Weinberg

continued from page 78

Energy Analysis (Oak Ridge, Tenn.), and he is now on leave from the institute.

Weinberg will report to federal energy chief William Simon and with a small staff of perhaps a dozen members, Weinberg will be responsible for

- formulation of energy R&D policies and plans to implement them.
- ensuring that R&D priorities are consistent with overall energy policy.
- assisting the administrator in evaluating new R&D programs.
- working with AEC, the Environmental Protection Agency, NSF and the Department of the Interior to ensure that R&D programs are coordinated and balanced throughout the federal government.
- working with the Office of Management and Budget, the Council on Environmental Quality and other Executive Office agencies in presenting R&D alternatives to the President.

CERN II

continued from page 77

of the machine, 5–10 seconds per cycle. Typical field strengths were 4.5 tesla (45 kG), although the Saclay workers also looked at designs with 5–6 tesla.

Adams believes that by and large all the technical problems of building the magnets had been solved. Costs of producing a single magnet at a laboratory were known, but there was no knowledge of industrial prices. A second problem was how reproducible the magnets would be in mass production. And finally, there was the problem of reliability of mass-produced magnets in a really big machine. It was clear, Adams said, that the cost of the superconducting magnets went far beyond the money budgeted for them in the eight-year program for the SPS. To get it, Laboratory II would have had to raid the piggybank that had the money for the North Experimental Area. It did not appear worthwhile to pay the additional money to reach 500 GeV instead of 400 GeV.

1000 GeV. Superconducting magnets had also been considered because they would allow CERN to reach 1000 GeV with the same radius machine. So while GESSS was studying superconducting magnets, it was also studying designs for 1000-GeV superconducting machines. One possibility was to make half the magnets superconducting, giving 500 GeV, and then at a later stage, replace the iron-core magnets with superconducting ones to get 1000 GeV. A second possibility was to use the SPS as injector, operating at 200 GeV, build a new machine with superconducting magnets and put it in the same ring. Such a proposal has been discussed for the National Accelerator Laboratory. A third possibility was to use the SPS as injector, operating at 200 GeV, build a new machine with superconducting magnets, and put it in another ring concentric with the present one. In plans two and three the field would rise from 18 kG to 45 kG to provide the additional energy required.

GESSS concluded that the first plan was more expensive than either of the other plans. That was the clincher that killed the plan to make the SPS into a 500-GeV machine, and in June the CERN Council decided to go ahead with a 400-GeV device.

It is not clear, Adams notes, that using the same tunnel is the best solution for a 1000-GeV machine. Although CERN would save the 70 million Swiss francs needed to build a new tunnel, there are extra costs entailed in squeezing in a new machine. For one thing, the new machine would be locked to the same lattice as the SPS. A more economical design might be possible if the tunnel shape is a variable. Furthermore, to use the same tunnel, the SPS would have to stop doing physics for a year while the 1000-GeV machine was being built.

GESSS continues to function because there is great interest in superconducting magnets for detectors and in beam lines. (The SPS has a total of 6 km of beam lines, which would require as many magnets as were used for the Intersecting Storage Rings.) The problems for beam lines are different because many of them are run dc, not pulsed.

Power. Although CERN will not reach 400 GeV until 1976 and the National Accelerator Laboratory has already reached this energy, NAL is not able to do this routinely. The local power company, Commonwealth Edison, does not regularly provide the power to operate at this energy because when it does there is a phase shift and a voltage variation on the grid. Recently NAL and Commonwealth Edison did negotiate a formal agreement that will allow NAL to run at 300 GeV regularly, although 300-GeV operation has been routinely conducted for the past year. NAL is building a condenser bank to be placed in series with the power line, in order to reduce the voltage fluctuations produced by operation at 300 or 400 GeV. Even after installation of the condenser bank, NAL will continue to draw energy from the power network on a pulsed cycle. To even out this load, NAL is designing a superconducting magnetic storage device. The major portion of the energy used in an accelerator pulse would be drawn from the energy reservoir in the superconducting magnetic device.

CERN has been able to sign a contract with the French power company, EDF, that will enable the SPS to run routinely at 400 GeV. CERN has been working with the company for four years, even before the project began, to see how to cope with the power load in Europe. CERN ran simulated tests on the grid system with the projected power load, which proved successful, and the laboratory has designed a number of devices that will smooth out voltage variations and phase fluctuations.

The SPS is being built on a budget of 1150 million Swiss francs at 1970 costs. Its eight-year program ends in February 1979, at which time Laboratory II will dissolve and there will again be only one CERN laboratory, with a single director. By the end of 1976, Adams expects to have a beam in the experimental area.

Plans for the experimental areas are well underway, we learned from a conversation with Paul Falk-Vairant and Emilio Picasso. In 1975 and 1976 the existing West Hall will be transformed so that it will be ready to start experiments with the SPS at the beginning of 1977.

Two major facilities are planned. One is a neutrino beam that will be produced by 10^{12} or 10^{13} 400-GeV protons striking a target. The decay length will be 400 meters. A beam of 10^{7} neutrinos per pulse is expected to be injected into the Big European Bubble Chamber, a 3.7-meter device that is already operating (PHYSICS TODAY, January, page 18). BEBC will also receive separated hadronic beams up to 150 GeV and protons with as much as 200 GeV. The West Hall cannot be used for higher energy protons because of lack of space for shielding. The second major facility is a superconducting separator that will shoot separated hadronic beams up to 40–60 GeV into the huge Omega spark-chamber assembly. Both major facilities are expected to operate in 1977. In addition four or five other beams are being discussed.

In 1978 the huge new North Area will be opened up; part of it will be used for muon physics. To produce the muon beam, 400-GeV protons will strike a target that will be 40 meters below ground. —GBL

in brief

The US Patent Office is expediting the processing of patent applications relating to energy. Write to the US Patent Office, Office of Information Services, Washington, D. C. 20231 for information. □