

the existing 50 MeV linac would be used to inject into TART, the rings need to be positioned close to the injector to the west of the PS. Two positions, shown on Figure 2, are being studied. Position 2 crosses the beam transfer lines to ISR and the TART rings would need to be lowered by over 6 m to give 1 m of concrete shielding below the ISR tunnels. Position 1 would require an extra 40 m of transfer tunnel.

The project was brought to the attention of the Scientific Policy Committee at its meeting at the beginning of March. If it is decided that this scheme (or a similar one, for example using three rings) is worth pursuing for the second stage of the PS improvement programme it is probable that a study group will be set up in the near future to work out the precise details of the scheme.

For those who would like more detailed technical information, see :

'A circular injector for the CPS (TART-scheme)' W. Hardt, 1965, AR/Int. SG 65-10.

'A slow cycling injection method for intensity improvement of the CERN-PS (Twin Accelerator Ring Transfer Scheme)' W. Hardt, to appear in the proceedings of the Vth International Conference on High Energy Accelerators, Frascati 1965.

'On interlaced injector synchrotrons' W. Hardt, 1966, ISR-300/GS/66-7.

CERN News

Bubble Chambers

The bubble chamber experiments with the 2 m hydrogen chamber are expected to be under way again in June and are now scheduled to continue right through to December. It had previously been planned to have a shut-down in the Autumn to convert the chamber for some experiments using deuterium instead of hydrogen. The changeover to deuterium has now been postponed, because of the PS breakdown, until the beginning of 1967.

Some preparatory work for this changeover is being done during the present extended shut-down. In particular, four new gaskets are being installed to improve the sealing of the safety cold tanks around the chamber itself.

When the system is being cooled down, heat conduction to the glass windows and condenser lenses in the chamber and the cold tanks is via gaseous hydrogen or deuterium. With deuterium, which is much more expensive than hydrogen and in limited supply, care has to be taken to reduce leakage from the cold tanks to a lower level than can be tolerated with hydrogen. Flexible gaskets are needed to cope with the stresses introduced during the cool-down (when temperature gradients as high as 40° C can appear across adjoining surfaces). This is a problem in itself because few materials remain flexible at temperatures of the order of -200° C. Inflatable gaskets are used, filled with helium. The new gaskets have been specially developed at CERN and are different to those employed on other

bubble chambers. Two have been installed and it is hoped to have the other two in position before the chamber is cooled down in June.

The chamber has been moved a few metres to a new beam line (called u3) incorporating r.f. separators. This is an improved version of the existing r.f. separated beam (u2). Probably, about 1 million pictures will be taken in the u3 beam before starting to run in the new beam line (m6) in October. A further million pictures are planned in the m6 beam in 1966.

The Saclay 81 cm hydrogen chamber may take about 900 000 to 1 000 000 pictures before the end of the year. The 120 cm heavy liquid chamber will be involved in one experiment (looking at K⁰_s decays) before starting the new series of neutrino experiments.

Quotes

'The primary function of technology is to make things which are socially useful, but the essential end of science is quite different. It is the broadening of knowledge and the deepening of understanding. The processes and goals of technology are more visible to society than are those of science, but because its products are devised with the aid of knowledge that science provides, they are likely to be attributed to science itself.'

C. P. Haskins
President of Carnegie Institution of Washington,
Annual Report for 1964-65.

'The second Heisenberg uncertainty principle: For theories of the structure of matter, mathematical precision and physical relevance cannot be simultaneously achieved.'

E. C. G. Sudarshan
Syracuse University
(Concluding remarks at the International Seminar
on Unified Field Theories, July 1965).

'Particle physics is admittedly remote, as the exploration of the far frontier has always been. It does not pretend to yield daily bits to input to other sciences or to technology. Basic research never has and it never will. What high energy physics may do at any time, if it is allowed to continue in a forward looking way, is to create new sciences, to revolutionize old ones, and perhaps to revolutionize our lives. These things are more likely in this field where we are dealing with the elemental and the primordial, than in other fields of science.'

E. McMillan
Director of the Lawrence Radiation Laboratory
Congressional Hearings on the USA High Energy
Physics programme, March 1965.

'We do not discover the laws of physics, we invent them: when something is so ridiculous that we cannot possibly understand it, we invent a law of physics which says it must be so.'

D. H. Wilkinson
Oxford University
(*'The Elementary Particles'* Science Journal,
March 1966).

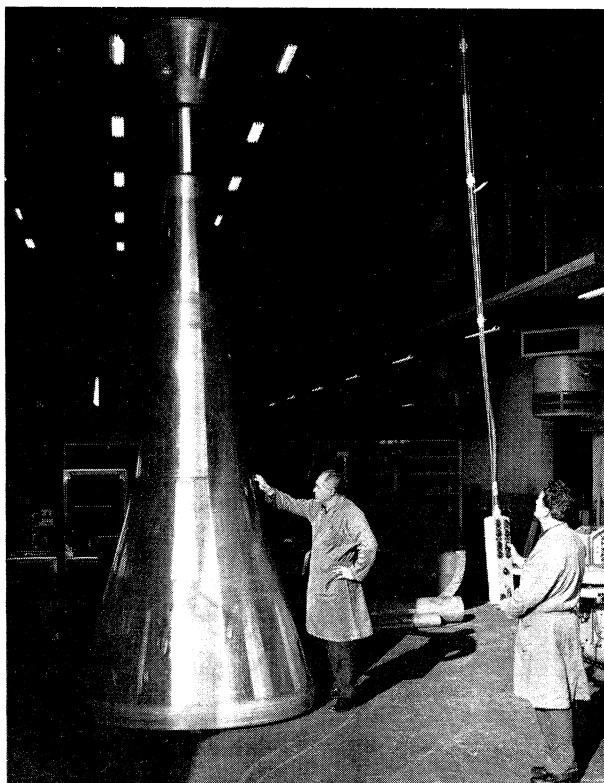


CERN/PI 238.3.66

Craftsmen in the Main Workshop putting the final touches to the first of the three new r.f. test cavities for the PS (see CERN COURIER, vol. 6, no. 3 (March 1966) p. 43) before it went to the manufacturers of the amplifier and power supply systems on 14 April. As can be seen in the photograph, the new cavities are very much bigger than the existing units on the PS. They are 2.4 m in diameter, the maximum that can be accommodated between the height of the beam path and the floor of the PS tunnel. Since only 1 m of axial length is available in a short straight-section (as compared to the 2.5 m for the existing cavities), the maximum possible diameter was chosen in order to dispense with water-cooling and thus to reduce maintenance work in the ring.

Three such cavities are required in order to add 50 % to the accelerating voltage of the 15 cavities now in the PS ring. This will make it possible to accelerate twice as fast during most of the rise-time of the magnet field. Power will be fed to the cavities at frequencies from 17 to 19 MHz. The cavity is tuned at 19 MHz.

The large port at the bottom of the cavity gives access for internal adjustments of electrodes etc., and the cavity can also be opened along the diameter which is diagonal across the photograph.



The inner conductor of one of the 'reflectors', to be incorporated in the new neutrino beam line, being checked for dimensional accuracy after welding in the West workshop. The conductor is 5 m long, with an inner diameter of 20 cm minimum and 2 m maximum, and will take peak pulsed currents up to 500 kA. This is the most difficult component of the reflector to construct, and it has been made on site (other components are being manufactured outside). It is constructed from cones of aluminium alloy 2 to 3 mm thick — horizontal bands on the completed conductor indicate where the separate sections are welded together.

The reflector is part of the focusing system designed to increase the flux of neutrinos in the new beam line to a value four times higher than in the previous experiments. It will be placed 15 m from the target located in a modified magnetic horn (as used in the previous experiments, see CERN COURIER vol. 2, no. 9 (September 1962) p. 4) and followed by a second reflector, 4 m long, positioned 50 m from the target. These three devices will serve to focus the 'neutrino parents', π and K mesons which decay to produce the neutrino beam.

It is hoped that assembly of the reflector, when this inner conductor will be placed inside its large cylindrical outer conductor will begin at the end of May and that tests will be completed in July and August. The reflector will then be installed with the many other components in this complex beam line.

Chassis goes West

High energy physics is 'big science' and the days of string and sealing wax in experimental equipment are virtually over. Because of the cost of the equipment and the pressure for time on the accelerators it is necessary to ensure that all the units used in the operation of the machines themselves and in the experimental set-ups, achieve a high standard of reliability. It should be possible to replace faulty units easily and to move units from laboratory to accelerator, from experiment to experiment, from country to country. This has brought

about an increasing degree of standardization in instrumentation.

In the early 1960's, work was carried out at CERN on chassis systems. This was to standardize the construction of the boxes carrying electronic equipment to be fixed in 19 inch racks (the standard rack size) so as to achieve, as far as possible both physical and electrical interchangeability.

In 1962, a meeting of the International Electrotechnical Commission was held on this topic in Geneva. The American representative, from Oak Ridge, was then introduced to the CERN system and subsequent development in the USA incorporated

many features of the CERN design. In July 1964 the AEC Committee on Nuclear Instrument Modules made its recommendations (TID-20893) which have by now been accepted by the majority of American laboratories and manufacturers (see 'Nucleonics', March 1966, p. 20).

It is possible that the CERN system will soon be updated to incorporate some of the ideas which have emerged over the past few years, including some of the refinements introduced in the American standard. This will be especially necessary because of the great quantity of new instrumentation required for the ISR project.