

The European Organization for Nuclear Research (CERN) came into being in 1954 as a co-operative enterprise among European governments in order to regain a first-rank position in nuclear science. At present it is supported by 13 Member States, with contributions according to their national revenues: Austria (1.92%), Belgium (3.78), Denmark (2.05), Federal Republic of Germany (22.47), France (18.34), Greece (0.60), Italy (10.65), Netherlands (3.87), Norway (1.46), Spain (3.36), Sweden (4.18), Switzerland (3.15), United Kingdom (24.17). Contributions for 1983 total 92.5 million Swiss francs.

The character and aims of the Organization are defined in its Convention as follows:

'The Organization shall provide for collaboration among European States in nuclear research of a pure scientific and fundamental character, and in research essentially related thereto. The Organization shall have no concern with work for military requirements and the results of its experimental and theoretical work shall be published or otherwise made generally available.'

Last month at CERN

Although in July the holiday season meant that room could nearly always be found in the car parks, life proceeded very much as usual for those who remained in CERN.

Apart from the routine number of hours for machine development and nuclear chemistry, roughly half the

running time of the **proton synchrotron** during July was spent with the external proton beam, for the 'neutrino experiment', and half with the internal beam, primarily for the two counter experiments in the East hall. These two — one studying the nature of the secondary particles from proton interactions in various targets, the other some new measurements on proton-proton interactions — both completed their machine runs. Several other experiments using counters and spark chambers were being set up, or shared the beam during these runs.

The proton-proton interaction experiment, which investigated the production of excited nucleon states (isobars) and deuterons, served to provide an interesting demonstration of the **flexibility of operation** of the synchrotron. Normally a high-energy accelerator like the PS is not used to accelerate protons to energies much below the maximum possible, since usually it is the higher energies that are most useful, lower-energy accelerators being used for lower-energy problems. For an experiment like this one, however, where the production of the isobars and deuterons changes in a systematic way with the incident energy, it is useful to be able to vary the energy of the incoming protons over as wide a range as possible. In this way, any errors that might be introduced by transferring the detecting apparatus to a lower-energy machine is avoided. Thus during the progress of this experiment in June and July the incident proton energy was varied right down to about 3 GeV. As a final proof of versatility, during one of the machine development periods the synchrotron was operated at 1 GeV, equal to the maximum energy of Europe's smallest (and first) synchrotron at Birmingham University, where, incidentally, many of CERN's accelerator engineers gained their initial experience.

The intensity of the synchrotron's **circulating beam** was further increased during the month, and the maximum recorded figure has now reached 8.5×10^{11} protons per pulse. The highest average for one 8-hour shift was $7.9 \times$

10^{11} protons/pulse and the average for the whole month just over 7.2×10^{11} protons/pulse.

In previous discussions of the fast ejection system now operating at the synchrotron, mention has been made of the **slow ejection equipment**, designed to extract the protons gradually from the circulating beam over a considerably longer time during each machine cycle, to suit experiments using electronic counters and spark chambers.

At the end of July, a further step was taken towards the provision of this facility. During the 2½ normal maintenance days, the 'slow ejection magnet' and its electromechanical positioning equipment were completely installed in the vacuum box in straight-section no. 1 of the accelerator. This is the same box that contains the fast ejection magnet, but whereas the fast magnet is impelled into the beam path from below, the slow magnet moves in and out in a horizontal plane. Both systems have been carefully interlocked, so that they do not interfere with each other.

The slow ejection magnet is of the 'septum' type, with a length of about 1.8 metres and overall cross-section 10 cm x 15 cm. Before being installed, the whole system had completed some 250 000 cycles of test operation in a similar vacuum box in the South-hall extension, under normal operating conditions except that there was no proton beam or other radiation.

Back at CERN in July was Anselm Citron, physicist of the Nuclear Physics Division and present co-ordinator of experiments on the synchro-cyclotron, after a stay from 23 May to 20 June at the **Joint Institute for Nuclear Research** in Dubna, U.S.S.R. During his visit, the result of an invitation to a number of CERN physicists from Prof. D.I. Blokhinsev, Director of the Institute, he worked in the Laboratory of Nuclear Problems on the first stages of the installation of a muon beam at their 660-MeV synchro-cyclotron. His experience with the design and construction of the muon channel at the CERN synchro-cyclotron was thus of particular use. He

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The cover photograph was taken in the control area of the big spark-chamber assembly in use for the neutrino experiment, during the initial stages of a run during July. Of the three physicists in the picture, representative of more than a dozen working on this part of the experiment, only one is a CERN staff member — Frank Krienen, from the Netherlands, who is furthest from the camera. Max Reinharz, speaking into the microphone of the communications set linking the experimental areas and the main control room of the synchrotron, is a research associate, from Austria, and Shuji Fukui is a Ford visiting scientist from Japan. An article on CERN fellows and visitors, and the way in which they join in the work of the Organization, begins on p. 101.

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also gave two lectures (in Russian) ; one at a general seminar, on the experiments already completed or now in progress at the CERN SC, the other more specialized, on muon focusing devices.

Apart from other Laboratories (equivalent to CERN Divisions) of the Institute, he visited the Lebedev Institute in Moscow, which has various electron accelerators, and the Physical Institute of the Armenian Academy of Sciences, in Erevan, where he saw the 7-GeV electron synchrotron under construction and some large-scale cosmic-ray experiments.

Both he and his wife were very cordially received everywhere, and apart from the scientific interest of the journey they were able to meet many people and see something of the everyday life of the country●

Slight corrections to the data on sub-nuclear particles published in our May issue have been shown to be necessary by a communication from physicists of the Lawrence Radiation Laboratory, Berkeley, U.S.A., in *Physical Review Letters* dated 1 July. This resolves an anomaly previously existing in the determination of the mass of the Σ^- hyperon and gives new values for both this mass and that of the Σ^0 . The new values are 1197.6 ± 0.5 MeV and 1193.2 ± 0.7 MeV respectively. The previous anomaly was shown to be due to the fact that Σ^- particles slowing down in matter lose energy at a lower rate than Σ^+ particles of the same velocity.

Prof. A. H. Rosenfeld, of Berkeley, has also kindly pointed out to us that the **eta meson** occupies an anomalous position in table 2 of the listing in the May issue. Its short lifetime is due to decay by means of the 'electromagnetic' interaction and it is in fact stable against disintegration by the 'strong' interaction. Although it is among the newer particles to be discovered, transferring the eta meson from table 2 to table 1 would make the table headings more correct, an 'elementary' particle being interpreted as one which is stable against break-up via the strong interaction.

We hope to return to this subject later on, but meanwhile, readers of *CERN COURIER* will be interested to know that Prof. Rosenfeld is currently contributing a series of articles entitled 'An elementary (?) guide to the elementary (?) particles' in the Lawrence Radiation Laboratory's monthly journal *The Magnet*●

In Memory of Prof. Bakker



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At 12.30 a.m. on Thursday 25 July, members of CERN gathered in the library to remember our former Director-general, the late Prof. C. J. Bakker, and to witness the unveiling of a bust created — from memory — by one of us, Paul Theurillat, photolithographer in the Scientific Information Service.

There also were Mrs. Bakker, Mr. J. H. Bannier, Netherlands delegate and Vice-president of CERN Council, Mrs. Bannier, and Mrs. Dakin. The unveiling was performed by S. A. ff. Dakin, CERN's Directorate Member for Administration, deputizing for the Director-general, Prof. Weisskopf, who was unable after all to be present.

Mr. Dakin recalled Prof. Bakker as the chief of the few devoted men who built up the framework of the Organization, forming the living structure to express the ideals for which it was created :

'Very happily, he saw the synchro-cyclotron come into most successful operation, and the first of the many first-class research results to come from it, the harvest of so many years of his work, as Leader of the Synchro-cyclotron Group before CERN existed, as Director of the SC Division and as Director-general. We must be happy that he saw also the operation and the inauguration of the proton synchrotron.'

Continuing, Mr. Dakin reminded us that : 'Prof. Bakker saw CERN through the first of its growing pains, when the Member states had to be gradually, and painfully, convinced that the original estimates of our size and cost, drawn up with the innocence of people who were trying to do something that had never been done before, had proved grossly insufficient... CERN is now going through another such period ; without the work and effort which Prof. Bakker devoted to it a few years ago, CERN would now be barely alive enough to grow.'

Of the bust, Mr. Dakin said : 'It seems to be particularly fitting that (it) is the work of a member of the CERN staff... This makes it peculiarly a CERN family occasion, and it is good that this bust should be placed in the library, not in a public place, but in the very heart of CERN itself.'

Mr. Bannier, speaking, as he said, on behalf of Mrs. Bakker and her family, for himself, and as Netherlands representative on the Council, remembered Prof. Bakker firstly as a scientist, who had put all his enthusiasm into building up the scientific organization that is CERN. It was fitting that his image should be in the library, where all the results of CERN's work are stored in printed form and where inspiration for further progress is to be found.

But Prof. Bakker was also more than a scientist ; he had a scientist's vision for international co-operation and better understanding between peoples. From the very earliest days he had imagined, and worked for CERN not as just another important scientific institution, but as something of very great human value. It was good that in the future those who worked here, and those who came to CERN as visitors from all over the world, should find him here also as the spirit of the international co-operation that he had so much at heart●