

CERN News

maximum percentage paid by Germany is 25.4 %).

Austria	2.22
Belgium	4.01
Denmark	2.28
France	21.47
Germany (Fed. Rep. of)	25.00
Greece	0.46
Italy	13.33
Netherlands	5.30
Norway	1.60
Sweden	4.55
Switzerland	3.38
United Kingdom	16.40

Elections

With this Council Session, the three year term of office of W. Gentner (Federal Republic of Germany) as President of the Council came to an end. Warm tributes were paid to Professor Gentner's abilities and his efforts on behalf of CERN during those years. He is to be succeeded by P. Levaux (Belgium) who was elected President from 1 January 1975. Dr. Levaux has an impressive record in science administration in his own country and distinguished himself particularly in CERN affairs by his brilliant leadership of the work of the Finance Committee during three years as its Chairman.

The Vice-Presidents of the Council, T.G. Kouyoumzelis (Greece) and G.H. Stafford (UK) were re-elected as was the Chairman of the Finance Committee, M. Lemne (Sweden). A.G. Ekspong has completed a three year period as Chairman of the Scientific Policy Committee and will be succeeded by W. Paul.

PS: 10^{13} ppp

An intensity of 10^{13} protons per pulse was reached in the proton synchrotron (PS) in a test run held on 10 December. This test was a repeat of the one held on 7 November (see December COURIER, p. 423), finishing the year with a new record and achieving the required intensity set out in the PS improvement programme.

However, two incidents had troubled the days preceding the test: a small fire, fortunately put out very quickly, started in a transformer of a power supply of the Booster (PSB) and there was a water leak in part of the transfer line from the PSB to the PS. The damage was repaired rapidly and finally all was ready for 10 December.

The test began by adjusting the linac beam to produce long (100 μ s) high intensity (85 mA) pulses which were then injected over 15 turns into the four rings of the PSB, where the energy was raised to 800 MeV. With dynamic programming of the working point and compensation of both transverse and longitudinal instabilities, 1.4×10^{13} protons per pulse were ejected towards the PS. The transfer line had to be matched to 800 MeV for the protons to be injected into the PS. With experience gained during previous tests it proved possible to compensate more rapidly the resonances up to transition.

After a day of effort and a final run on each machine to obtain the best possible adjustments, the 10^{13} ppp barrier was finally broken, maximum intensity measured at transition reaching 1.019×10^{13} ppp.

However, this is only a beginning and much remains to be done before a beam of such intensity with the emittance required by users can be obtained under working conditions.

The most difficult will be the development of a new ejection system (continuous transfer) for the 400 GeV proton synchrotron (SPS). This is being installed and tests at high intensity will be carried out during this year.

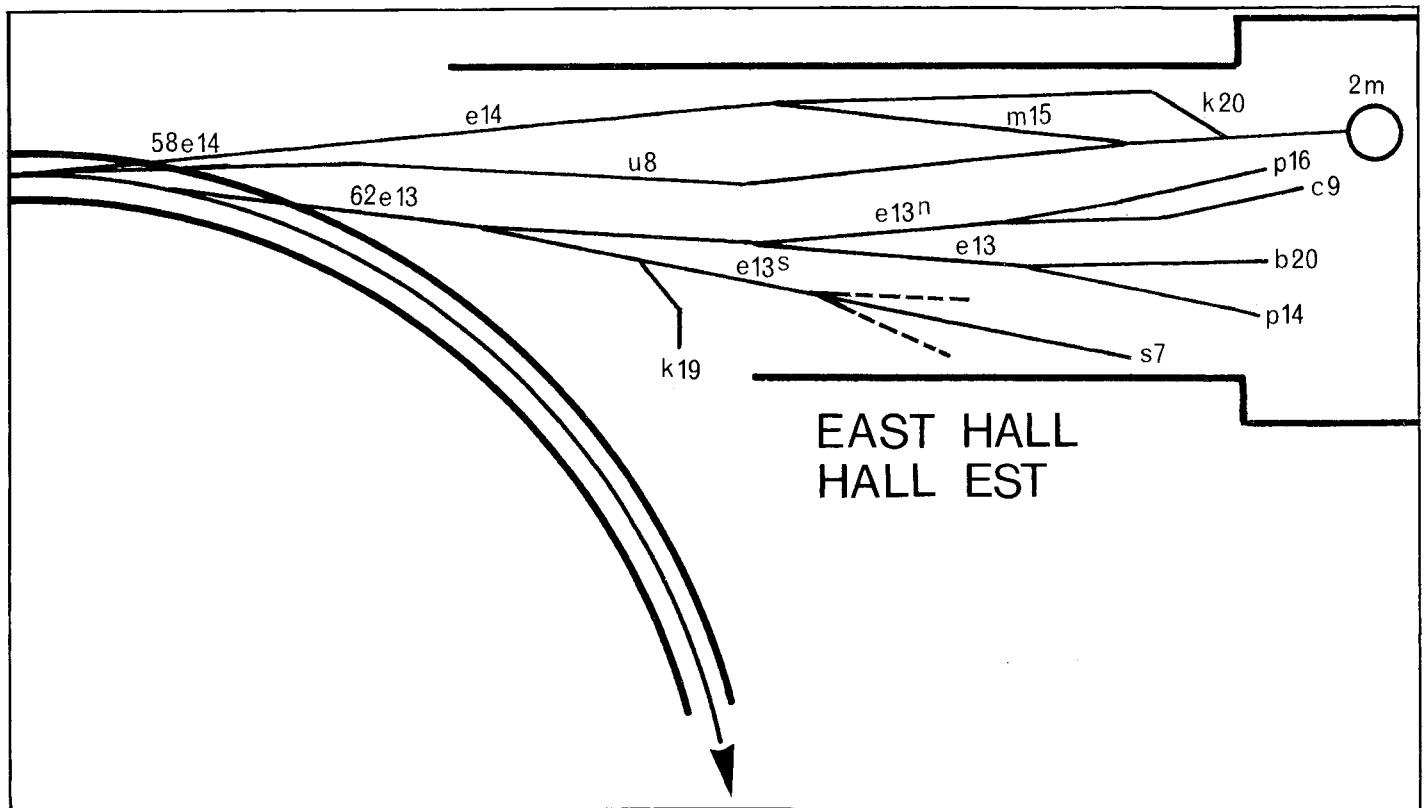
Annual shutdown

From 2 January to 19 February there is an overhaul of the Laboratory I machines — the 50 MeV Linac, the 800 MeV Booster, the Proton Synchrotron and the Intersecting Storage Rings plus beam-lines and the experimental halls. The PS accelerated its last 1974 protons on 21 December, to allow a fall in the levels of induced radioactivity during the end of year holidays before the shutdown work began. The shutdown is also being used for modifications and to install new apparatus. Some of the major operations are described here.

Now that construction of a new Linac has started, work on the existing machine is being kept to the minimum necessary to ensure that it does its job until its replacement comes into service. Diagnostic facilities are being improved by installing additional equipment to monitor the ion source parameters, the r.f. cavity phases and the beam energy spread in the 50 MeV spectrometer line. New units are being added to the r.f. amplifiers to allow the cavities to be decoupled one from another and thus be independently adjusted.

Preliminary work is being done on the injection line of the Booster (civil engineering, vacuum, laying of cables and cooling water piping) in preparation for the installation in 1975 of a new six-level beam distributor (four levels for the PSB rings and two for beam dumping). In the rings themselves: magnet positions are being realigned where necessary; a

The organized layout of beam-lines in the East Experimental Hall of the proton synchrotron. The 2 m bubble chamber (top right) is being moved by 13 m (taking its beam-lines with it) so as to clear more space for experiments with electronic detectors in the Hall. This more extensive use of the East Hall will enable the North and South Halls to be progressively closed down.



zero harmonic quadrupole correction system (using the correction windings of the quadrupoles and allowing individual operation on each ring) is being installed; the beam dump installation will be modified to enable beams from the four rings to be absorbed separately; a quadrupole pick-up electrode and a horizontal and vertical electrostatic deflector, are being installed for more precise monitoring of the transverse behaviour of the beam; glass dosimeters are being introduced to measure the radiation doses received by the installations and samples of the araldite insulation of the main magnet; the transfer line to the PS is receiving five new vertical dipoles and a correction dipole and the 800 MeV spectrometer line is being adjusted.

In the main PS ring, magnets are being realigned where necessary and, as usual, repairs are carried out on magnets at the 'hot' points of the

machine where end laminations come adrift. Four magnets are being repaired by clamping plates on the end blocks and a fifth is being replaced by an overhauled unit. In the auxiliary magnet system, sixteen sextupoles are being replaced by compact versions, and nine injection skew quadrupoles installed to complete the skew quadrupole system.

Forty-five straight sections (nearly half the total) are to be dismantled and modified. A new beam loss monitoring system is being installed in all the straight sections, increasing the sensitivity in relation to the previous system by a factor of a hundred and allowing measurement of losses down to 50 MeV beams. The detectors are faster and give a resolution of 50 ns (an improvement by a factor of a thousand). They are moreover radiation resistant and calibration will be possible using a low intensity radioactive source.

To prepare for the continuous transfer system for injection into the SPS, enlarged vacuum chambers are being fitted in eight magnets. The intermediate straight sections are also being replaced and the auxiliary magnets mounted there changed or moved. Also two r.f. cavities are being moved and a 200 MHz cavity installed for prebunching of the beam before its transfer to the SPS.

Damping resistors are being fitted in the 98 vacuum pump mainfolds to damp a resonance at about 1.5 GHz, which enlarges the beam longitudinally. The beam control system is being modified to give greater flexibility in cases where great variations in beam intensity are required from one cycle to the next.

There is a general overhaul of the main converter in the power supply, which involves dismantling the rotor, the generator and the motor. The mercury rectifier protection system is

On 3 January, the Italian Minister for Education, F.M. Malfatti, visited the CERN Laboratories. He is seen here (centre of photograph), together with D. Amati (left) and F. Bonaudi being shown the Split Field Magnet detection system at Intersection I-4 of the ISR.

being augmented by installing an auxiliary 100 kVA generator to ensure continuous excitation even when the local supply fails. Preparatory work is proceeding for the installation of four static power supplies in the auxiliary generator building in place of the rotary machines.

Modifications are being made to the regulator of the 3 MW rectifier supplying the Gargamelle bubble chamber and the $g-2$ experiment and to twenty two regulators in the South generator building. Rectifiers and their auxiliary equipment are being installed in the new East rectifier building. The racks in the PS control room are being rearranged so as to free an opening to the future control room.

Although there are no major changes in the South-East experimental area and in the South and West Halls, the East Hall is seeing great upheavals. To make room for a larger number of electronic experiments, the 2 m bubble chamber (carrying beam-lines with it) is being moved about 13 m. This will take about five months, freeing space for electronic experiments. The resulting new layout of beam-lines and experiments is shown in the diagram.

At the ISR, the experimental programme is being reshaped with new experiments set up at intersections I-1, I-2, I-3, I-4, I-6 and I-8. The work-load is particularly heavy this year because twelve sectors of the machine have to be opened including three intersections: I-2 and I-8 for the installations of experiments, and I-3 to modify the bases of the beam dump targets. In this last intersection the radiation level is high and a large number of people will work there, each carrying an adjustable threshold radiation detector so that they can be under the surveillance of Health Physics group.

In the ISR, great importance is



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attached to the vacuum conditions which must be exceptionally good in order to maintain beam quality during operation. To increase the pumping speed, clarinet-shaped sublimation pumps are being installed in certain sectors. At intersection I-8 cryogenic pumps are being installed.

Work on beam measurement and control includes installing a new beam profile monitoring system in sector 62, two collimators in sectors 21 and 32 to reduce background for physics experiments, and standard ISR monitors at each intersection for luminosity measurements. It is also intended to install an experimental section of vacuum chamber made of titanium.

Major maintenance, checking and improvement work is being carried out on many the machine components such as the fast kicker magnets for injection and beam dumping and the r.f. cavities. Finally, the electronics in the ISR control room will be rear-

ranged and maintenance work done on the refrigeration plant.

The shutdown is also being used to prepare the beam transfer line TT2 from the PS to the ISR for sending beam to the SPS. A satellite computer to control the equipment in TT2 will be installed and the beam-line will then be able to handle alternately pulses of protons destined for the ISR and for the SPS.

BEBC magnet operational again

Contrary to tradition, Friday 13 December was a lucky day for the 3.7 m European bubble chamber, BEBC. The large superconducting magnet was successfully powered at its design current of 5700 A.

The magnet had been dismantled for reasons which have already been explained in detail (see March issue