

HIGH-ENERGY PHYSICS

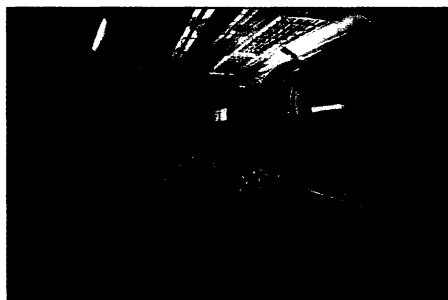
U.S. and Europe Close In on LHC Deal

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 will 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-

serve programs like ATP. Its conclusions also contrast with a recent National Academy of Sciences (NAS) report that was cautious in its assessment of government-industry partnerships. That study, chaired by former NAS President Frank Press, concluded that the federal government "should encourage, but not directly fund, private-sector commercial technology," unless it would benefit government missions or open up a

broad new market only with government help. The Council on Competitiveness study "will be used as ammunition by those who want to counter the Press report," predicts one congressional staffer.

Last month, a group involved in the study shared its findings at a dinner with five senators, including Mark Hatfield (R-OR) and Ernest Hollings (D-SC), who have been advocates of such partnerships. But council of-

ficials and those responsible for the study insist they do not want to get involved in the political battles over funding such activities. "We want to emphasize the importance of partnerships, not whether or not we get more money," says McTague, who attended the dinner. "We just want to get the message out about the most effective way to reach desired national outcomes," he says.

—Andrew Lawler

LIFE SCIENCES

Animal Activists Target NASA Mission

A multinational space project to examine the effects of weightlessness on rhesus monkeys has come under heavy fire from animal-rights activists, and as a result, its planned launch this fall may be in jeopardy. Members of Congress are asking questions about the project, and National Aeronautics and Space Administration (NASA) chief Daniel Goldin has ordered a complete review of its scientific justification and ethical implications. Last week, he told a congressional panel "I would like to withhold judgment" on the research until the review is completed next month.

The controversy pits the political muscle of animal-rights activists and their allies—who have called the experiments "one giant leap backward for mankind"—against NASA life scientists eager to conduct the first comprehensive examination of the effects of weightlessness on muscles, bones, the immune system, and coordination. The Russian Space Agency is providing the Bion capsule and the launcher, while the Russian Institute of Biomedical Problems is responsible for training the rhesus monkeys that will be used on two flights. U.S. and French researchers will conduct the bulk of the experiments.

The campaign against the project is being led by People for the Ethical Treatment of Animals (PETA), which argues that the project is both scientifically unnecessary and inhumane. PETA has run newspaper ads urging readers to call Goldin and express outrage at what it calls "mutilation, torture, and killing of monkeys." NASA and members of Congress have received hundreds of letters and calls from PETA members in recent months protesting the Bion mission, say NASA officials and congressional staffers. And the campaign has caught the interest of lawmakers.

"There is a lot of concern being expressed by my colleagues," Representative Jerry Lewis (R-CA), who chairs the House Appropriations subcommittee that oversees NASA's budget, told Goldin at a hearing to review NASA's proposed 1997 budget. Goldin responded that he has not yet decided whether to endorse the project's scientific merit, the need to use monkeys, or the quality of animal care. "We should not be

flying in an inhumane fashion," he added.

NASA officials say they are confident Bion will pass its next test. "I welcome a review by any unbiased group," says Joan Vernikos, director of NASA's life and biomedical sciences and applications division. NASA has gone out of its way to ensure Bion meets U.S. standards of animal care and to ensure high-quality science, she says: "We've put on all the bells and whistles."

Many of the experiments planned for the Bion program, which includes a second flight in 1998, were drawn up several years ago to fly on a U.S. shuttle mission. When that flight was canceled 2 years ago, U.S. and French scientists hooked up with a Russian program that has launched five missions involving rhesus monkeys. As a result, says Vernikos, most of the planned Bion experiments have gone through four peer reviews.

The latest review, completed in February by 13 U.S. and French life scientists from outside NASA, concluded that "the use of rhesus monkeys in the proposed studies is well justified" and that "the quality of animal care appears excellent." The panel, noting that "the studies planned for Bion 11/12 would not be possible in humans during space flight," expressed no major concerns with procedures to be carried out in Russia. These include four separate surgeries and two other medical procedures to implant brain electrodes and eye and ear coils and other apparatus in each monkey. And it said there was no evidence that the monkeys would suffer any permanent injuries.

The panel ranked 15 of the 18 projects as outstanding or excellent, and Vernikos says that NASA has dropped experiments that fell below those grades. Four others were jettisoned because of budget constraints, technical problems, and a decision to focus on musculoskeletal research, she adds.

The major weakness of the program, accord-

ing to the report, is the lack of communication between the United States and Russia. There is no formal mechanism for sharing data, NASA scientists lack a good working knowledge of Russian procedures, and Russian modifications have not been relayed to experimenters, it says. The panel recommends that a senior scientist be named to oversee the project.

"We're trying to tighten the management," says Vernikos, noting that U.S. managers are discussing with their Russian counterparts the need for one scientist to be in charge. Coordinating peer review with Russia has also been a problem. The Russian Academy of Sciences reviewed the Russian Bion experiments last fall, but

Vernikos says she has not seen all the results. Joint protocols on animal care and use should be completed in May, she adds.

In contrast, PETA officials see the February report as vindicating their concerns and say its comments show that the program is flawed. Mary Beth Sweetland, PETA's director of research, investigations, and rescue, wrote to Goldin on 21 March that the report contains "startling condemnations" of the science on Bion.

"We ask you again to intervene immediately to stop a project that has already embarrassed NASA and continues to do so," she wrote. In a previous letter to Goldin, Sweetland said the experiments amount to "grotesque neurological assaults" and that most monkeys would suffer from "painful postsurgical complications." NASA officials disagree, and Vernikos says that none of the 10 monkeys flown by Russia on previous missions has suffered permanent injuries.

For U.S. and French researchers, Bion represents their best chance to do such research before 2004, when the space station's animal habitats are in place. Vernikos believes the work is essential: "You can't be in this field without using animals for research." But Goldin must first convince lawmakers that Bion deserves to get off the ground.

—Andrew Lawler



Media blitz. PETA's ads have sparked letters to Congress.