

RESEARCH FACILITIES AND PROGRAMS

CERN starts storage rings and plans the 300 GeV

The European Center for Nuclear Research retains its air of purpose and international harmony. So we found when we lunched there recently with the director-general, Bernard Gregory, and members of ECFA, the European Committee for Future Accelerators, which was meeting that day at CERN, just outside Geneva. ECFA appears to be approaching the European 300-GeV accelerator with the same smoothness that has been characteristic of CERN since its 1952 founding. Touring the site and talking with physicists, we found that, aside from the 300-GeV plans, the most stimulating conversation pieces are two storage rings and a neutrino facility that is abuilding.

International harmony at CERN is outstanding. In Gregory's view the reasons are the good sense and explicitness of the 1953 convention under which the center was established and the feeling of purpose that surrounds a limited, clearly defined program: practically all of the work centers around the 28-GeV proton synchrotron.

George H. Hampton (UK), director for administration, and Léon Van Hove, (Belgium), head of the theoretical department added a few more reasons. One is positive feedback: the 26 CERN council members who represent the 13 member states are so proud "that they have been able to make at least one international organization work" that they just keep on doing so. Another is the absolute authority of the director-general. He looks to his seven department directors (known locally as "his seven dwarfs") for advice but makes the decisions himself. A third reason for harmony, says Hampton, is that a principle often stated, seldom applied elsewhere, really operates: the best man gets the job regardless of nationality. Ability rather than nationality is the selection criterion for a staff post.

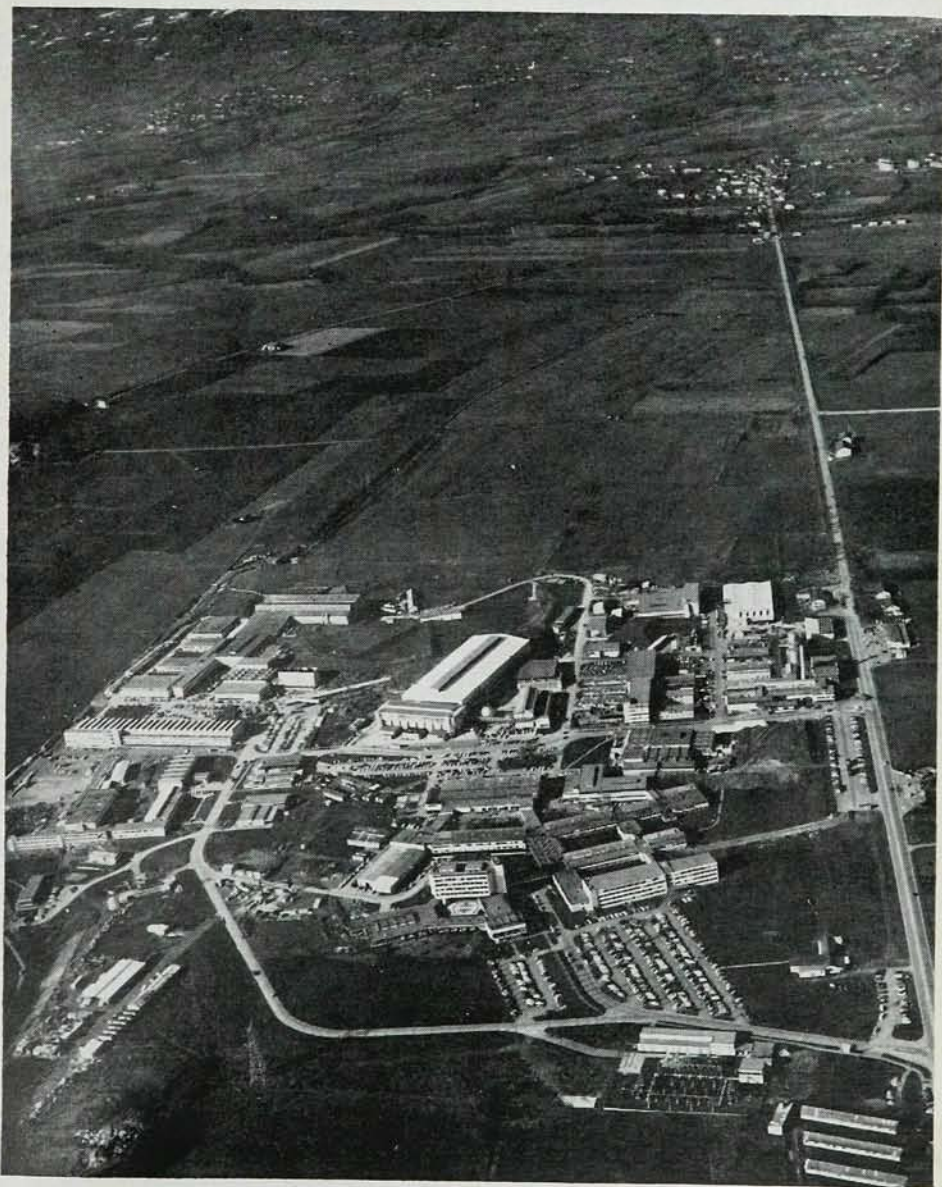
The 300-GeV accelerator is not a CERN project—at least not yet. But

ECFA has met at CERN's invitation under the chairmanship of Eduardo Amaldi (Italy). Its members are individual physicists (not delegates) from the western European nations that belong to CERN (Portugal, Northern Ireland, Finland and Yugoslavia do not), and observers from four or five interested nonmembers (including the US) attend meetings. Its purpose is to make sure that scientific recommendations for the 300-GeV machine and other aspects of

European collaboration are made by the whole European subnuclear-physics community and not just by the Geneva laboratory.

The CERN council is now considering likely sites for the 300 GeV (PHYSICS TODAY, October, page 75). Proposals in nine member states are now being studied in detail. Appearances are that the countries may agree on the project in time to dig holes in 1969. Physics might start coming out of the accelerator in 1976–80.

Although the 300 GeV would probably not fall under the jurisdiction



CERN FROM THE AIR. At upper corner of largest white roof is 28-GeV proton synchrotron. Just beyond it, in France, will be the new storage rings.



ECFA LUNCHEONS AT CERN. Director-general Bernard Gregory (head silhouetted against waiter's coat) discusses 300 GeV with *Physics Today* editor Hobart Ellis.

of CERN in its present form, the CERN council has become host and sponsor for ECFA in an attempt to exploit the harmony of its own operation. Gregory hopes that the council may take the new machine under its protection and operate it as an independent laboratory. CERN-I and CERN-II would then have their own directors-general and function separately although they would report to the same council.

Proton storage is much nearer realization than 300-GeV acceleration. We stood on top of the administration building and looked into that fenced-off piece of France that will hold the new storage rings. A cement column marks the ring center, and one or two others show where other portions of the new installation will be. Digging has just started and specifications for manufacture of the ring components are being completed.

The new facility will have not only the rings and installations around them from which to watch protons collide but also a new large experimental area to use protons direct from the accelerator. Protons will reach it through a pipe passing under the new ring.

The storage-ring project is expected to increase CERN staff and activities by about half. The increase will probably occur over the next ten years—

five of them to complete the construction and five more to bring the work to a peak. (1967 plans call for a total staff of 2360, an average of 350 visiting scientists on the grounds at a time and overall CERN expenditures of about \$50 million.)

Muon storage, meanwhile, already exists. In a 5-meter-diameter ring a group under Francis J. M. Farley (UK) is getting ever better data as they measure the anomaly in negative muon magnetic-moment-to-spin ratio. They have already exceeded the precision of their 1962 determination, and, when we talked to them, were looking forward to what Farley called "a really hot experiment."

In their apparatus a pulse of protons from the accelerator creates about a hundred stored muons. As these decay, counters register fast electrons that are produced, discriminating against slower ones. Counting rate decays at the muon decay rate, but superimposed on the decay is a modulation corresponding to spin precession and thus to the anomaly in the moment-spin ratio.

Data presented last September to the Berkeley high-energy conference showed widely scattered points to which a computer could fit a satisfactory modulation curve. But recent refinements produce counting histograms in which both mu decay and

modulation are unmistakable in the raw data. So far the measurements confirm theoretical predictions and also offer the first verification of relativistic time dilation in an out-and-back system.

Neutrinos will be available at four times former intensities in the neutrino facility CERN is building to replace its earlier one. Tunnels now being dug, shielded and equipped will feed neutrinos at first into the CERN 1.15-meter heavy-liquid bubble chamber. But this will soon be succeeded by a new larger heavy-liquid bubble chamber. Named "Gargamelle" (Gargantua's mother), it will come from France early in 1969 and hold 10 000 liters of liquid. (For more about Gargamelle, see next page.)

One feature the builders are eager to try out is a bigger and better Van der Meer horn that focuses the charged particles that eventually make neutrinos. The horn is a cone in which a pulse of current produces something like the ideal focusing field. The ideal would be the longitudinal field, increasing with radius, that corresponds to a cylinder of uniform current. Only in a plasma can one hope to create just this field and focus particles through it. But horns have worked well in earlier CERN installations, and hopes are high for the new one.

CERN-US cooperation has always been great, emphasized Gregory in our luncheon talk. Observers are regularly exchanged with Brookhaven National Laboratory. About 20 US scientists are at CERN as visiting scientists, and one of them, Winslow Baker, formerly of Columbia and Brookhaven, has recently been appointed a staff member. The 1960 appointment of Victor Weisskopf (MIT) as director-general, says Gregory, was by no means the solution of a political problem. He was the best person to bring the laboratory from completed construction to effective scientific research activity.

Before leaving CERN, we enjoyed a look at one of its best known rooms, Auberge Bimov. It does not honor one of the frequent Russian visitors but is the coffee, cake and coke room when the accelerator beam is off.

—RHE.