

News from Abroad

Base of the Pyramid Experiment

In 1965 a plan was put forward, by Dr. Luis Alvarez from the Berkeley Laboratory in the USA, to examine the Egyptian pyramids for hidden chambers, by means of a particle detection technique. It is reported in the July issue of 'The Magnet' that on 14 June the governments of the USA and the United Arab Republic entered into an agreement to proceed with the experiment.

The aim is to test one of the theories concerning the structure of the pyramids. These mighty monuments constructed some 4500 years ago are still largely unexplored, which is not so surprising when one appreciates their colossal size. Some Egyptologists contend that the Egyptian monarchs ingeniously planned the pyramids, which were to be their tombs, to mislead predators in future generations into believing that the tombs had already been sacked.

If this deception theory is correct it could mean that the most exciting of the passageways and chambers remain to be discovered. Several of the now known upper chambers did in fact escape detection for thousands of years.

But how can one decide where to tunnel in the vast pyramids to have a good chance of finding a chamber? The idea of Alvarez, who is himself a keen Egyptologist as well as a celebrated physicist, is to 'X-ray' the pyramids by spark chamber analysis of cosmic ray muons. The muons will lose energy as they pass through matter in proportion to the density of the matter. If there are voids (which could possibly be chambers) in the structure they should show up, when the spark chamber telescope points in their direction, as peaks in the muon counts recorded by the spark chambers. If voids exist, Alvarez is confident that they can be detected and positioned to within a few metres. Tunnelers could then penetrate directly to the possible chamber.

Two wire spark chambers with magneto-strictive read out will be used

and it is estimated that several months round-the-clock observation per pyramid will be needed. An iron absorber will be placed around the spark chamber assembly to stop muons scattered in the rock of the pyramid interfering with the readings.

The investigation will be carried out by an international team of scientists headed by Dr. F. L. Bedewi, a physicist from Ein Shams University at Cairo, Dr. A. Fakhry, an archeologist, and Alvarez himself. They will look first at the second pyramid of Chephren at Giza. This pyramid has a suspiciously solid structure, standing over 140 metres high with a base of side 216 metres, in which only one chamber has been found at the base. If the technique is successful the team may then move on to other pyramids such as the Great Pyramid of Cheops which is also at Giza.

The United Arab Republic, the US Atomic Energy Commission and the Smithsonian Institute are providing the finance, \$ 250 000, for the research.

Desy

The seventh issue of the journal of the DESY Laboratory at Hamburg in the Federal Republic of Germany reports on the experiments and developments at the 6 GeV electron synchrotron.

One item of information concerns a major machine improvement. A contract was signed in July for a new linear accelerator for the synchrotron injector, which will raise the injection energy from 40 MeV to 300 MeV. The higher energy of the injector will increase the accelerated electron beam intensities from the synchrotron and the new linear accelerator will have the additional advantage of being able to inject beams of positrons as well as electrons. This will make possible a range of experiments with high energy positron beams at DESY for the first time.

Excavation work for the building to house the new injector has already started and it is hoped to commission the machine within three years. The existing 40 MeV injector will be kept in service and will be used whenever high intensities are not required. In this way, it will be possible to pursue development work on the new linear accelerator without interrupting the operation of the synchrotron.

CERN News

At the PS

Some information concerning operation and development at the proton synchrotron in the last few months.

For two weeks at the beginning of July, the machine operated at an energy of 19.2 GeV with a long flat top (200-300 ms) and achieved an average intensity of over 10^{12} protons/pulse. This is the first time such a high average intensity has been maintained for two weeks of operation. Only 3.2% of the scheduled machine time in this period was lost due to breakdowns. Average intensities approaching 10^{12} protons/pulse have been reached in subsequent weeks but it is not known why beams of over 10^{12} cannot be regularly accelerated. Some of the operating time given to machine development is concentrating on 'beam loss measurements' in an attempt to determine why high losses are experienced in the first 20 ms after injection.

The new type of ion source, the duoplasmatron, which was installed during the long shutdown at the beginning of this year (see CERN COURIER vol. 6 no. 5 (May 1966) p. 88) has been working extremely well. The number of faults connected with the source has halted operation for only a few hours in 1700 hours of PS time. One very pleasing feature of the performance of the source has been the 'life' of the cathode. It was expected that it would be necessary to change the cathode filament fairly frequently but the present cathode has given 2050 hours of service so far, without any signs of deterioration. The 50 MeV linear accelerator reliably injects 80 to 100 milliamps into the synchrotron and with this high beam intensity available, multi-turn injection is not, for the present, being used.

The ways in which the accelerated protons can be used to provide beams for the experiments have become more and more versatile. The most significant new feature of the machine operation programme is that beam ejection is now almost always used. A standard programme takes, say, five of the twenty accelerated proton bunches for fast ejection from the ring, uses some of the remainder onto a target in the ring to provide a short