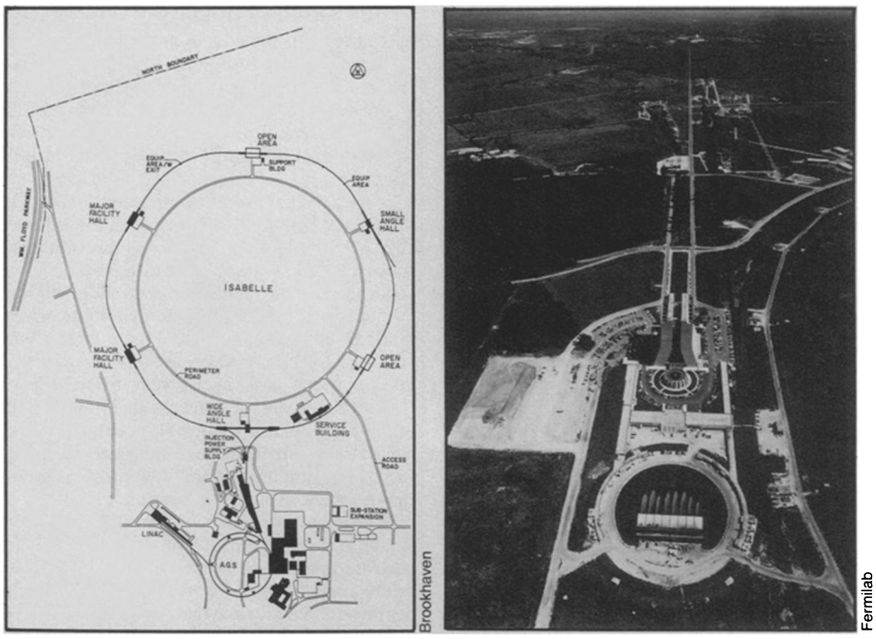
Accounting for Priorities in High Energy Physics

The design and construction of a major experimental facility for particle physics (aka high energy physics) can take several years and cost tens of millions (even hundreds of millions) of dollars. It is therefore necessary for the physicists (and the government) to think ahead about exactly what is wanted. As James Leiss, associate director of energy research for high energy and nuclear physics for the Department of Energy, puts it, "High energy and nuclear physics have long range planning. Most areas of basic science don't have such planning."

The remark is one of Leiss's responses to a report issued Sept. 16 by the Controller General of the United States, Elmer Staats, in which one may read: "The amount of funds provided by DOE [to high energy physics] has not been based on a comprehensive plan for maintaining a leadership position." The report, entitled "Increasing Costs, Competition May Hinder U.S. Position of Leadership in High Energy Physics," was prepared by the General Accounting Office. It is much less than a rave success among laboratory administrators and among the executive departments it criticizes.

After relating that the DOE had struck a deal with the Office of Management and Budget to fund high energy physics at a steady level of $300 million (1979 dollars) between 1979 and 1984, the report goes on, "Since the funding agreement was reached, DOE has not formally prepared a comprehensive plan which is consistent with the agreed upon funding level." Remarks like that draw outraged cries from the leaders of the physics community and from DOE. They insist they have plans. They are also unhappy with the allegation in the report that DOE's policies emphasize construction of accelerators to the detriment of other programs, such as funding for university researchers. That is to say that money tends to go into the budgets of national laboratories rather than into grants to university researchers. DOE disagrees, and Leiss even points out that because of the services laboratories provide to people who come to them to do experiments, "Half the money going to labs ends up as services to university researchers."

In the question of plans both sides may be right by their own lights. The report's language, indeed its title, indicates that the GAO is unhappy with the United States' competitive position in high energy physics and other sciences. "GAO is attuned to finding something wrong," says Leon Lederman, director of the Fermi National Accelerator Laboratory. The survey started after Lederman's predecessor, Robert R. Wilson, resigned in protest against the slowness of the funding of the



Colliding beam facility under construction at Brookhaven (l). Overview of Fermilab (r).

Tevatron, the laboratory's project to double the maximum energy of its accelerator.

According to Sumi Arima of GAO, the investigators "took a look at the energy saver [part of the Tevatron project]," and then gradually expanded the inquiry to the whole high energy program. They found that things in place and things desired cost a lot more than the available funds. And so the physicists have to bite the bullet, Arima says.

What the GAO report proposes is a series of scenarios intended to maintain the U.S. position of leadership in chosen branches of particle physics while deliberately giving secondary emphasis to others and writing others off more or less completely. This would be a bitter pill to swallow, but in the light of the fiscal estimates made by the GAO investigators, it seems necessary to GAO unless Congress can be persuaded to appropriate a lot more money. Biting the bullet seems to mean picking a place to concentrate your means.

The GAO people seem to have their eye on Western Europe, which seems to have opted for just such a concentration. The Europeans chose electron-positron colliding-beam facilities (with secondary excursions into proton-proton and proton-antiproton colliders). Should the United States make such a choice?

"Our program is broader based than that," says Leiss. The United States has a variety of high energy physics equipment capable of different kinds of experiment. Leading American physicists profess a dedication to a flexible approach. They are less willing to lay bets on the future of physics (as the Europeans are doing, and as the GAO seems to want). The triage aspect of declaring some laboratories major, some second class and some expendable also causes agony. In fact, the general comment is that this cost accounting approach is no way to do physics.

The physicists also disagree with the accounting itself. Lederman says the investigators went around the laboratories asking people what they would like to have and added it all up without making selections or evaluations. That's how they got their high estimates. GAO's estimate of 50 percent increase is unrealistic Leiss says; 10 or 15 percent would be sufficient to meet inflation.

Another bullet-biting proposal is that the President's Office of Science and Technology Policy do a comparative survey of high energy physics and other branches of science to see how much support it should have in competition with them. "Horrendous," says Lederman. "Extraordinarily difficult," says Leiss. There seems little chance that OSTP will want to reach for that nettle.

The GAO is an organ of Congress, and so the report goes to Congress, to the President of the Senate and the Speaker of the House. They will presumably relay it to the appropriate committees. One such is the House Committee on Science and Technology. Ezra Heitowit, a staff member of its Energy Research and Production Subcommittee, says, "We are reading it with interest, but I don't know that we've learned anything new from it." □