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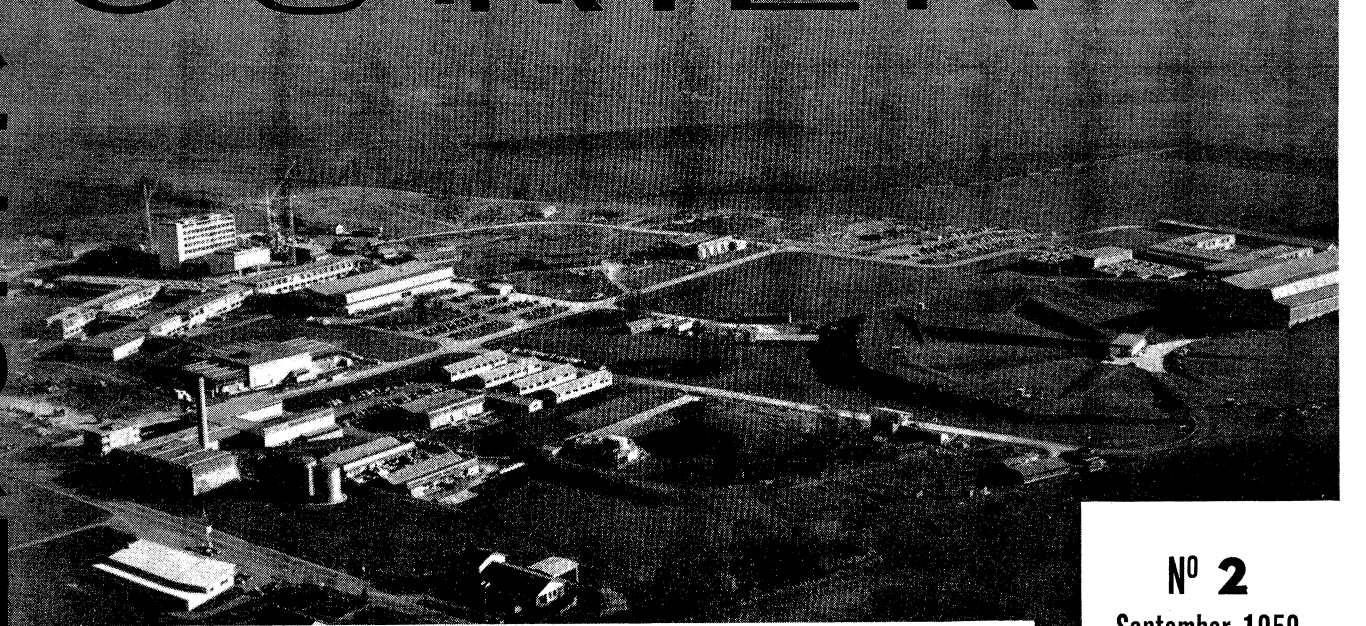


Last month at CERN

It seems to be getting quite a habit for the proton synchrotron to provide the most important CERN news every month.

On 24 August a 50 MeV particle beam was obtained at the output end of the last of the three linac cavities. Final energy of the linac was thus reached.

That evening the accelerated proton current reached half a milliampere. Tests made at night — maximum energy is only produced at night so as to avoid unnecessary radiation hazards for the staff — have since made it possible to increase this figure to nearly 5 milliampere. This is almost the maximum beam intensity for this part of the machine. The beam then passed through a port in the radiation shielding wall at the end of the linear accelerator room.

Further on, the proton beam entered the inflector, which should be completely installed by the middle of September.

The purpose of this device is to bend the beam emerging from the linear accelerator into the 100 m radius orbit of the proton synchrotron ring. In addition, the inflector gives the 50 MeV beam the optimum shape and characteristics for use in the big circular accelerator.

After final adjustments have been made on the inflector, the beam will enter the synchrotron vacuum chamber for a distance of about 15 to 20 magnet units. This distance corresponds to what is known by scientists as a "betatron wave length" and will allow careful study of the behaviour of the beam after it has been injected into the proton synchrotron proper.

Simultaneously, the beam may be directed into the circular vacuum chamber to make one or more complete revolutions. During this preliminary test, the beam will not be accelerated.

All this is planned for September. In October, all the components of the radio frequency accelerating system will have been assembled. The beam will probably be accelerated for the first time at the end of that month.

The running-in period will follow. This may perhaps end with the announcement of a high energy beam before the end of 1959. In the opinion of those concerned, this will however be the critical period. Although it may be relatively easy to design the components of a machine, test them separately and assemble them, it is the perfect running of the machine as a whole that always gives the most trouble.

Of course, there is a precedent — the energizing of the electromagnet — when a whole system was brought into regular operation without any major snags. A magnetic field corresponding to the maximum energy of the accelerator, 25 GeV, was obtained. Apart from some details needing adjustment, only one addition will be necessary : in the interphase transformer assembly.

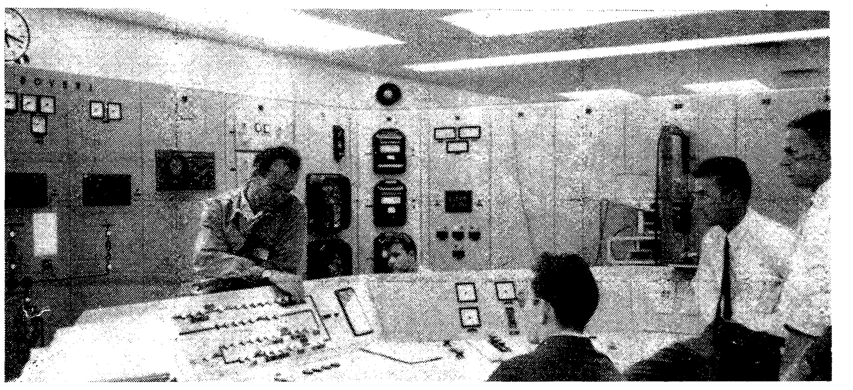
While on the subject of corrections, some readers have been kind enough to assist an absent-minded proofreader... Thanks to their eagle eye two misprints have been spotted in the French edition of our first issue.

It is certainly rather incongruous to have reduced the CERN site to a tenth of its actual area. The Organization will run much better if it is restored to its original size of about 41 hectares.

Also — and the reader will probably have corrected this himself from the context — the final energy of the proton synchrotron should have read 25 000 million electronvolt and not 25 million.

To err is human... as they say.

On 27 July, the PS electromagnet was energized for the first time. This view of the magnet power supply control room shows M. Georgijevic, E. Ratcliff, J. B. Adams and F. Grütter, a few minutes after the first test. An account of the PS electrical tests appears on page 3. (CERN photo)



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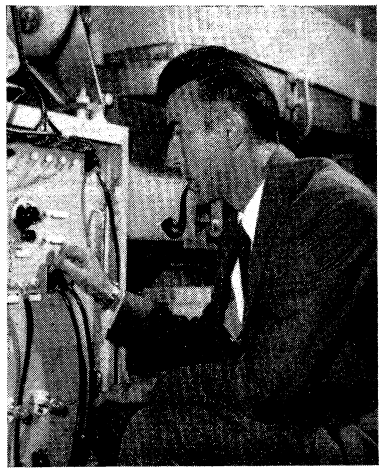
Who's Who in CERN

J. B. ADAMS, Constructor of the CERN PS



J. B. Adams, one of the pioneers of CERN's accelerator projects, will leave the Organization, an official announcement states. The present Director of the Proton Synchrotron Division will take up a new appointment with the U.K. Atomic Energy Authority towards the end of 1960.

John Bertram Adams was born in Kingston, Surrey, on May 24th, 1920.

During the war, he worked at the British Telecommunications Research Establishment of the Ministry of Aircraft Production, on the development of centimetric radar. He played an important rôle in the development of radar high frequency components, particularly on wave-guides in the 10 and 3 cm bands. Towards the end of the war, he contributed to studies of a telecommunications system using centimetric waves.

During the early days of atomic energy projects in Britain, he joined the Ministry of Supply, which at the time was responsible for atomic and research development in the United Kingdom. In 1946 he went to the Atomic Energy Research Establishment, Harwell, to work initially on the design and later on the construction of a 110 inch synchro-cyclotron. This 175 MeV machine was the first high-energy proton accelerator built after the war; it has been operating without interruption since 1949.

Also in Harwell he developed, from 1950 to 1952, high frequency klystrons with a 20 megawatt pulsed output, intended to power linear accelerators.

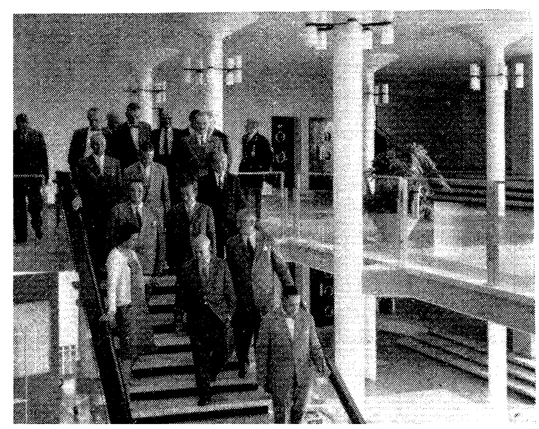
In 1953 the Ministry of Supply released J. B. Adams to help design and build the 25 GeV proton synchrotron then under consideration for CERN. He was apppointed Director of the PS Division in 1954 and since then his vast experience and his well known capacity for organization have contributed to the realization of CERN's huge new nuclear research tool.

J. B. Adams will return to England at the end of 1960. His future appointment will be as Director of a new Controlled Thermonuclear Research Establishment. All work in this field, now being carried out at AERE, Harwell and AWRE, Aldermaston, will be concentrated in the new laboratory, the location of which has not yet been announced.

CERN VISITORS

— On 20 August, CERN welcomed 17 members of the « Commission de Gestion » of the Swiss National Council. Messrs Grandjean, Aebischer, Arni, Bauer, Bösch, Brochon, Clottis, Cottier, Eisenring, Fischer, Häberlin, Huber, Leuenberger, Meister, Revaclier, Sollberger and Steinmann were received by Miss Hohl and Messrs Grütter and MacCabe. After hearing a brief introductory talk in the Main Building, the visitors were interested to see the progress made with the PS.

The members of the « Commission de Gestion » of the Swiss National Council visiting the Main Building. (CERN photo)



— At the beginning of August, Dr. Schmorak, a member of the Weizmann Institute in Israel, had fruitful talks on bubble chambers and SC experiments with several members of CERN including Messrs Filthuth, Hillman, Lundby and Merrison.

— On Monday 10 August, 28 participants in the Theoretical Physics Summer School at Les Houches (organized by the Grenoble Faculty of Physics) visited the Organization. Under the guidance of Mr. J. F. Detœuf, the visitors heard an introductory talk by Dr. Barbier, himself an old student of the school and then visited the PS and SC. Finally, since this year's session is devoted to plasma physics, they visited the CERN laboratory concerned with this field. It must be mentioned that Mr. Maisonnier, a CERN fellow, is studying at the school which this year includes students from the United States, Hungary, Czechoslovakia, etc..

— The CERN members who stayed at the Jungfraujoch research centre either as visitors or as members of the Cosmic Ray Study Group, will remember the attendant of the station, Mr. Wiederkehr ; on August 4 last, he visited CERN at the invitation of some of his guests of former years.

— Mr. Eiichi Goto of the Department of physics of Tokyo University spent several days at CERN from 29 July onwards. Mr Goto is constructing an electronic computer for Tokyo University based on his " Parametron " and was naturally interested in the machines of Mr. Erskine's electronic computer group.

— His Excellency Mr. Xanthopoulou, permanent Delegate of Greece to the United Nations head office in New York recently visited CERN.

— Professor Marshak of Rochester University and secretary of the IUPAP high energy physics commission, and Professor Piccioni who conducted important studies on antinucleons, called at CERN at the end of July, on their way back from the Kiev Conference.

Electrical tests on the PS

One minute past five, Monday 27 July 1959.

F. Demont makes an entry in the magnet power supply log-book : " Magnets excited at 1000 ampere, 500 volt ".

In the PS power house control room, a dozen men are assembled. Not more. Few people have been admitted to enjoy that historic moment when power was supplied for the first time to the 100 electromagnets of the world's largest particle accelerator. J. B. Adams, Director of the Division, is there. J. Y. Freeman, operational security officer and G. Leskens, in charge of personnel safety, are also present. E. Ratcliff, von Balmoss and representatives from the firm supplying the electrical equipment are busy at their station. Anonymous but indispensable, many others are also at their posts either in the ring, in the generator room or near the 24 rectifier units. Then of course, there are F. Grütter and M. Georgijevic, two mainsprings in the PS electrical engineering group.

J.Y. Freeman announces at the microphone : " The magnet is about to be energized ". This was how those waiting at their post in the ring knew that the test was about to take place. (CERN photo.)

Later on, these two will retrace the years of patient work, the long studies, the thousand and one preliminary tests carried out by their team since 1956.

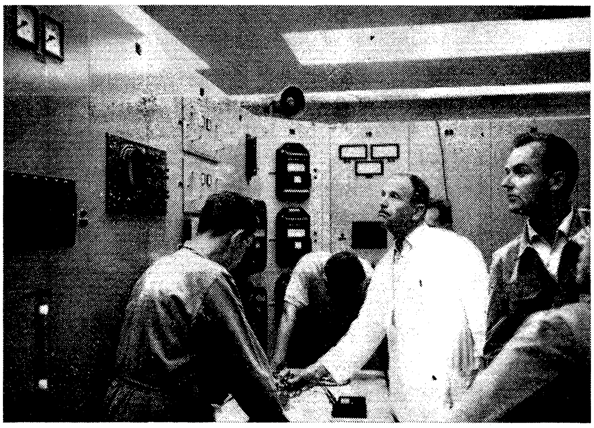
Indeed, two years were scarcely enough for drawing up plans for the installations of the PS magnet power supply and for turning those plans into machines and equipment whose novelty arose from the very special purpose they were to serve.

This novelty, even though it gave rise to design difficulties, nevertheless left the way clear for favourable innovations. For instance F. Grütter had the idea of using a Scherbius-type regulator in order to control the power absorbed by the motor driving the alternator, a difficult endeavour as the load of the latter varies from plus 46 000 kVA to minus 44 000 kVA in a tenth of a second.

Once all the machines had been delivered, on 20 June 1958, they still had to be tested. Of course, the tests had to be done without the magnet — which was completely installed at the beginning of July 1959 only — but they were carried out all the same by means of an expedient well known to technicians : short-circuiting the terminals of the equipment.

The tests thus carried out without the final load of the electromagnet had the advantage of making possible a few improvements to the rectifiers which transform the alternating current produced by the generator into direct current energizing the magnets.

Then came the date when voltage was first applied to the magnets, 27 July 1959. It would be too much to draw a parallel between the atmosphere of the moment and that prevailing at a rocket launching site prior to on attempt to place a satellite on its orbit ! Nevertheless, in the PS as there, everything had been checked and rechecked and some people may have felt the same apprehension when the fateful button was pressed. In point of fact, it took more than merely pressing a button to supply voltage to the magnet.



The last potentiometer has been set. H. von Ballmoss, and M. Georgijevic closely watch the two meters whose pointers will show that the magnet has been successfully energized. (CERN photo.)

The alternator had been started up at noon and afterwards the technicians carried out the excitation routine very methodically. Routine, for there was scarcely a gesture different from those made during previous tests. The only difference, this time, lay in the knowledge that the huge magnet was connected to the power supply.

However, the atmosphere grew tenser when the loudspeakers announced that the magnet was about to be energized.

It was 4.32 p.m. An engineer turned a last switch, eyes fixed — just like everyone else — on the dials of two small meters whose pointers obstinately refused to move... The general disappointment could be clearly felt.

Half an hour later the current was nevertheless flowing through the 400 pancakes making up the magnet coils : a control error had been enough to cause anxiety.

By the evening of 27 July, the current in the magnet had been increased to 2000 ampere — about 350 times the mean current that flows through our domestic network. At 10.07 pm, the machine was stopped. The day's results : a 3800-ton electromagnet excited without any snags and two burnt-out bulbs to be replaced. The test programme could now be carried on.

Browsing through the log-book giving the development of the tests is like watching the beginning of the accelerator's life. A sort of growth is noticeable as one turns pages studded with entries telling of starting up and stopping the generator, tripping of circuit-breakers and pulsing of the magnets.

On July 30, the current reached 2400 A and the voltage 1500 V. On 10 August, the voltage selector having been set for the first time on the 100% mark, the voltmeter showed 6000 volt while the ammeter needle pointed to 1100 A. On 14 August, these figures were 6000 V and 3000 A.

But it must not be thought that the tests were all smooth running. The book is interspersed with entries indicating difficulties, blown fuses, alarm for incorrect vacuum indication, tests continuing until after midnight, tripping of a circuit breaker due to unknown cause...

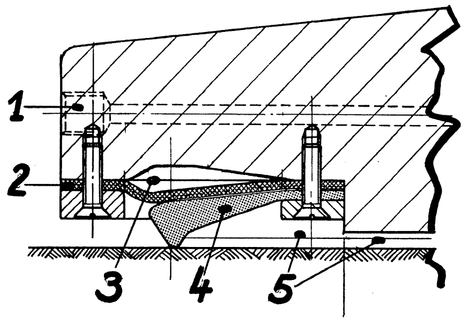
On 19 August, at 11 p m, the machine was stopped after having received 37 096 pulses. At the time, two or three weeks were still to be spent checking the 109 protective devices included in the electric circuits.

This delay, even though it may seem long, was nevertheless essential if nothing was to be left to chance.

Meanwhile, electrical tests are continuing. Coming out of a meeting, the head of the electrical engineering group announced, beaming : " The test programme for to-morrow is : voltage at 100% i. e. 6000 V ; peak amperage : 5000 A ; pulse repetition rate : 3 seconds ".

These are the figures corresponding to the future normal energy of the accelerator beam, 25 000 million electron-volt... And this goes without comment.

A conference is hurriedly organized round the control desk. From left to right : H. von Ballmoss, representatives of the firm which built the alternator, G. Plass, K.H. Reich and M. Georgijevic. (CERN photo.)



Cross-section of the seal.
(1) represents the supply of compressed air to the bell (5). (2) shows a rubber diaphragm pushed against a hard rubber gasket (4), by the pressure of the air contained in (3). The gasket is thus pressed against the ground and prevents too much compressed air escaping from the cavity (5). (CERN drawing)

The CERN pneumatic platform

The recent crossing of the Channel by Cockerell's "Hovercraft", the announcement by Curtiss-Wright of the development of an "Air-Car" and the ill-fated tests of the "flying boat" developed by Weiland of Zurich, have aroused interest in vehicles using unconventional means of support.

In this respect, it may be interesting to describe a similar piece of equipment now being designed at CERN.

This is basically a "pneumatic platform" which can move considerable loads simply by floating them on almost leakproof cushions of compressed air.

The problem of how to move the large PS bubble chambers over an area of 100 × 50 m arose last autumn. Of course, several solutions were envisaged : supporting the loads on compressed oil, rolling them on ball-bearings, floating them in water, etc. Finally, J. Augsburger's idea was adopted : supporting the inertia of the equipment on a cushion of compressed air.

"One must not believe", said G. Konried, who was in favour of the idea from the start, "that the pneumatic platform works on the same principe as the Hovercraft, for example".

Although both systems make use of compressed air, the Hovercraft is supported by jets of air produced by an engine, which support the weight as they escape freely.

The CERN platform works on cushions of air which tend to eliminate friction and which are as air-tight as possible.

J. Augsburger and R. Stierlin, who shared in the development of the pneumatic platform prototypes, lift the rubber gasket surrounding one of the experimental disks. A design of this gasket is at present being produced by the PS and SC drawing offices, so that it can be manufactured industrially. (CERN Photo.)

Of course, the ideal would be to prevent any escaping of air but in practice this is technically impossible.

First tests

First of all, a level platform was tried. Resting on a surface as smooth as a billiard table, the platform was lifted by means of compressed air. As the amount of air escaping was prohibitive, an attempt was made to remedy this by using paper gaskets ; this temporary solution gave a satisfactory performance for loads of up to about 8 tons.

This purely experimental version was followed by a more advanced model using compressed air at a pressure of 1 kg/cm^2. A surface of about 3.5 m^2 surrounded by a rubber gasket pressed against the ground by air at a 0.65 kg/cm^2 pressure, supported nearly 30 tons. Many spectators watched the official testing of the vehicle. Their scepticism soon changed to astonishment when one of them pushed the load with two fingers and managed to position it to within a $^1/_{100}$ th of a millimeter according to the comparator. The dynamometer showed that a force of 20 to 25 kg was enough to move the load of 28 tons with unexpected accuracy. From that moment the idea was accepted.

The original problem was to move bubble chambers weighing as much as 300 tons over some 5000 m^2 of the experimental area in the PS South Hall.

The situation has changed since then. The large 2 m diameter hydrogen bubble chamber will not only weigh 600 tons but will also have to move in one direction only. Rails are the obvious solution in the case.

However, the engineers and draughtsmen of the Synchro-cyclotron and Proton Synchrotron Divisions are still just as interested in this device. In the SC, Frank Blythe is planning to use it for accurately moving focusing lenses from one channel to another in the vicinity of the machine. In the Neutron Experimental Room, magnets will also be used for the large cloud chamber, weighing 100 tons, and measuring 2 m × 3.5 m, being designed for Prof. Preiswerk's PS experiments.

Finally, in the PS, H. Horisberger has adopted the same method for moving the 1 m diameter propane chamber which is at present being designed ; here again the weight will reach a hundred tons.

The present version

After the second test mentioned, the study of the pneumatic platform continued.

A need for standardization made it necessary to redesign the base of the device. This time the platform was divided into three, and later four steel disks with an initial diameter of 50 cm, later brought to 1 m, which work according to the following principles : the underside of each disk is hollowed out and forms a cavity enclosing compressed air. Round the outside runs a groove containing a hard rubber gasket (see sketch), to keep in as much as possible of the compressed air.

Close contact between this gasket and the ground is ensured by an extendable diaphragm behind which air is also injected at a variable pressure.

So far tests have been carried out with a maximum pressure of 5 kg/cm^2 in the cavity. They have helped to determine the best running conditions and to show the advantages and drawbacks of the equipment.

The **drawbacks** are that the vehicle needs :

— a relatively flat surface free from cracks so as to avoid poor contact between the gaskets and the ground, which would allow air to escape. This can be prevented, if necessary, by covering the ground with thin steel sheets, the joints of which are covered with adhesive paper.
— Strictly horizontal movement. On a slope the vehicle will tend to slide, especially since friction will have been practically eliminated.

Against these drawbacks, the pneumatic platform has considerable **advantages** to offer :

— It is simple and therefore cheap to construct.
— It is about 99 % efficient because of the small friction factor.
— The energy required for starting is the same as that needed for normal running.
— The movement can be accurately controlled.
— The load is equally distributed over the whole surface of the disks, which gives a ground pressure of from 1 to 5 kg/cm^2.
— The gaskets are replaceable and can be standardized : the disks of the final version will have an effective diameter of 1 m.
— The vehicle does not take up much room vertically.

OTHER PEOPLES' ATOMS

Russia is always a very newsworthy item after any international conference held there. Particularly in the case of CERN, following the Kiev conference on high energy physics.

With the visit of several CERN scientists to Dubna and Moscow and with the arrival at CERN of many distinguished Russian scientists during the coming accelerator conference, we thought it topical to devote this feature to Dubna and to one of the Moscow Institutes.

Our proposal was magnificently served by Dr. A. W. Merrison's detailed report of his visit to Dubna. He has kindly allowed us to reproduce excerpts of his paper here.

The Joint Institute for Nuclear Research, Dubna

Dubna statutes were approved in September 1956 following a conference of representatives of eleven eastern countries, held in Moscow in March of the same year.

The Dubna research centre serves by and large the same purposes as CERN. The Institute originally concentrated the efforts in nuclear research of eleven countries : Albania, Bulgaria, China, Czechoslovakia, Hungary, the German Democratic Republic, Korea, Mongolia, Poland, Rumania and the U.S.S.R. Later, Vietnam joined the Institute as twelfth Member State.

The material and technical basis of the Joint Institute were :

— The Institute of Nuclear Problems of the U.S.S.R. Academy of Sciences, with its 680 MeV synchro-cyclotron.

— The Electrophysical Laboratory of the same Academy, with its 10 GeV synchro-phasotron, i. e. the Russian term for proton-synchrotron.

The Institute is 3 hours away by bus, north-east of Moscow at the confluence of the Moskva and Volga rivers. It now comprises five main autonomous scientific divisions with a total staff of more than 1700 people of whom 300 are scientists. This does not include the central administration. Fifty per cent of all scientists are from countries other than the USSR. The USSR contributes 47% of the budget, China 20% and the remaining 10 member states « about 5% each ». The number of scientists from a country in the Institute is not tied to the amount it contributes ; for example, there are as many Rumanians as Chinese.

The strong focusing 7 GeV accelerator being assembled at Professor Alikhanov's Institute in Moscow. This machine will serve as a model for the 50 GeV accelerator which is envisaged. A close-up of one of the magnet units appears on page 9. (Prof. Bakker photo.)

The distribution of personnel in the scientific divisions is as follow :

— 600 at the Synchro-cyclotron (led by Prof. V. Dzhelepov, including 120 physicists ;

— 900 at the Synchro-phasotron (led by Prof. Veksler), including 80 « pure scientists » ;

— 120 in the Theoretical Division (led by Prov. Bogoljubov), including 70 scientists ;

— 100 in the Nuclear Reaction Division (led by Prof. Flerov) where a heavy-ion cyclotron is being built ;

— 40 in the Neutron Physics Division (led by Prof. I. M. Frank) where a reactor is being built ;

The scientific council of the SC, SP and Theoretical Divisions have the right to confer degrees of Doctor or Candidate. About 10% of the staff of the Joint Institute have teaching duties elsewhere. It is intended to set up a branch of the Moscow University in Dubna next year. The Theoretical Division has a small electronic computer and will have a larger one ; there was no evidence that the computer was used extensively by the experimentalists.

Synchro-cyclotron Laboratory (Laboratory of Nuclear Problems)

The 680 MeV Synchro-cyclotron is working well on a 24-hours-a-day basis with two 8-hour periods each week for maintenance. In addition, there are longer maintenance periods every three months when any major rearrangement of experimental apparatus is made. The 600 people in the laboratory are organized into 17 « sectors », seven of which are scientific sectors with 10 to 20 physicists each. Sixteen beams of various particles are extracted on one side of the machine. The normal circulating proton current is 0.5 microampere with a pulse repetition frequency of 70 per second. There is a large amount of experimental equipment around the machine, including fifteen bending magnets. Some of them are rather large, which is due to a predilection for air-cooling resulting in large coils.

Synchro-phasotron Laboratory (High Energy Laboratory)

The 10 GeV Proton Synchrotron has been running satisfactorily for experiments for seven months. It works 24 hours a day with two days for maintenance each week and one day a week for visitors.

The usual intensity is 2×10^9 protons per pulse (with a maximum of 3×10^9 protons per pulse) but the machine is usually run at much lower intensities because the present experiments require it. The limitation on intensity is in the 9 MeV linac injector. About $1/7$ of the beam survives the first 100 millisecond of acceleration and then there is no further loss. The duration of the pulse is normally 5 millisecond but this can be increased to 200 millisecond. The pulse repetition frequency is 12 pulses per minute. There is a double vacuum chamber inside the huge 35 000-ton magnet : the inner high vacuum chamber having a cross-section 2 m x 0.4 m. The outer chamber has 8 cm thick Dural walls. The orbit diameter is 56 m with a maximum field of 13 000 gauss.

The machine is not a perfect circle but embodies 4 straight sections 8 m long. For the moment one is used for injection, one for targets and two for acceleration. It has been found, however, that only one accelerating station is necessary so that two sections will be available for experiments by the end of the year.

The present experimental hall is about 50 m long and 15 m wide and follows the curvature of the machine, but a second hall will be constructed by the end of this year. There are experiments going on with bubble chambers (xenon, propane and hydrogen), diffusion and expansion cloud chambers. At present a small hydrogen bubble chamber is working, a 42 cm diameter chamber is being constructed and a large one (1.6 m x 0.8 m x 0.4 m) is planned.

Professor Alikhanov's Institute in Moscow

Several CERN people also visited Prof. Alikhanov's Institute on the outskirts of Moscow.

The principal object of interest there is a 7 GeV Proton Synchrotron intended as a model for a 50 GeV machine. The 7 GeV machine is well under way with all the C-magnets in position and being aligned. No quadrupoles or injector were as yet in position. The injector may be a 4 MeV Van de Graaff generator but it may eventually be replaced by a higher energy linear accelerator. The experimental hall is 100 m x 35 m x 35 m.

Back from the USSR

CERN scientists talk about the Kiev conference

Some 370 physicists and scientists from all over the world assembled for the 9th International Conference on High Energy Physics in Kiev.

The international nature of the meeting is well shown by those present in the Ukrainian capital : 60 American personalities, the same number from Western Europe — 14 of whom were from CERN —, some 130 Soviet scientists and about the same number of Eastern European and Asiatic specialists.

Another outstanding characteristic : the absolute frankness prevailing in this type of conference. Their main characteristics are moreover the absence of restrictions, the genuine co-operation between the scientists representing the different countries and the free exchange of information concerning fundamental research.

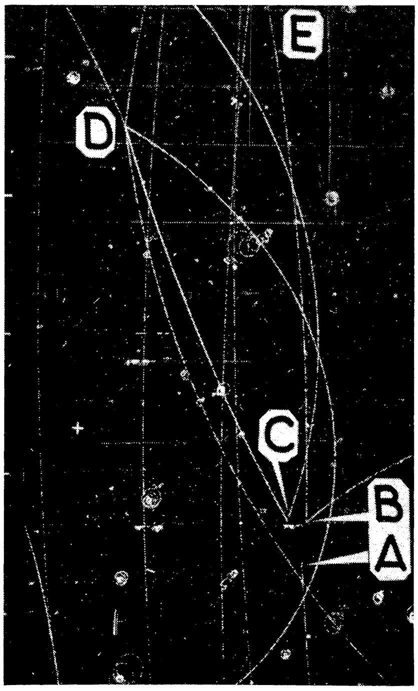
To increase knowlege of matter

All efforts seemed to be concentrated on one aim : to add new bricks to the symbolic building representing the knowledge of the intimate structure of matter. Thus, for instance, it was not unusual at Kiev for a report to benefit at the last minute from information gleaned during conversations between foreign scientists.

The conference was spread over ten sessions at each of which a rapporteur presented two or three reports either in English or in Russian. This created a real problem due to the difficulty of simultaneous or consecutive translation of texts and speeches relating to a highly specialized scientific field. Copies of each report were issued to the participants **before** the conference and the main interest of the sessions lay in the subsequent discussions.

For some people, the discussions provoked during the first days by the organization sessions were the most fruitful. In any case, they as well as the plenary sessions gave the participants a chance to exchange views.

One is tempted to ask : " What transcendent news was disclosed at the Conference ? " They reply will seem disappointing if extraordinary revelations are expected. Indeed, most of the scientists questioned agreed that the main feature of the Kiev Conference was the absence of anything new. Then, in spite of the fact that the next conference is to be held in the United States from 25 August to 3 September 1960, should one agree with Soviet Professor Blokhintsev that once a year is too often for conferences on high energy physics ?



This photo taken by means of the large Berkeley bubble chamber was presented at Kiev and was one of the outstanding features of the Conference. It confirms the existence of the anti-lambda particle.
An anti-proton produced by the Berkeley Bevatron hits a proton (A). Out of the collision come one lambda and one anti-lambda particle. Since both are neutral electrically, they leave no tracks in the liquid hydrogen of the chamber. However, they rapidly decay into particles leaving tracks by which they can be identified.
The lambda particle (B) turns into a proton and a negative pi-meson which go off the picture to the right and upwards (E). The anti-lambda (C) turns into an anti-proton and a positive pi-meson which goes off the picture to the left of (E). The anti-proton hits a proton (D) creating two negative and two positive pi-mesons which shoot in all directions.
(Berkeley photo.)

Opinions are divided.

Mr Lundby does not agree. He suggests that experimental contributions should be presented by their authors and should be introduced by a brief report.

Service rendered by Kiev

In any event, Kiev rendered a useful service by rounding out arguments set forth last year.

" Even though the Conference did not produce any sensational statement " said Professor C.J. Bakker who presided over the High Energy Comittee, " it showed what direction to follow and suggested ideas which will encourage future developments in theoretical as well as experimental physics. "

As for Professor Bernardini, rapporteur of the first plenary session, he fully supported this view when he said : " The Kiev Conference was a pointer towards the future ". Accordingly, he thought it was one of the best meetings he ever attended.

" Kiev " he said " did more than close an era of decisive discoveries concerning the structure of matter. The conference also marked the beginning of a period of several years during which scientists will have to try to solve fundamental problems which have so far been neglected. "

Many very good lectures were given in the immense Palace of the October Revolution in Kiev, which could have seated 2000 people. The esoteric nature of these lectures explains why it is not possible to review them in detail in this publication.

Prof. Bernardini described the results of various experiments carried out at CERN in the field of " Photoproduction

Important Nuclear Conferences

The Annual International Conference on High Energy Physics has been held outside the United States for the second time.

It was in the United States, in the Physics Department of Rochester University, that the idea originated in 1950 of a meeting between the physicists concerned. As Professor Marshak then said : "the purpose of these conferences is to assemble a representative group of active workers in the field of high energy physics, for informal discussions of the latest experimental and theoretical results ".

These conferences were held at Rochester up to and including 1957. In 1956, however, another Symposium took place at CERN, concerned partly with " high energy accelerators " and partly with " pion physics ". The aim of this meeting was to assemble at CERN physicists from all over the world, specializing in the field of high energy and thus to make the Organization play the part for which it has been created, that of an international centre of advanced nuclear research.

Later, under the sponsorship of IUPAP, the " International Union of Pure and Applied Physics ", its was decided to establish :

- A biennial " **International conference on high energy accelerators and instrumentation** " corresponding to the first part of the " CERN symposium, 1956 ". The next of these meetings took place at CERN in September 1959 and it is planned to hold the next one at Brookhaven in the United States, in 1961. Some preliminary notes about the September Conference appear in this issue.
- An annual " **International conference on high energy physics** », corresponding to the second part of the "CERN Symposium, 1956 ". CERN was chosen as the scene of this meeting in 1958. In July 1959, the conference was held at Kiev. Fourteen CERN scientists took part in this manifestation. Their impressions form the basis of the account which appears above. It was decided at Kiev that the next conference of this type would be held at Rochester in the United States, in 1960.

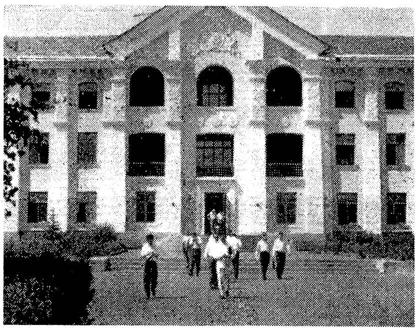
and Compton-effect on nucleon". The Soviet scientist B. Pontecorvo then presented a report of the same type on "The interaction of pions and nucleons". "The emphasis" said an American scientist, "was on careful work, good statistics and high accuracy with which the Russians carry out their work".

E. Segre, an American and V. I. Veksler, a Russian, then spoke about the same field. The former lectured in particular about technical improvements in the handling of anti-nucleons. Y. A. Smorodinsky, a Russian, presented a very clear report on the theoritical aspects of the same "Strong interaction of ordinary particles"; recent results obtained at an energy of 635 MeV at Dubna were incorporated in this document.

That day also witnessed the display by Dr Stevenson, a student of Alvarez of a very beautiful picture — scientifically speaking — taken with Berkeley's new 6-ft hydrogen bubble chamber. It was the first confirmation of production and decay of lambda and anti-lambda particles.

Interlude

The Conference adjourned for 24 hours after having heard reports from Stanford University on experimental and theoretical aspects of « nucleon structure and electro-magnetic interaction ». Messrs Panofsky, Hofstadter and Schiff — the first two co-operated in CERN's work — presented this report.



The scientists who attended the Kiev Conference visited the Ukrainian Academy of Science. (Prof. Bakker photo.)

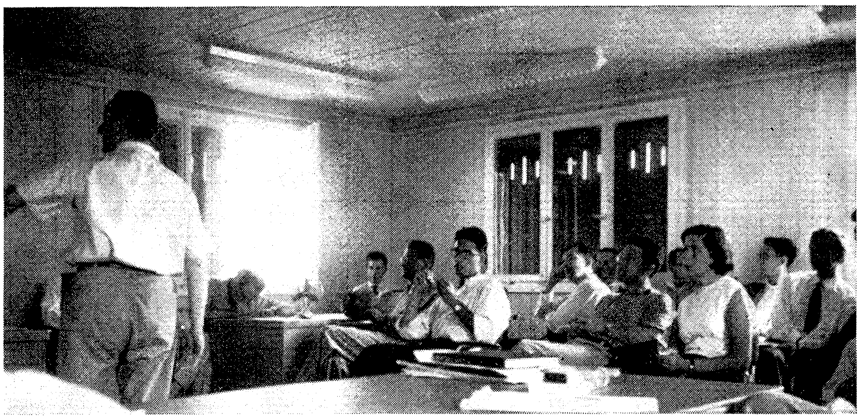
J. Steinberger's report on american experiments in "Stange particles" production was followed by the announcement of results obtained at Dubna too late to be included in the programme of the Conference. This statement made by a scientist of the People's Republic of China concerned the production of hyperons and K-mesons in a propane bubble chamber, by means of pions at a 6.8 BeV energy.

After talks had been given about "Theoretical research", "New theoretical ideas", "Weak interactions" and "Multiple production of mesons at super-high energies", the Muscovite Nobel Prize winner Tamm gave the closing speech of the Conference.

Atmosphere of co-operation

The Russian physicists did their utmost to put the Western scientists at their ease, in spite of some rather unsuccessfully-organized practical details : transport facilities and translation service for instance.

(see page 9)



Most of the CERN scientists who attended the Kiev Conference gave lectures after their return to Geneva. A group of theoreticians listen here to a talk by Dr. Fubini. (CERN Photo.)

IN SEPTEMBER AT CERN

The Conference on High Energy Accelerators

Under the auspices of the International Union for Pure and Applied Physics, an international conference on high energy accelerators and instrumentation was held at CERN between September 14 and 19.

Some 340 participants to the Conference including 30 scientific secretaries from CERN, found space in the Main Auditorium. In addition the Council Chamber seated another 120 participants. These were able to watch the proceedings in the auditorium through closed-circuit television. English was the official language of the Conference but translators were available for the Russian language.

Participants invited included about 80 scientists from the United States, 40 from the USSR, 75 from the rest of Europe and 40 from other parts of the world.

Among the 250-odd scientists who at the end of August had accepted the invitation to participate were famous scientists from Australia, Brazil, Canada, Czechoslovakia, China, Eastern Germany, India, Ireland, Israël, Japan, Poland, Turkey, the US, the USSR, and of course from the CERN 13 Member States.

The program of the Conference included organizing sessions on September 11 and 12. September 13 was set apart for a « welcome party » held at the Hôtel des Bergues. A visit to the CERN 25 GeV proton synchrotron now nearing completion was scheduled for the evening of September 15 and on September 16 a dinner was served on board a steamer plying on Geneva lake.

In order to limit the scope of the accelerator part of the Conference, the contributions have been confined to important developments in accelerator technology and to research work on new principles of accelerating particles. As for the contributions on experimental apparatus, only those dealing with new developments to be used with accelerators in the GeV range have been accepted.

The ten sessions of the conference covered the following topics : Need for new particle accelerators — advances in high energy particle accelerators — fundamental limitations in accelerators — production, transport and separation of particles from high energy machines — bubble chambers — picture evaluation for track chambers, counters and other high energy particle detectors. There were also reports on the present status of some high energy accelerators. The machines selected for presentation included the Hamburg and Cambridge Synchrotrons, the Brookhaven and the two Russian (7 and 50 GeV) alternating gradient synchrotrons, the Stanford 2-mile linear accelerator and the Kharkov Linacs.

The implications of the conference are of course diverse.

For CERN it unabled the Organization to act once more as a centre for international meetings.

For the scientists, it was a new splendid opportunity to exchange and gather valuable information on construction and operation of accelerators and of their associated instruments.

As for the administrative people entrusted with organizing the whole gathering — mainly the Conference secretariat, the accomodation and travel personnel, the SB transport section and the Scientific Information Service — the Conference provided one more occasion to demonstrate their efficiency.

Austria becomes a member of CERN

On 1st July 1959, Austria became the thirteenth Member of the European Organization for Nuclear Research. This is the first accession since the Organization was established by twelve founder States.

Austria had taken an interest in the institution for a long time.

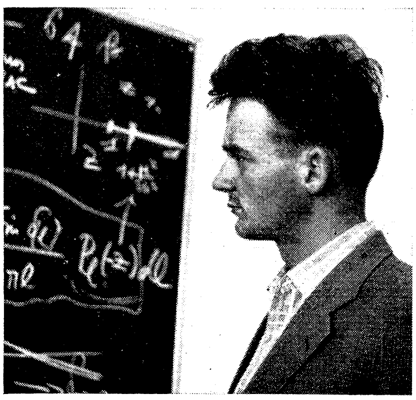
As soon as the European Council for Nuclear Research was founded, in 1952, Austria closely followed this initiative. In the summer of 1953, the Austrian cabinet decided that the country should apply for membership. At that time Austria could not be accepted as a member, being forced to wait for the Convention to come into force (29 September 1954), since Austria was not a party to the Agreement of 15 February 1952, constituting a Council of Representatives of European States for planning an international laboratory and organizing other forms of co-operation in nuclear research.

During the first years of its existence, the Organization considered that it should be established on a firmer basis before increasing the number of its members.

However, Austria continued to show interest in nuclear research and CERN was able to act as host to Austrian physicists and keep in close touch with the country's scientists.

In 1958, an official delegation including Austrian personalities from the Federal Chancellery, the Ministry of Finance and the Ministry of Education visited the President of the Council and the Director-General at CERN, in order to obtain information about the work of the Organization and the terms and conditions of accession.

After that, negotiations progressed rapidly and on May 26 1959, the Council unanimously voted for the admission of Austria to the Organization. This country, which has given to physics such men as Boltzmann, Hess, Pauli and Schrödinger, finds its natural place in CERN.



Dr. Julius Wess, CERN fellow, was for some time being the only representative of Austria in the Organization. He returned to Austria in the middle of September, after having carried out research work in the Theoretical Study Division. (CERN photo)

Staff changes for August 1959

On September 1 1959, the following addenda were made to the list of CERN divisions and groups, attached to the first issue of « CERN COURIER » :

DG (Directorate-General)

LEADING BOARD	C. MALLET
Guest professor	Prof. H. LEHMANN

SB (Site and Buildings)

DIRECTOR OF DIVISION	C. MALLET

I. ARRIVALS

a. **Staff Members**

Name	Nationality	Div.	Group or Section
DIJKHUIZEN Hendrik . .	NL	PS	Propane Chamber
DOW Julian	UK	SC	Electronics
DUFOUR Ernest.	F.	SB	Common Services
de GROOT Albert	NL	SC	Technical Development
MORATEL Hélène . . .	S.	SB	Common Services
MURATORI Giovanni . .	I.	PS	Propane Chamber
NETTLETON Robert . . .	UK	SC	Research Groups
SWIRE Elizabeth	UK	AD	Personnel (G.S.)

b. **CERN Fellows and Research Associates**

von BEHR Jobst	G.	DG/SC
ERIKSSON Karl	Sn.	DG/TH
GATTI Gerardo	I.	DG/SC
JOHNSEN Kjell	N.	DG/PS
LOCK William	UK	DG/SC
WESS Julius	A.	DG/TH

c. **FORD Visitors**

FIEDLER Leigh	USA	DG/STS
ROBOUCH Benjamin. .	Lebanese	DG/PS
SMITH Lloyd	USA	DG/PS

d. **Supernumeraries**

BRECHES René	F.	SB	Common Services
BROCHU Emile	F.	SB	Common Services
CHABOT Gilbert	F.	SB	Common Services
COLIN Pierre	F.	SB	Common Services
DALLUGE Alfred	G.	SB	Main Workshop
DAVID Robert	F.	SB	Common Services
GOBBI Adriano	S.	SC	Research Groups
HADEN Irene	UK	STS	Scientific Information
HARTMANN Walter . . .	G.	SC	Technical Development
HEISS Dieter	G.	PS	Hydrogen Chamber Group
ISCH Michel	S.	STS	IEP
JACQUEMIN Arlette. . .	F.	SC	Stores
LANG Hermann.	G.	SC	Technical Development
LEPINE Georges	F.	SB	Main Workshop
MANDICA Salvator . . .	F.	SB	Main Workshop
MARÉCHAL René	F.	PS	Mechanical Engineering Group
MARTEL Jacqueline . . .	F.	STS	Scientific Information
MEURET Paul	B.	SC	Research Groups
MONTESUIT Raymond . .	F.	SB	Common Services
MUGNIER Jean-Pierre . .	F.	SB	Common Services
NAMIAS Maurice	B.	SC	Research Groups
NEF Jean-Paul	S.	SB	Main Workshop
ROHRBACH François . .	F.	SC	Research Groups
ROUILLER Claude . . .	S.	PS	Radio Frequency Group
SOCHTING Klaus	G.	STS	IEP
UBERTIN Gilbert	F.	SB	Common Services

II. DEPARTURES

a. **Staff Members**

CARPIN Jean-Claude . .	F.	SB	Common Services
BRICKA Louis	F.	SC	Adm.

b. **CERN Fellows and Research Associates**

BURGMAN Jan	Sn.	DG/SC
TOLHOEK Hendrik . . .	H.	DG/TH
WILDERMUTH Karl . . .	G.	DG/TH

c. **FORD Visitors**

FELDMAN David	USA	DG/TH
HOFSTADTER Robert . .	USA	DG
KOESTER Louis	USA	DG/SC
PAUL Helmut	A.	DG/SC

d. **Supernumeraries**

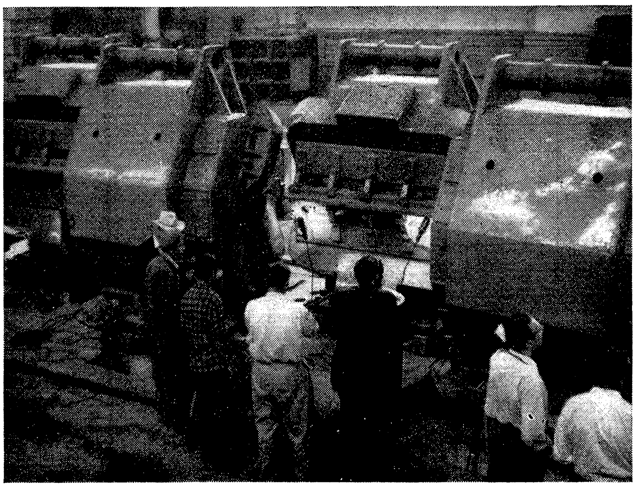
BERTOLA Jacqueline . .	S.	AD	Personnel (G.S.)
COULON Hugo	S.	PS	Linear Accelerator Group
DOUCET Henri	F.	SC	Research Groups
KELLER Jakob	S.	PS	Mechanical Engineering Group
LEUTERT Gerhard . . .	S.	PS	Mechanical Engineering Group

CERN scientists talk about the Kiev conference

(continued from page 7)

One of the most interesting aspects of the Conference, which must be stressed again, was the atmosphere of international co-operation. « We feel that we are getting to know our Russian colleagues much better, » said Professor Panofsky, and he continued « Relations were much easier this time than in 1956 and we had much freer discussions on subjects which used to be closely guarded, such as accelerator administration ».

One example among many will serve to give the general atmosphere of the discussions between scientists. Professor R. G. Sachs, a Fellow of the Guggenheim Foundation working at CERN, reported a conversation he had with E. L. Andronikashvili of the Republic of Georgia Academy of Science. A large cloud chamber intended for work on very high energy cosmic rays is being built in the Caucasus ; this machine will embody a huge 900-ton electromagnet. Not only did the Russian scientist provide his American colleague with the technical data he desired, but he also gave full information about the procedure for getting official approval for the project, the time taken for manufacture, the sources of capital, etc...



After the Kiev Conference, some CERN scientists visited Prof. Alikhanov's Institute in Moscow where a 7 GeV accelerator is being installed. This photo shows the magnet units being aligned. Note their special shape - an open C. (C. J. Bakker photo.)

The Dnieper boatmen

The large white steamers cruising on the waters of the Dnieper were the scene of several profitable conversations. For instance, it was there that Prof. Bernardini planned with the Russian physicist Landau a programme of fundamental experiments to be carried out in the next 5 or 6 years... overlooking the fact that the main concern in physics until now has been to obtain increasingly high energies producing results that grow progressively more difficult to understand.

The excursion on the Dnieper went the village of Kanev. Many campers were installed on the river banks, beside fishermen and women doing their washing. When they arrived, the travelling physicists were pleased to attend an exhibition of Ukrainian dancing which, everyone agreed, was remarkable.

As for the town of Kiev, 91% destroyed in 1942, it has been completely replanned on modern lines in the purest post-war style ; one of the chief concerns of its authorities seems to be to decorate it with well-kept flowerbeds and parks.

Some of the participants from CERN visited Moscow or passed through on their way to Kiev or Dubna. Many people were astonished to see two or three dozen Tupolev 104 commercial aircrafts parked on Moscow's Vnukovo airport.

The flourishing prosperity of Moscow also made a great impression as well as the eager curiosity of the general public about the foreigners and... the inefficiency of a travel agency which appeared to be somewhat unprepared to cope with an unexpected increase in the number of tourists.

To close this account, Professor Bernardini will be quoted once more : " Kiev ", he said, " brought to light the doubts we all feel as to the direction to follow. The work done in the last year has, of course, been useful but it cannot be considered brilliant. Most of it was based on technicality and was not the result of hard thinking. In other words we need more than powerful machines which allow to accumulate experimental results : as far as possible we must also visualize the final aim of our research... and this should not be the concern of the theoreticians alone. "

Name	Nationality	Div.	Group or Section
LEITCH Norman	UK	STS	IEP
MAYOR Alim	S.	SC	Technical Development
OSTORERO Jean	S.	SC	Technical Development
ZUBLER Jörg	S.	PS	Mechanical Engineering Group

III. CHANGES

Staff Members	Nationality	from	to	
JULLIARD François . .	F.	AD	DG	Public Relations
MANSEY Jean	F.	SB	AD	Personnel (G.S.)
VANNIER Pierre . . .	F.	SB	AD	Purchasing Office

The travelling wave

CERN members travel, sometimes far and wide, in order to represent our Organization at important meetings or to gather information valuable for their particular trade.

Last month Dr. B. Wheatley went to Munich to attend the 9th international Congress of Radiology. Here is the report he wrote especially for this magazine after his return from Germany.

One of the most remarkable features of international cooperation in a scientific field is the Congress of Radiology, an organisation without even permanent headquarters. It lives for a few hectic weeks and then apparently dies, only to rise like a phoenix in another part of the world some years later. Since the end of the war the Congress has been held in London (1950), Copenhagen (1953) and Mexico (1956), and after Munich the next is scheduled for Montreal in 1962. The Congress is supported by the radiological societies of various nations, and 47 countries sent official delegations to Munich. It provides an international meeting ground not only for diagnosticians and radiotherapists but also for others interested in the human application of radiation. At Munich over 900 papers were read in six sections, which included nuclear medicine, radio-biology, radiation dosimetry, hazards and protection, and organizational problems. Some of these papers originated from outstanding experts, others from people who wished to review their work in the presence of a small critical audience. The discussions in fact were often better than the papers and the main advantage of the Congress was the opportunity it provided for meeting people working in similar fields. The scientific and technical exhibitions were excellent, and it was valuable to compare instruments and equipment on a world-wide basis.

Being in Germany, the native land of Röntgen, it was easy for members of the Congress to reflect on the rapid growth of radiology since the discovery of X-rays some 60 years ago. This expansion has had some evil consequences such as the death of X-ray workers now commemorated by a memorial in Hambourg which already bears 361 names.

The study of radiation protection grew from radiology and has been closely associated with it ever since. The International Commission on Radiological Units and Radiological Protection are associated with the Congress and their work has been of importance in fields very remote from the original medical one.

(see page 10)

On August 24th, Dr. H. C. Linhart left Europe for the West Coast of the United States where he is invited to attend seminars and give lectures on plasma physics and on work done by the plasma group of CERN.

This trip will take him to Seattle to attend a plasma conference. After a seminar and lectures at Stanford University, he will visit the US Government Laboratories at Los Alamos, Oak Ridge and Livermore (San Francisco).

Hence he will cross the Pacific on the invitation of Prof. Yukawa and give more lectures at the Tokyo and Kyoto Universities, as well as at Nagoya which is presently the centre of Japanese fusion research.

Dr Linhart will return to CERN in the middle of November to resume his work as leader of a group working on plasma physics and its application to new particle accelerators.

*

The "Physiker Tagung" organized in Berlin from September 29 to October 3 1959 by the Verband Deutscher Physikalischer Gesellschaften will be held at Berlin's Free University.

Professor Bernardini is to attend that meeting and give a lecture on "Research Progress with the CERN Synchro-cyclotron".

IN OUR NEXT ISSUE

On the spot report of CERN High Energy Accelerators international conference.

CERN IN THE NEWS

— In its issue of 3 August, « Ekstrabladet », a Copenhagen newspaper, published an illustrated report on a sequence recently filmed in Professor Niels Bohr's laboratory ; this sequence is to be incorporated in the CERN film.

— A news film made at CERN was shown on the evening of 30 July on French Television (RTF). Mr. de Rose, President of the CERN Council and Messrs Jean-Alexis, MacCabe, Ratcliff, Reich and Stanley took part in the 20 minute sequence produced by Claude Thomas.

— Dr Vanderhaege, CERN physicist, was a member of the Board of examiners at Lausanne when Mr. J. P. Dentan, a chemical engineer, read his thesis for the degree of Doctor of Science. The subject of Mr. Dentan's thesis was the physico-chemical study of photographic emulsions.

— Several recent issues of the Dutch magazine « Nederlandsche Tijdschrift van Natuurkunde » carry the texts of lectures delivered at the Utrecht Symposium on December 8 1958 by Dr. Hedin and Dr. Regenstreif, respectively on the "The construction and starting of the 600 MeV synchro-cyclotron at CERN" and on "The CERN Proton Synchrotron."

— The London periodical "Nature" in its June issue, announced the conference on high energy accelerators and their instrumentation held at CERN from 14 to 19 September.

— In a rather superficial article about the "competition" between different centres constructing accelerators, the German weekly, "Der Spiegel" of 1 July 1959 devoted a few lines to the CERN PS which « next year will for a time hold the much sought after title of the world's biggest atom smasher ».

— "Il Nuovo Cimento" has published a paper by Dr. A. Martin, CERN theoritician, on "A new method for the determination of the Meson-Nucleon coupling constant from the 33 Phase Shift".

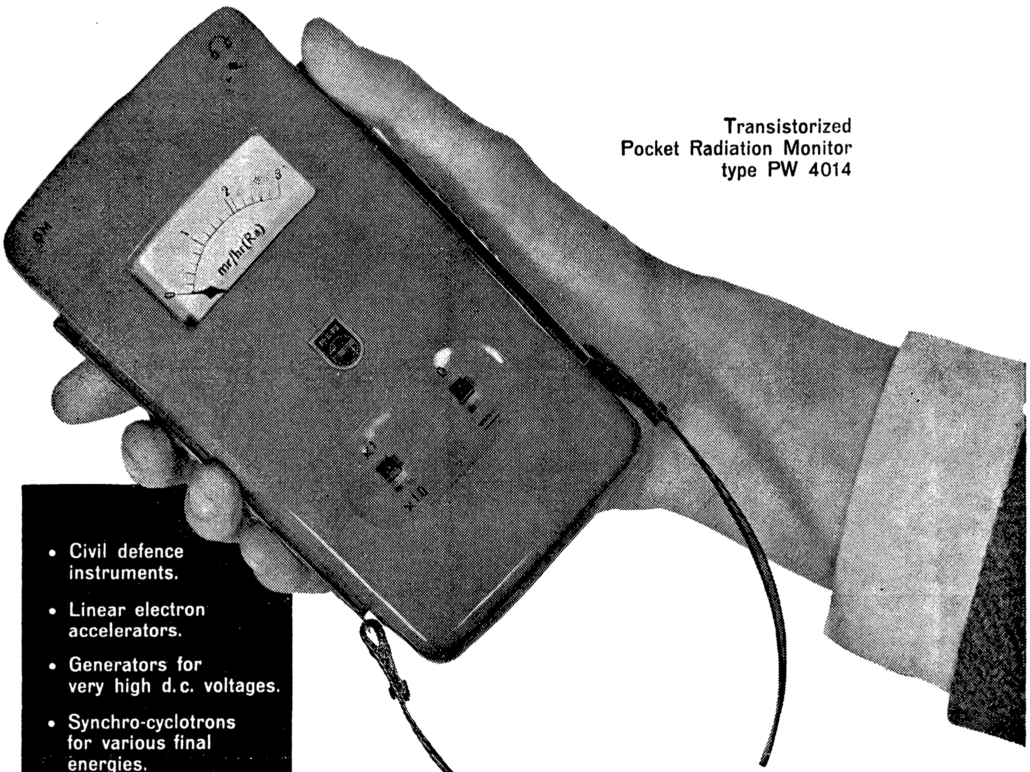
— The "Tribune de Genève" of 17 August published an article by Guillaume Chenevière about the visit of CERN scientists to the Soviet Union.

— Dr. B. d'Espagnat and Dr. J. Prentki both CERN theoreticians published a paper on "Non-leptonic decay of hyperons" in "Nuclear Physics," No 11, 1959 (June).

— In an article on Dubna, "Discovery" for July 1959 drew a parallel between the Russian research centre and CERN.

PHILIPS

equipment for Nuclear Physics and Atomic Energy



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- Synchro-cyclotrons for various final energies.
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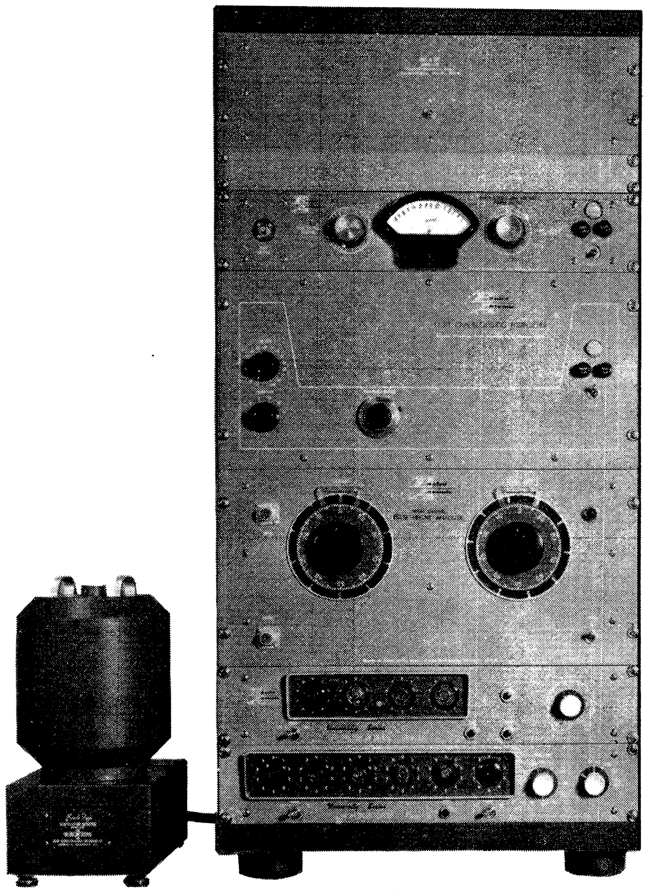

RÉGULATEURS DE TENSION SORENSEN