



29th Session of CERN Council

The CERN Council held its 29th Session on Thursday 25 March, under its President, Mr. J. H. Bannier, of the Netherlands.

This was a special meeting, between the normal Sessions in December and June, arranged to review progress on the future plans for high-energy physics in Europe and with the particular hope that a decision could be made on the construction of the PS storage rings at CERN*. Unfortunately, the decision once again had to be postponed, but nevertheless the meeting afforded a useful occasion for a further exchange of views on the wider problem, especially related to the recently published American proposals (outlined on pp. 72-74 of this issue).

January-March at CERN

Conforming to the usual practice, the Session opened (after formal business) with a report to the Council Members, by the Director General, of the most important developments at CERN since they had last met.

Foremost among these was the completion of the first experiment at CERN on the decay of the K^0_2 meson, which had shown that the proposed 'fifth force' could not be invoked to explain the violation in this decay of the hitherto fundamental principle of CP invariance**. CERN had found itself in the unique position of having the only high-energy neutral kaon beam in the world and was thus able to be the first to confirm the occurrence of the decay into two pions and to rule out what might have been a simple explanation. Another interesting experimental result showed the existence of a new meson, with a strangeness number of 2, which decays into two kaons. Then, early in March, confirmation had been obtained at CERN of an interesting discovery at Brookhaven, when anti-deutrons had been detected in the m_4 beam. Although this was not surprising, it was at least satisfactory to know that they existed. So far, only 'antiparticles',

corresponding to the normal 'fundamental particles', had been found; now there was experimental proof of the existence of 'antinuclei', in this case the combination of antiproton and antineutron, confirming that the forces between antiparticles were certainly not much different from those between particles.

Among the activities of the theoretical physicists, many new and original contributions had been made at CERN to the various symmetry theories that were being talked and written about, although it was still much too early to come to any conclusions on the final outcome of all this thought.

In December, Prof. Weisskopf said, he had been able to announce the first tests on the CERN 2-metre bubble chamber. Now he could say that it was successfully carrying out physics research, and already it had taken its first 100 000 photographs. The new computer had arrived and was in operation 24-hours a day, though still more for tests than for actual use on physics experiments.

Lastly, the Director General mentioned the neutrino conference held last January*, from which it had emerged that the CERN experiments, done with the best existing neutrino beam, had more or less exhausted the present possibilities. Even though some of the results had been negative they had helped to establish a definite situation, and it was clear that any major advances would require improved instrumentation.

Expansion of high-energy physics in the U.S.A.

As a prelude to re-opening the discussion on the programme for future high-energy physics research in Europe, Prof. Weisskopf reported to the Council on his participation in the public hearings on the American programme, held by a sub-committee of the Joint Committee on Atomic Energy. Although he had been asked to appear in his capacity as an American citizen

* CERN COURIER, vol. 5, p. 26, February 1965.

** See CERN COURIER, vol. 5, pp. 20-21, February 1965.

* CERN COURIER, vol. 5, pp. 38-41, March 1965.

and Professor at Massachusetts Institute of Technology, it was in fact his experience as Director General of a European organization with international contacts that was of interest to the committee, and he had spoken on two topics: 'High-energy physics at CERN and in other non-U.S. Western countries', and 'International co-operation in high-energy physics; possibilities of co-operation in the construction of a multi-hundred BeV (GeV) accelerator'.

Dealing with the American programme, Prof. Weisskopf remarked that the present level of expenditure on high-energy (sub-nuclear) physics in the U.S.A. is about twice that in Europe, and it is proposed to double the annual expenditure there over the next five years. It seems likely that a decision to build the 200-GeV accelerator will be taken before the end of this year, and that it will certainly be a national machine, although a larger one, of some 800 GeV, might be constructed on an international basis.

International co-ordination

At the moment, the possibility of creating organizations on a larger scale than CERN for the construction of new accelerators was still in the future, but this did

not mean that there was no co-operation, continued Prof. Weisskopf. In fact, there was already a sort of 'world programme' of accelerators: 70 GeV at Serpukhov (say 1967), 200 GeV in the U.S.A. (1972?), 300 GeV in Europe (1975?) and 800 GeV in the U.S.A. (1980s). This programme had not been worked out in committee but was simply the result of give and take arising from the mutual consideration of other people's programmes.

A good example of this kind of procedure was the American decision not to build storage rings at the Brookhaven AGS. This was certainly not because of lack of interest in the type of physics that could be investigated with such apparatus, and in consequence the proposed storage rings (ISR) at CERN acquired added significance. There was also no question that experiments with colliding beams would stimulate the development of new detection techniques, placing Europe in a strong position in a field that was of equal interest for experiments with the larger accelerators.

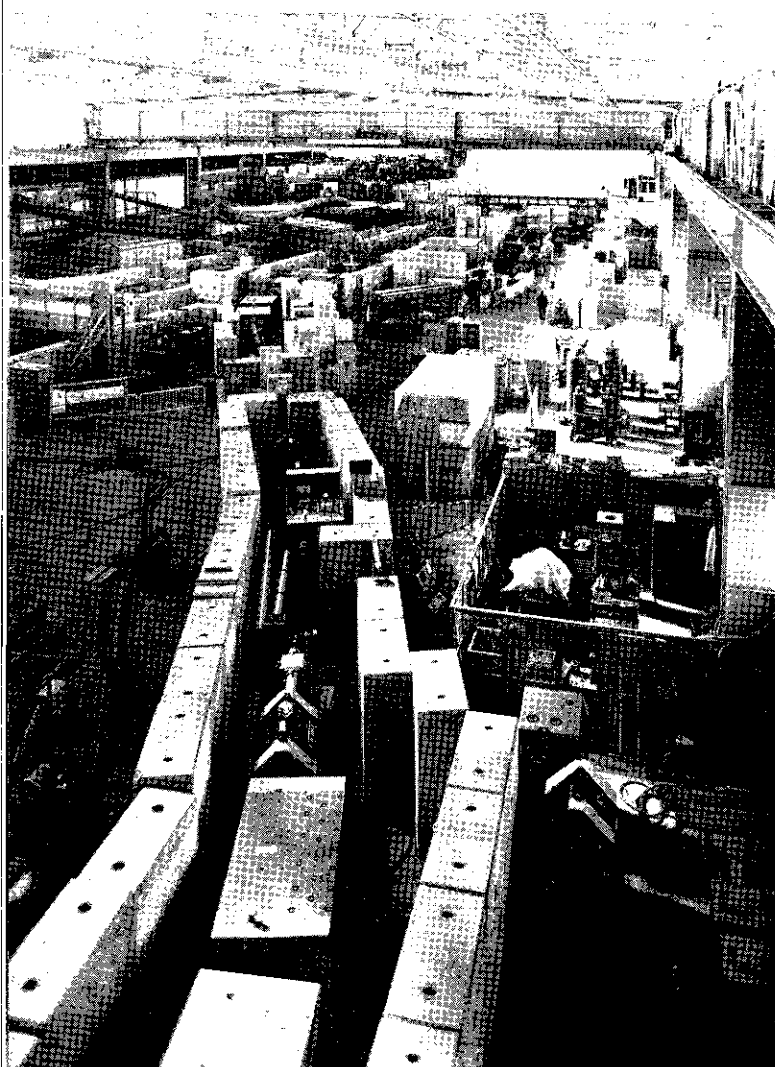
Already, physicists in the United States had shown themselves interested in participating in some way in the research carried out at the ISR, and CERN was anxious to foster this kind of collaboration. In a similar way, the Russian 70-GeV proton synchrotron at Serpukhov could provide experience for the 200-GeV accelerator in the U.S.A., and both could be of use to the 300-GeV machine in Europe. This idea had, in fact been taken up with the Russians and they were quite enthusiastic about the possibility that instruments from CERN could be taken to Serpukhov when their accelerator is in operation.

S.P.C. confirms its position

Speaking for the Scientific Policy Committee, its chairman, Prof. L. Leprince-Ringuet, reiterated its views on the three-point programme put forward last year. It firmly believed that these plans should be supported and that it was important to come to conclusions about the whole programme as soon as possible, even though construction of the different items would be phased over a relatively long period.

The three main parts of the programme consist of the appropriate development of the present CERN facilities, the construction of intersecting storage rings for the PS, and the building of a 300-GeV synchrotron somewhere in Europe. Basic details of the CERN improvement programme have now been worked out

As mentioned in Prof. Weisskopf's report to the Council, the CERN 2-m liquid-hydrogen bubble chamber was in operation during March. To bring antiprotons or kaons to the bubble chamber from the target inside the proton synchrotron, the α_2 beam in the East experimental hall was deviated after the electrostatic separators and brought across the hall by means of a new series of bending and focusing magnets. The complete beam line (α_4), enclosed on each side by concrete blocks, can be seen in this photograph.



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for the first four years, to include the first phase of the PS improvements aimed at increased intensity, better experimental facilities, some large instrumentation for counter techniques, and the installation of a new heavy-liquid bubble chamber, to be constructed in France. The cost of these developments would be 1, 6, 18 and 30 million Swiss francs, respectively, in the years 1965, 1966, 1967 and 1968. The Scientific Policy Committee, in its statement to the Council, remarked that this expenditure was modest compared with that on similar developments proposed in the U.S.A. However, it represented capital expenditure, which was in addition to the normal running costs of the laboratory and should be taken into account appropriately in considering the budgets for 1967 and 1968, still to be determined.

On the question of the storage rings, Prof. Leprince-Ringuet underlined the fact that, apart from their intrinsic value, they provided an important element for wider co-operation among the world's high-energy physicists. The site was already chosen and in order to secure maximum benefits from the machine it should be built as soon as possible. The decision to undertake construction should thus be taken in 1965.

During discussion on the storage-ring project it was announced that Italy was after all able to participate in the supplementary programme (design studies for the storage rings and the 300-GeV accelerator) this year and was also in favour of the ISR project as such. A number of other Delegates also indicated that their countries were in favour of constructing the storage rings, adding to those who had announced this at the December Session. Of the major financial contributors to CERN, only the United Kingdom had still to come to a positive decision. As Sir Harry Melville explained, the new Government had called for a complete review of all research expenditure and no decision could be taken out of this context.

'Gargamelle'

Detailed discussion of the improvement programme for CERN-Meyrin concentrated on proposals for two new bubble chambers.

Prof. Leprince-Ringuet reported the Scientific Policy Committee's recommendations that two new large chambers should be built, the more important one being a liquid-hydrogen chamber and the other, which could be built more rapidly, a heavy-liquid chamber.

The Committee proposed that a working party should be set up to study in detail all the questions concerning the hydrogen chamber, so that a detailed design could be ready in about a year's time.

For the heavy-liquid chamber, a design has already been brought to an advanced stage by a joint group from the 'Ecole Polytechnique', Paris, the University of Paris, and the 'Centre d'Etudes Nucléaires' at Saclay. The chamber even has a name: 'Gargamelle', after the giant, mother of Gargantua, created by the French author Rabelais in the sixteenth century. Professor F. Perrin, speaking for France, stated that his Government was willing to finance the construction of this apparatus as a contribution to European physics. There would be profit to France in the experience gained in developing techniques for its construction and operation, but once built it would be used at CERN in the same way as any other bubble chamber; French physicists would demand no special privileges.

The chamber would have a diameter of 1.9 metres and a length of 4.5 metres, with a visible volume of more than 10 m³, ten times larger than the present CERN heavy-liquid chamber. It would cost rather more than 12 million Swiss francs and could be built in 3½ years. CERN would have to provide the power supply (6 MW) and other facilities for its installation, at a cost of 7 to 8 million Swiss francs spread over four years.

The possibility of building such a bubble chamber, which would be of particular use in the study of neutrino interactions, was greeted with great interest by the Delegates to the Council, and it is probable that a decision to proceed with its construction will not be long delayed ●

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