

People and things

design and significantly reduce the chamber production costs. A standard vacuum chamber prototype will be completed at the end of December and series production will start in February.

Prototypes of integrated sputter-ion pumps with two different cell diameters (32 and 17 mm) have been tested. Series production of the pumps has started in the workshop of the Technical University Aachen and delivery of the first elements begins this month. A new method of degassing vacuum chambers was successfully tested in which the anodes of the pumps are used to sustain a glow discharge in an argon atmosphere. This method of cleaning in situ works very satisfactorily and seems to be far superior to thermal outgassing.

Inside the tunnel, the outer wall is covered with several comblike supports that are waiting for some 60 km of aluminium busbars — the current leads for quadrupoles and sextupoles. (The dipole current will be directly carried from one magnet to the next.) Near the tunnel floor, two aluminium pipes supply the cooling water for magnets and vacuum chambers.

In the northern and southern straight sections, the ring tunnel widens to give room for 32 cavities each, which will supply the energy for acceleration and to compensate for loss by synchrotron radiation. At least 16 cavities will be installed by 1978 allowing a particle energy of 15 GeV for machine tests. At the beginning of 1979, 32 cavities will allow an energy of 17.5 GeV and, finally, 64 cavities for 19 GeV will complete installation of the first stage of PETRA. Prototypes of these five-cell cavities have been tested c.w. up to a power dissipation of 150 kW and no thermal instability has been seen. Also, no multipactoring was observed and titanium coating is not necessary. Delivery of cavities will start in January 1977. Coupling

windows and tuning plungers are now being produced at DESY and the waveguide transmission-system and eight klystrons of 500 kW each have been ordered.

Progress on the project in general is on schedule and fingers are crossed that the work which needs to be done in the coming years will go as smoothly as it has in the course of 1976. Eyes are already being raised to the future and the greatest hope seems to lie in the development of superconducting r.f. cavities such as are under attack at Karlsruhe. These cavities could make it possible to give more energy to the beam without prohibitive power costs. The PETRA magnet system will be capable of holding particles of energy up to 40 GeV and a further stage of the PETRA project would become technically feasible if superconducting r.f. cavities are mastered.

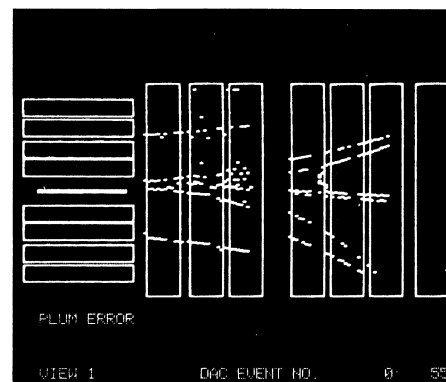
Event recorded in the Omega spectrometer of CERN during tests of the electron beam generated by SPS protons on 12 November. This is CERN's first ever high energy electron beam and the physicists were very happy to see such events appear without any tuning of the beam or of their detectors.

Super magnets

All four superconducting dipoles, scheduled for the high energy un-separated beam-line from the Brookhaven AGS to the MultiParticle Spectrometer, have been installed after successful tests. The magnets are each 2.5 m long with a 20 cm bore and give a 4 T bending field. Their design is similar to that proposed for use in the 200 GeV proton storage rings, ISABELLE, and the successful operation of these magnets has given added confidence to the ISABELLE team.

Future physics

In the course of 1976 three Study Groups at CERN have produced reviews of possible physics at future accelerators. The reviews are now available as 'yellow reports'. Report CERN 76-12 edited by L. Camilleri covers work on physics at a multi-TeV proton synchrotron and at 400 + 400 GeV proton storage rings (LSR - Large Storage Rings). Report CERN 76-18 covers work on physics at an electron-positron storage ring of energy up to 100 + 100 GeV (LEP - Large Electron-Positron). The group looking at the potential of LEP was chaired by Pierre Darriulat. Both reports are available from the CERN Scientific Information Service, CERN, 1211 Geneva 23, Switzerland.



1. André Klein

2. Wim Klein

Opposite page:

The prototype superconducting quadrupole which has worked so well in tests at the CERN ISR Division

What not to do with accelerated particles

Flutter in the dovecots of the precious stone trade in Geneva on 11 November. A large diamond, expected to attract around 3 million Swiss Francs at a Christie's auction, was withdrawn under suspicion that its yellow tint was not natural but had been obtained by irradiation with a beam from a cyclotron. Such irradiations, by affecting the crystal structure, can change the light transmission properties of a diamond. A diamond artificially tinted in this way plunges in value by a factor of ten (for some obscure reason).

50 microamp at TRIUMF

Since September, the TRIUMF cyclotron has been running 1 to 2 μA beams with 10 μA scheduled for one shift each week. Quite apart from the lack of shielding, it is still necessary to limit the average current to avoid irradiating the machine too severely. With the delivery of more concrete blocks, a 20 μA test was scheduled for 23 November. 20 microamp was achieved on the target by midnight and the current was gradually increased to a maximum of 50 μA , the limit being set by the cooling capacity of the temporary beam dump. The permanent dump (which is also a neutron source) will be installed next Summer in preparation for the first 100 μA runs by the end of the year.

Power from accelerators

The fertile mind of Bob Wilson, Director of Fermilab, has looked again at the possibility of accelerators becoming energy producers, via the nuclear fission route, in the light of the reduced power requirements for accelerator operation using super-

conducting magnets. Construction of the Fermilab superconducting Energy Doubler is the obvious source of this rethink. The necessary sequence would be to use high energy protons to generate neutrons which would be absorbed in uranium or thorium yielding fissionable material, like plutonium, to burn in a reactor. Some collections of accelerator parameters (energies, intensities, etc.) could make this sequence productive by generating more power than is used to accelerate the protons. Professor Wilson accepts that there are better ways of producing plutonium but points out that the necessary proton beam intensities in any device such as he outlined would make a truly magnificent neutrino source.

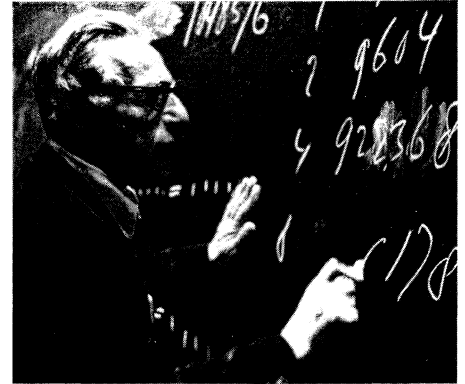
On people

By coincidence, CERN is bidding farewell at the same time to two prominent staff members bearing the name Klein. André Klein has returned to the upper echelons of French administration after five years at CERN during which time his main task was as head of administration at the SPS project. In that role he did a great deal to smooth relations with the two host countries, France and Switzerland, during the complicated negotiations involved in the major extension of the CERN site. Wim Klein, the human computer, has retired after eighteen years in the Theory Division. His phenomenal abilities at mental arithmetic are legendary — there cannot be many people around who could even understand the complication of mentally extracting the 37th root of a 220 digit number in a few minutes! His departure was marked with a 'Farewell Show' in the CERN Auditorium on 10 December when his prowess was obviously undimmed.



CERN 146.9. 76

1.



CERN 217.8.76

2.

Frank Cole of Fermilab has joined John Blewett of Brookhaven as co-editor of the journal 'Particle Accelerators' published by Gordon and Breach. John, who has edited the journal since it was started, intends to retire as editor in July of next year.

New appointments at Fermilab: Drasko Javanovic becomes Associate Head of the Research Division. Linc Read becomes Head of Research Services. Dennis Theriot and Dick Lundy swap places becoming Head and Associate Head of the Neutrino Department.

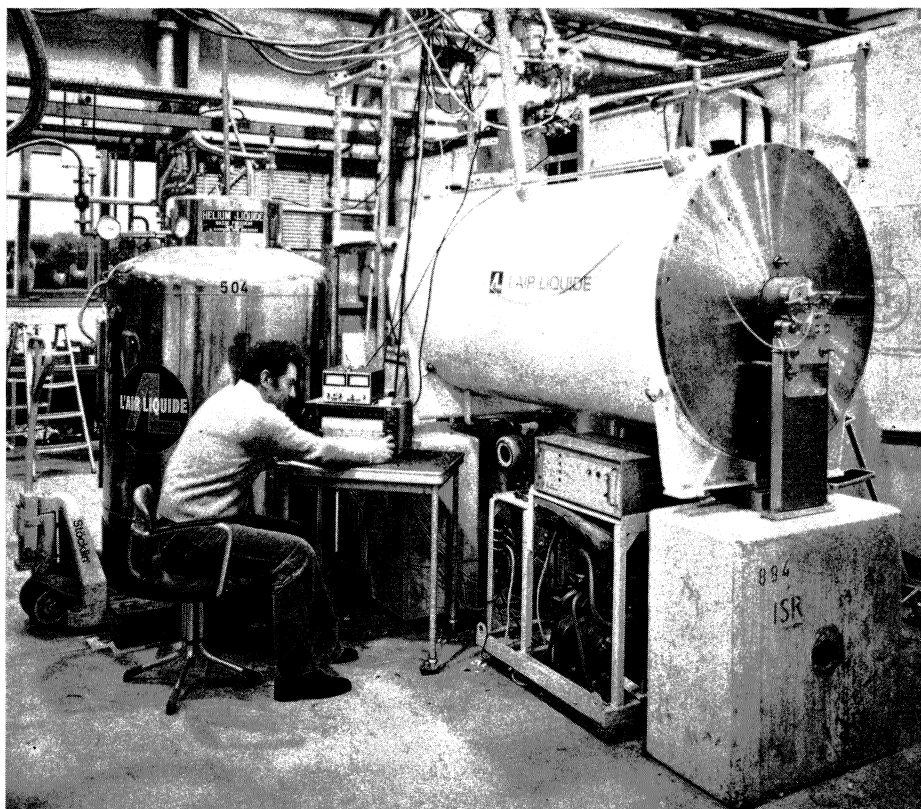
On the occasion of their 30th Anniversary, the Associated Universities Inc. which operate the Brookhaven Laboratory, honoured I.I. Rabi and Franklin A. Long with commemorative plaques for many years of distinguished service on behalf of Brookhaven and the National Radio Astronomy Observatory.

The Program Advisory Committee at SLAC has five new members for a term extending to 1978. They are Joe Ballam (SLAC), Robert Cahn (Michigan), John Kadyk (LBL), James Pilcher (Erico Fermi Institute) and Stanley Wojcicki (Stanford).

A Point of View

Leon Van Hove, Research Director General at CERN, gave the closing lecture at an International School of Particle Accelerators held in Erice from 10 to 22 November. The title of the talk was 'What do physicists expect from higher energies?' Giving his personal evaluation of the high energy physics outlook, Professor Van Hove concluded with the following comments about the need for a strategy concerning the selection and exploitation of future large accelerators.

CERN 22.11.76



Superconducting quadrupole of ISR quality

A prototype superconducting quadrupole such as could be used in a high luminosity insertion at the CERN Intersecting Storage Rings has emerged with flying colours from a series of tests and magnetic measurements in its own horizontal cryostat. (The first tests in a vertical cryostat were reported in May, page 185.) Very stringent tolerances on field gradient allow a maximum error of only 2 parts per thousand over the beam aperture of the magnet and this has been achieved at the design peak field gradient of 40 T/m with a maximum field of 5.1 T in the superconducting magnet windings. The magnet is of such a quality that its installation in the ISR could be envisaged with confidence—there is no higher criterion in the accelerator world.

COURIER progress

With this December issue we complete the first volume of CERN COURIER in which we have attempted to extend our information coverage to be more representative of the world-wide community of high energy physics. Thanks to the splendid collaboration of the correspondents based in the Laboratories (see the list inside the front cover) our aims have been largely achieved. There remains, however,

a great deal that can be done and, in the coming year, we hope to be able to invest more effort at the editorial end so as to realise more of the potential of the communications system that has been established in the course of this first year.

A word of thanks should also go to those who take such good care of the distribution of the journal in several of the larger countries. After a few teething troubles, the new distribution chains seem to be operating efficiently (though we have still to establish the distribution system in France). Finally in our list of appreciations, we should like to thank Presses Centrales Lausanne who have printed CERN COURIER for the past four years. Their high competence and enthusiasm eased the task of the Editor considerably.

The COURIER will move to a new printer at the beginning of 1977 and it has been decided to open the year with a combined January/February issue. This will avoid the problems of producing an issue in the first days of January (problems which mainly stem from postal delays immediately after the turn of year festivities). The issue will appear mid-February and, given the continued excellent co-operation that we receive from so many people, we hope to serve the high energy physics community better in the course of 1977.

The recent developments have made it overwhelmingly clear that much new knowledge can be expected from higher energy machines. The interest of the phenomena to be investigated and the advances being made toward unified theories leave little doubt about the scientific validity and vitality of high energy physics. One can therefore hardly see any reason why a reasonably strong level of support would not be continued for this branch of physics, which is obviously quite fundamental and in a state of constant progress. The problem is not so much whether new high energy accelerators will be built in the future. Right now in fact, new electron-positron storage ring facilities are under construction at DESY and SLAC, and Fermilab is building an energy doubler to accelerate protons to 1000 GeV (1 TeV).

The problem is rather to ensure, through a proper strategy for future accelerators, that the world resources allocated to high energy physics be spent for the greatest overall benefit and advancement of science. Two circumstances play here a dominant role, firstly the evidence that the progress of physics demands various complementary types of machine, secondly the fact that the cost of each of them is likely to saturate the financial possibilities of a whole continent for many years.