

One of the cryostats for the large European bubble chamber arriving at CERN in September. It measures 6.28 m in external diameter, 4.47 m in internal diameter and 1.9 m in height. It weighs 50 tons. The cryostats are manufactured by Alsthom-Neypic.

layout greatly helps the natural drainage in this area.

The thickness of the molasse was found by a drilling near the village of Peissy, carried out in 1944 and 1945. The drill was taken down to a depth of 293 metres before it met the limestone supporting the molasse.

2) The molasse was found to consist of a complex of sandstones and marls of heterogeneous composition at the level of the samples, although cores containing a single piece three metres long have been obtained, indicative of a better quality of rock than on the present CERN site. This type of rock has fairly uniform geo-technical properties.

These results indicate that the ground is suitable for the construction of the machine. Data obtained on the present Laboratory site during the last ten years show that the molasse is sufficiently stable (e.g. 0.1 mm stability in 100 m per annum at the PS level). In addition, the measurements made since May 1970 in the transfer tunnels from the PS to the ISR show the same stability as at the PS (± 0.1 mm in five months, both vertically and horizontally). Moreover, these tunnels were blasted out in conditions much more likely to disturb the molasse than the tunnelling machine which it is intended to use to bore the ring for the large accelerator.

BEBC Progress

The main components for the large European hydrogen bubble chamber (the 3.7 m BEBC) are now arriving steadily at CERN. Last month CAFL delivered the disk and the lower ring for the magnetic shield. More recently one of the cryostats arrived from Alsthom-Neypic, with the second to follow at the beginning of October. In November or December the two vacuum tanks are expected (from Alsthom and Mannesman), and by mid-December the body support is scheduled from Mannesman. Finally, in April 1971, the body of the chamber itself is to be delivered by the same firm.

At the same time, the building programme is nearing completion, so that it will be possible to begin installing the



CERN/PI 134.9.70

associated equipment, in particular the refrigeration plant, for which the first components have just arrived from Sulzer.

The construction of the chamber, and especially of the large stainless steel vessel has stretched industry to the limit of its capacity and deliveries have been subject to delays (4 months on the cryostats and the chamber body support, 6 months on the body of the chamber). These have been caused mainly by welding and machining difficulties. The delays will affect the completion of the programme and it now seems likely that tests on the assembled chamber, originally planned for the middle of 1971, will take place at the beginning of 1972.

Mortal coils

Within the superconducting coils of the bubble chamber magnet currents can arise by induction when the field rises. These currents could persist for weeks or even years and could be strong enough to cause deformation of the magnetic field. (It is calculated that they may reach 1 to

2 per cent of the theoretical current strength.)

The latest method of eliminating this effect consists of twisting the filaments within the strip (see CERN COURIER, vol. 9, page 22). At the time when manufacture of the conductor strip for the BEBC was being undertaken this technique had only just been discovered and it was impossible to use such twisted filaments without a major change of the programme. It was therefore decided to equip the chamber with precision Hall gauges from which instantaneous maps of the magnetic field can be obtained. These will be taken into account in scanning the photographs.

A very simple additional solution was adopted. It consists of winding in with the superconductor an aluminium heating strip through which a current can be passed (pancake after pancake) at the moment when the magnetic field reaches its maximum (35 kG) so as to cause the conductor abruptly to lose its superconducting property. The resistance in the coil rises and currents quickly disappear

and will not return when the superconducting state is re-established, provided there are no significant changes in the field.

Each of the 40 pancakes of the coil requires 250 kJ of energy to bring about the reversion to the normal state. This energy is provided by a current of 1500 A passing for 0.3 s at 600 V. It was therefore necessary to increase the dielectric strength of the winding insulation.

In the course of winding the coil the insulation is being subjected to continuous testing at 2200 V. It was found that ageing effects had destroyed the insulation on two pancakes and necessitated their re-winding. In addition, despite careful examination and cleaning of the strips, it was impossible to exclude metal chips and abrasions completely. Under very high radial stresses their sharp points could cause local damage to the insulator. Since time was available, owing to the delay in delivery of the stainless steel tanks, it was decided to rewind all the 16 pancakes already completed, using a harder and thicker insulation.

By 18 September 10 pancakes had been rewound and it is hoped that the first magnet pole will be finished by the end of October. By the beginning of September, 50 km of the superconducting strip (75 per cent of the contract) had been delivered by Siemens and Thomson Houston and had met the specification.

Interest in CERN solutions

Solutions worked out for the large European chamber are proving of interest to the designers of the 30 m³ hydrogen bubble chamber, to be built for the 200/500 GeV accelerator at Batavia, for which the plans have just been approved. They aim to have their first cool-down in July 1972 so as to be ready for physics in January 1973. In view of the short time schedule, they are adopting solutions rather than working through the design from scratch themselves. They are interested in adopting the optics (fisheyes and lenses) and the honeycomb plastic piston design (see CERN COURIER vol. 9, page 65) of the European chamber. Manufacture of these components for Batavia may be carried out by European firms as has been the case for some components of the Batavia accelerator itself.

Computing and Data Processing School

The 1970 CERN Computing and Data Processing School was held at Villa Monastero, Varenna, Italy from 30 August to 12 September. This was the first of its type to be organized by CERN and was, in a way, an experiment to test the belief that it would be to their mutual benefit for computer scientists and experimental physicists to rub shoulders and ideas together.

Computer science has been evolving rapidly in recent years and has successfully tackled some of the basic concepts underlying the techniques used in various branches of computing and has made some headway in establishing a theoretical foundation for computing. Experimental physics on the other hand is making ever increasing use of computing to record and analyse growing volumes of data.

The two disciplines have a different approach to computing and an awareness on each side of the problems and potential of the other side was expected to be fruitful. The computer scientist could gain from the opportunity to study closely the problems of data processing applications which arise in experimental physics. The physicist could gain from being able to see his empirical use of computers in the wider conceptual framework of computer science.

66 young students from 16 countries (predominantly Western European but including Poland and USSR) attended the School.

The programme was established by an Advisory Committee consisting of computer scientists and high energy physicists from the CERN member states. It contained courses mainly on programming languages, data processing in high energy physics, and data structures, and on computers in space research, computer graphics, and computer systems. Two evening lectures were also given on 'The Impact of computers on nuclear science' and on 'Artificial intelligence'.

Judging from the reactions of the students recorded at the end of the School, it proved very successful. The computer scientists gained a more precise

feeling for the practical problems in handling large volumes of data and perhaps particularly a realization that the most elegant solutions may not always be the most efficient. The physicists learned that there are other useful programming languages and techniques besides those in common use at present and gained a deeper understanding of the methods that they are using. An example of the latter was the course that was given on data structures because of their immediate relevance to the practical problems faced by experimental physicists. ('Data structures' concerns the way in which large volumes of information can be organized in the computer — selecting from among the different methods of storing the raw information in the computer is an important factor in the ease of manipulation of the information to draw out the results.) It was also intriguing to hear that high energy physicists are not alone in their problems of sheer quantity of information. The data processing of experiments carried out in satellites involves similar problems on a scale at least an order of magnitude larger.

In addition, of course, both sides benefited from the informal discussions and personal contacts which are always a large fraction of the usefulness of any Conference or School.

It is intended to hold further Schools of this type in the future but their frequency and any change in emphasis compared to this first trial run remain to be decided.

Linac beam in its cups

A new system is being developed for the very rapid measurement of the beam emittance in the 50 MeV linac at the PS.

At present, the emittance is measured by moving a slit across the beam so as to pick out a piece of the cross-section. By means of a focusing system and of a second slit placed further along the beam path it is then possible to determine the emittance ellipse. The method of measurement destroys the beam and takes 100 PS pulses which are thus lost for experimental use. The results are average beam characteristics over 100 pulses, and since there are slight fluctuations between