CERN Gives Nod to Four LEP Detectors

On the morning of 15 July, Samuel Ting of the Massachusetts Institute of Technology and several co-workers kept a nine o'clock appointment with Herwig Schopper, the director general of the European Laboratory for Particle Physics (CERN), to learn the fate of their proposal to build an elementary particle detector for CERN's future accelerator LEP. That day and the next, five other groups representing competing detector collaborations also met with Schopper. When it was all over, four of the groups, including Ting's, had been invited to prepare revised, detailed proposals needed for the final selection process in October. Although uncertain finances could limit CERN to just three LEP detectors, the plan is to have four, so the four collaborations given a positive nod are nearly certain to see their proposals accepted.

High-energy physicists find the outcome of the LEP detector competition to be of more than passing interest. LEP, which stands for large electron-positron storage ring, is scheduled to begin running in late 1987 as a 100-billion-electron-volt (GeV) machine. In ensuing years, CERN hopes to raise LEP's energy to a maximum of 260 GeV. As high-energy accelerators become so expensive that, like LEP, only one of each type is built, laboratories have been moving toward a policy of evaluating experimental proposals according to scientific merit alone—that is, without regard to the country of origin. LEP is being paid for by the contributions of CERN's European member states, but two of the six letters of intent CERN received last January were from collaborations with heavy American participation (*Science*, 4 June, p. 1088). Observers have been wondering how CERN would balance the obvious political pressure to keep scientists from the sponsoring member states employed against scientific objectivity, when only a few proposals could be accepted and "a lot of careers are at stake."

The selection process began last March with the first meeting of the LEP experiments committee, a 14-man group headed by Günter Wolf of the German Electron Synchrotron Laboratory (DESY). The committee has been meeting monthly (except in April) for detailed technical and financial examinations of the six proposed detectors. In its most recent meeting on 13 and 14 July, the committee agreed on which detectors to recommend and also suggested certain modifications to improve them.

In the public portion of the first LEP experiments committee meeting, Schopper warned that selection of experiments would not be made solely on technical merits. CERN's management would be looking closely at finances. Moreover, certain scientific policy issues that were independent of the physics itself would be considered. "The committee looks at the science and the Director General looks at the politics," was one observer's characterization of the selection process.

Schopper explained to *Science* that the judgment of the technical merits of the proposals was based on achieving an overall balance in experimental capability—that is, proposals were not evaluated strictly individually. He stressed that a diversified selection of detectors is needed. The four proposals given the go-ahead are for two general-purpose detectors and two more specialized instruments that emphasize different aspects of particle detection. The two universal detectors, in turn, include one employing advanced but risky technology and one based on conventional and hence safer technology.

The general-purpose detectors selected were ALEPH and OPAL. ALEPH was designed by a collaboration of 18 European and one American Institution (the University of Wisconsin) and is led by Jack Steinberger of CERN. ALEPH is considered the advanced technology detector. OPAL, the more conventional all-purpose detector, was proposed by a 16-institution collaboration, including one from Japan, two from Canada, and one from the United States (the University of Maryland), and is headed by Aldo Michelini of CERN. OPAL barely nosed out ELEKTRA, proposed by a collaboration of 18 European and three Israeli institutions, according to Schopper.

One of the two specialized detectors accepted, DELPHI, was originally proposed as a universal detector. The collaboration, consisting of 25 European institutions with Ugo Amaldi of CERN as spokesman, was asked to put more stress on its altogether new Cherenkov counter technique for particle identification and to deemphasize calorimetry (particle energy measurement). DELPHI was chosen over LOGIC, a predominately American detector.

The fourth proposal given a green light was that of the 22-member collaboration headed by Ting, whose detector remains nameless. The collaboration includes nine American universities, two Chinese institutions, and a large group from the Institute for Theoretical and Experimental Physics in Moscow. The collaboration had originally proposed a somewhat specialized detector emphasizing high-resolution measurement of muons and calorimetry. It was asked to devote more attention to calorimetry and less to muons. It was also asked to reduce its detector's dimensions by 10 percent so that the instrument, whose huge magnet requires more iron than the Eiffel tower, would fit in a standard underground LEP experimental hall.

In one happy meshing of scientific and political considerations, the LEP experiments committee noted the high manpower requirements of the proposed detectors. Each of the four favored collaborations has agreed to accept new members from among the two other collaborations. In this way, the collaborations will be technically strengthened (a requirement for final approval) and the political and financial resources needed to keep LEP rolling will not be diluted by disgruntled losers drifting away.

Indeed, finances may limit how many detectors are built. Schopper says that CERN's experts made their own independent evaluation of detector costs and came up with a total figure from 250 million to 280 million Swiss francs for four experiments ($1 = 2.07 SF). CERN will provide 50 million Swiss francs. The American contribution to collaborations with U.S. participation will come to just over $22 million, most of it to Ting's group. The Soviets may kick in about two-thirds this amount. The Japanese share in OPAL will be about 20 million Swiss francs. If all these countries come through, there could be four experiments; otherwise there may be only three. Commitment in writing is expected by this October, when the final selection takes place.—ARTHUR L. ROBINSON

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