government subsidies for work the companies would do anyway. Indeed, ATP is one of the major sticking points in attempts by Congress and the White House to agree to a final 1996 budget for several federal agencies. The report also rejects the concept of limiting the government's role to basic research and letting industry conduct applied research, a separation favored by some House Republicans. "The message from industry is don't worry about what's applied versus what is basic research," says John McTague, vice president for technology at Ford Motor Co. and an adviser to the panel. McTague is a former science adviser to President Reagan.

The report seems certain to be hailed by the Administration and those in Congress who favor a broad federal role in supporting new technologies and are fighting to pre-