

28th Session of CERN Council

The customary end-of-year meeting of the CERN Council was held on 15 and 16 December 1964, in the Council Chamber at Meyrin, under its President Mr. J. H. Bannier, of the Netherlands.

Six months of progress

An early item on the agenda was the presentation by the Director General of the Progress Reports of the Divisions for the preceding six months*. Notable advances had been made on the instrumentation side of the Laboratory since the previous Council Session, and, in particular, Prof. Weisskopf was able to announce the successful operation of the CERN 2-metre bubble chamber. The proton synchrotron had reached a beam intensity of 10^{12} protons per pulse in July, and had been operated for long periods at around this intensity many times since. The accelerator was more reliable and had fewer breakdowns than others and was undoubtedly, at the present time, the best in the world. Another field where CERN was leading was that of radiofrequency particle separators. In the field of data evaluation the HPD (Hough-Powell Device) was being used for the automatic evaluation of photographs from a bubble-chamber experiment, in addition to its earlier use for spark-chamber photographs. Luciole, the other automatic device for analysing spark-chamber photographs, was also in operation.

Among the scientific achievements of the Laboratory, Prof. Weisskopf drew attention to the results of the first stage of the neutrino experiment, pointing out that it was almost as important to know that the so-called W particle, even if it exists, could not be produced with present-day equipment as it would have been to have discovered the particle itself. CERN was now a leading centre in the discovery and investigation of new 'resonances' and similar phenomena, according to Prof. Weisskopf. The team investigating high-energy proton-proton scattering had discovered, in common with other laboratories, the very interesting phenomenon of a 'real scattering amplitude'. Results from the experiment to investigate the electron decay of the lambda particle showed that this process was most probably identical with that of ordinary radioactive beta decay.

More generally, the ties between CERN and other high-energy laboratories throughout Europe were being strengthened. The 152-cm British bubble chamber, for instance, had taken several hundred thousand pictures already (again since the last meeting of the Council), and a team from the French Laboratory at Saclay had constructed their own apparatus to investigate the charge exchange of pions and protons, bringing the equipment to CERN for the actual experiment.

Mention ought also to be made specifically of the increased number of experiments on nuclear structure — more truly 'nuclear research' than most of the work at CERN —, and it had been proposed that a

HOMAGE TO FORMER GREEK DELEGATE

Before beginning their formal business, the delegates stood in tribute to Prof. N. Embiricos, who had died suddenly on 15 November. Prof. Embiricos was for many years one of the Greek delegates to Council and his signature appears on the Convention establishing the Organization.

large part of the synchro-cyclotron operating time would be devoted to such experiments in the future.

'Europe' equivalent to 'CERN'

Summing up these results, Prof. Weisskopf referred to the 'Rochester' conference, held at Dubna in August 1964, where it was clearer than ever that the contributions of Europe to high-energy physics were becoming more and more important with respect to those of the U.S.A. and U.S.S.R. Moreover, in this context it was impossible to distinguish between 'Europe' and 'CERN'.

As for the future, he hoped that this advance would be maintained, and that Europe would be able to keep pace or even improve its position. Much thought was being given to long-term plans, and an enormous effort had been put in by those concerned to produce the report that was being presented to Council (in two languages) on the design study of a 300-GeV accelerator. CERN could not stand still; by 1970 there would be machines of higher energy than the CERN proton-synchrotron in operation at Stanford and Serpukhov, and more powerful machines were also foreseen for Brookhaven and Berkeley.

Of more immediate concern, Prof. Weisskopf mentioned that the successful trials with the 2-metre bubble chamber had accentuated the problems of the electricity supply to the site. The necessary consumption was approaching a rate of 20 MVA and although the increased need had been foreseen over four years ago, difficulties outside CERN's control were considerably delaying the installation of the planned new supply. He hoped that these could soon be resolved.

In thanking Prof. Weisskopf for his report, and congratulating Prof. Peyrou and the whole of the TC Division on their new bubble chamber, Mr. Bannier recalled that when the decision was taken to build this instrument the Council Chamber did not exist, and few of the delegates, meeting at that time in the conference room of the International Labour Office, had realized how far CERN was going to develop in the meantime.

Among other speakers, Prof. Trumpy (Norway) remarked on the inspiring effect of CERN on the number of advanced students of physics in Norway, where active schools now existed at the Universities of Oslo and Bergen and the Technical University of Trondheim.

* Document CERN/560. See also last month's CERN COURIER.

More to spend in 1965, but costs higher

At the meeting in December 1963, Council approved a budget total for 1965 of 116 million Swiss francs, at 1963 prices. Taking into account the subsequent increases in the cost of buildings and equipment, as well as salaries, the corresponding total has become 128 760 000 Swiss francs*, and the draft budget for this amount was approved at the December 1964 session. Since a small part of the money required comes from miscellaneous other sources, a total of 126 400 000 Swiss francs** is to be provided by the contributions of Member States. The amount approved represents a 'real' increase of some 11% over the expenditure in 1964, conforming to the recommendations of the 1962 'Bannier report'.

Later in the session a firm estimate for the 1966 budget of 135 million Swiss francs (at 1964 prices) was also agreed upon.

Symphony in three movements

Opening a discussion on general scientific policy, Prof. L. Leprince-Ringuet presented the recommendations of the Scientific Policy Committee, of which he is Chairman. Broadly speaking these were the same as those presented at the June session of Council, but further discussions — and particularly a special meeting of the European Committee on Future Accelerators in October — had enabled further developments to be taken into consideration. Prof. Leprince-Ringuet likened the three parts of the programme to a symphony composed of three movements. The prelude would be the improvements to the present facilities at CERN, taking the Laboratory as far as 1971-1972, the andante would be the intersecting storage rings, and the finale the 300-GeV accelerator, which would not be in operation before 1976. Like the symphony, this programme formed a coherent whole. If the first movement were not followed by the second, to take one example, the audience might leave before the finale — if the proposed storage-ring operation were to be left out there might not be sufficient qualified physicists of the right calibre left in Europe to run the 300-GeV machine.

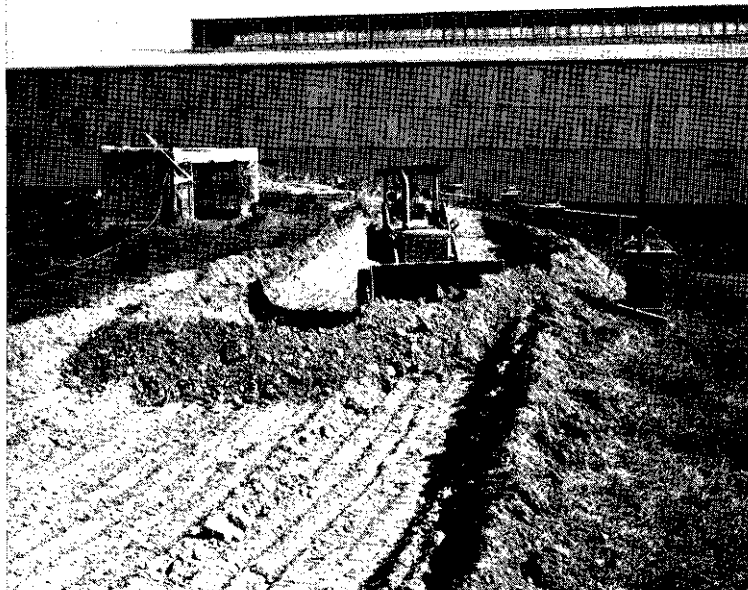
Mr. Bannier, reporting on a meeting held in Vienna between representatives of European countries, the U.S.A. and the U.S.S.R., said that it was quite clear that no collaboration was possible on an accelerator with an energy as low as 300 GeV. In addition, talks between representatives of the CERN Member States and of the U.S.A. had shown that joint construction of a machine of the order of 200-300 GeV was also impracticable. However, the idea of future collaboration between Europe, the U.S.A. and the U.S.S.R. should not be abandoned and CERN should continue to explore all possibilities in this direction.

Prelude

Later in the session, CERN's Director General, Prof. V. F. Weisskopf, outlined the present status of the improvement programme for the 28-GeV proton synchrotron. Although, as he pointed out, from a physics point of view the storage rings should be included in such a programme, from a budgetary point

* Equivalent to 29 800 000 dollars. ** Equivalent to 29 300 000 dollars.

CERN/PI 52.9.64



Many people were surprised last September when it appeared that preparations were being made for yet another new building, this time on top of the proton synchrotron ring! However, the bulldozer was only 'on loan', to remove a layer of earth temporarily in an experiment designed to gain more exact information on the shielding properties of this useful material. The experiment formed part of a study made jointly by AR Division, MPS Division and the Health Physics Group, to enable estimates to be made both of the extra thickness required if the PS intensity is further increased and of the needs of possible future machines such as the intersecting storage rings or the 300-GeV accelerator.

of view they were separate. During consideration of the normal budgets of CERN for the next few years, therefore, only the other improvements had to be discussed.

The first of the projects included a new power supply and Linac injector for the PS, which together would increase the beam intensity (protons per second) by a factor of ten. The second item to be considered was new instrumentation — a long-pulse radiofrequency separator, a large magnetic spark chamber, wire spark chambers working on-line to computers, etc., and other techniques as yet unknown.

An instrument that would certainly be needed was a large new bubble chamber. It might seem strange to talk about this on the same day that operation of the 2-m chamber was announced, but these things took many years to plan and build, and recent technical progress, in photography and cryogenics, now made it possible to consider building a much larger chamber at proportionally less cost. A cylindrical chamber, with a diameter of 5 metres and containing around 25 000 litres of liquid hydrogen would enable many experiments to be carried out that were impossible with present techniques, and such designs were currently under study in the United States, United Kingdom and elsewhere, as well as at CERN. The cost of a chamber of this size might be about 40 million Swiss francs, but the suggestion had been made that this instrument could perhaps be constructed by some of the Member States, following the 'tradition' established by the Ecole Polytechnique, Saclay, British and other chambers used at CERN, and thus not fall on the CERN budget.

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CERN/PI 240.12.64

Track Chambers Division's Christmas party on 22 December was also the occasion to celebrate the successful completion of the 2-m bubble chamber, and many other people from CERN were invited to join in the festivities. The party also inaugurated the Division's new apparatus assembly hall, then nearing completion as part of the new laboratory 13.

With the growing importance of neutrino physics, better beams and new experimental halls, ejection systems and detectors would no doubt be needed.

Balanced ensemble

It was hoped to carry out these projects during the years 1966-1971 inclusive. If this were done the PS would still be able to hold its own, after that time, with respect to the Brookhaven AGS, where even more ambitious improvements were expected to be carried out. The total cost would come to rather more than 20 million Swiss francs a year, on average; with the slower increase anticipated in the 'basic' CERN budget after 1966, the total annual expenditure could be expected to reach rather more than 210 million Swiss francs in 1971. If the programme as suggested could not be financed, it would have to be cut down or extended in time. The first alternative was undesirable, because CERN would then find itself with facilities far below those of Brookhaven. The second would be uneconomic in the long run; experience at CERN had already confirmed the rule that *ad hoc* improvements, compromises, and efforts to make do with existing equipment instead of what is really necessary, rarely use money in the most efficient way.

Referring to Prof. Leprince-Ringuet's analogy, Prof. Weisskopf said that he disagreed slightly. He felt that the improvement programme and the intersecting storage rings were more like the strings and the brass in a single movement. The two together formed a balanced whole that would serve CERN-Meyrin for the next 10-15 years and bring European physicists to the state where they could exploit to its full extent the 300-GeV accelerator — the key to the future of high-energy physics in Europe — which they all hoped would be producing results long before 1980.

ISR decision deferred, but studies continue

Although delegates from a number of Member States were able to announce that their Governments

were in favour of constructing the intersecting storage rings (ISR), intended as an addition to the CERN proton synchrotron, others were still not in a position to vote definitely for the project. It was accordingly decided to postpone the decision in the hope that it could be made at a special meeting of Council, called for 25 March. Later in the session, the continuation in 1965 of the supplementary programme, which covers work both on the storage rings and the 300-GeV accelerator, was agreed upon. Spain joined the Member States financing these studies, but Italy had to withdraw for the time being. All the other Member States except Greece are involved and expenditure this year of up to 5.7 million Swiss francs was authorized, pending a final decision on the budget and contributions at a later date.

450 pages on 300 GeV

The current state of the design studies on the proposed 300-GeV accelerator was shown by the presentation of a two-volume report by the Study Group on New Accelerators. In some 450 pages, accompanied by over 100 drawings, the main parameters of the complete project were given, including detailed time and cost estimates for construction.

As envisaged in this report, the accelerator itself, its booster synchrotron and injection linac, and the ejected beams would all be situated in tunnels some 10 metres underground. The accelerator tunnel would form a ring some 2.4 km in diameter, followed on the surface by a road with suitably positioned access points all round the ring; ejected beams from a number of points would follow inclined tunnels to reach the surface

COUNCIL OFFICERS FOR 1965

At the 28th Session of Council the following officers were elected, or re-elected, for the coming year:

President

— Mr. J. H. BANNIER (Netherlands),

Vice-presidents

— Sir Harry MELVILLE (United Kingdom),

— Dr. G. W. FUNKE (Sweden),

Chairman of the Finance Committee

— Dr. W. SCHULTE-MEERMANN (Federal Republic of Germany),

Chairman of the Scientific Policy Committee

— Prof. L. LEPRINCE-RINGUET (France).

In addition to the above, the Committee of Council includes the following members:

— Prof. E. AMALDI (Italy),

— Prof. W. JENTSCHKE (Federal Republic of Germany),

— Mr. J. MARTIN (France),

— Mr. J. WILLEMS (Belgium), representing Belgium and the Netherlands,

— Prof. B. TRUMPY (Norway), for the Scandinavian countries,

— One representative of Spain, for Spain and Greece,

— One representative of Switzerland, for Switzerland and Austria.

several hundred metres away from the ring; a bubble-chamber area is envisaged at a distance of 3 km. Apart from roads, and small buildings at the access points, most of the surface constructions would be concentrated in two areas, one around the main control centre and a smaller one in the so-called 'experimental area A'. By using buildings of several storeys, it is planned to keep the area of the central complex less than that of the present CERN site.

The report, as presented, would enable a decision of principle to be taken now on the construction of the accelerator. In fact it was stated in the foreword that the design is at a much more advanced state than was that of the CERN PS when approved by Council at the end of 1953.

According to the construction schedule, if a decision to build the accelerator could be made at the end of 1966 the machine could be finished before 1975. However, before work could begin, a site would have

to be decided and agreement would have to be obtained on the convention governing the new laboratory and its relations with the host country. Both steps would involve a considerable amount of technical and administrative work, and it was for this reason that the request for offers of sites had been sent to Member States after the June Session of Council. At the December Session, offers from four Member States were made known, and others were expected. A closing date of 1 May was fixed, so that a start could be made after then on a comparative evaluation.

Information presented to the Council showed that over a hundred technically possible sites had been considered by the Study Group since the start of the project, although many of them had quickly been found to have obvious disadvantages. Fourteen were still on the list as possibilities and the results of the eliminating examinations had been used to advise experts in the Member States so that only the most suitable sites would be included among the formal offers ●

PARTICIPANTS

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* Adviser ** Substitute

BOOKS

Progress in nuclear physics, vol.9, edited by O.R.Frisch (Oxford Pergamon Press Ltd., 1964; £4.10.0).

Even the casual reader, on leafing through this book to page 295, where the contents of previous volumes in the series are listed, will notice that those eight books contain the quintessence of nuclear physics. In fact, one is almost tempted to claim that the presence on one's bookshelf of the complete series makes the ownership of other textbooks on nuclear physics a luxury. To what extent, then, does the present volume follow the example set by its illustrious predecessors?

All but the most critical (and they are never satisfied, anyway) will have to agree that the high standard has been fully maintained. The contents have undergone the usual careful selection and the result is six articles of topical interest, covering spark chambers (J. G. Rutherglen), semiconductor counters (G. Dearnaley), beam design (N. M. King), analysis of collision amplitudes (R. J. Eden), interactions of strange particles with nuclei (E. H. S. Burhop, D. H. Davis and J. Zakrzewski), and the electromagnetic properties of the muon (F. J. M. Farley). In other words,

three articles on applied physics and three articles concerned with results or with theory; a well-balanced diet.

The quality of presentation is so high that it would be invidious to single out any one paper for praise. However, if laurels must be given, then let them go to Eden's exposé of an elegant technique in the domain of theory and to the review of the strange-particle interactions; to the former for its lucid explanation of a difficult and controversial subject, to the latter for the model ease with which a large body of experimental results, often not too well correlated, have been assembled and knit together to make a very readable (and very useful) survey. Needless to say that, as both articles are of interest to the reviewer, he is an unfairly biased judge.

Dare we, after all this praise, ask one embarrassing question? Assuming that *Progress in Nuclear Physics* is intended to present the latest knowledge in an easily assimilable and, at the same time, condensed form, why the long delay between the reception of the manuscript by the publisher and the appearance of the book on the market? With the book dated 1964, the bibliography finishes in 1962