

Around the Laboratories

Palermo Conference

The biennial International Conference of the High Energy and Particle Physics Division of the European Physical Society will be held at Palermo in Italy from 23 to 28 June. Attendance will be by invitation only with the quota for the various countries and Laboratories following established tradition.

The programme has the following major topics: The new particles, Lepton production by hadrons, $e^+e^- \rightarrow$ hadrons, Neutrino physics, Deep inelastic lepton scattering, Hadron spectroscopy, High energy hadron collisions, Standard electromagnetic interactions of hadrons, Theoretical topics, New projects, Highlights in technical developments. These subjects will be covered by invited papers in plenary sessions with the possibility of organizing special sessions if needed.

Papers for the Conference should be sent to A. Zichichi, European Physical Society, PO Box 39, 1213 Petit-Lancy 2, Switzerland — abstracts by 15 April and full texts by 1 June.

NOVOSIBIRSK Electron cooling successfully tested

The Institute of Nuclear Physics at Novosibirsk has concentrated on the construction of storage rings incorporating many new ideas. One of their long-term aims has been to build a machine where proton-antiproton interactions can be studied (see May 1967, page 88); the big problem with such a scheme is to achieve adequate antiproton beam intensities. The idea of G.I. Budker, Director of the Institute, is to use an electron beam travelling along with the antiproton beam to 'cool' the antiprotons — damping their

motion and making them less likely to be lost from the beam.

To test the scheme, a small storage ring, known as NAP-M, was designed in 1972. It has four bending magnets, 3 m bending radius, and four 7.1 m straight sections. It can hold protons up to 150 MeV and is fed with 1 mA beams at 1.5 MeV from a pulsed electrostatic injector. Circulating beam was achieved in September 1973 and its characteristics were studied during the subsequent six months. For the past year electron cooling experiments have been under way.

Electron beams of energy up to 100 keV and intensity 1 A, from a refined three electrode gun, can be run along with the proton beam in a 1 m length of a straight section. For the experiments, the proton beam was taken to 65 MeV and the ring magnet fields were then held constant while the electron beam at 35 keV was injected. Operation and observation was all under computer control (an Odra-1304). Probes with TV cameras, pick-up stations and scintillators (including one which could be moved across the beam) were used to monitor the beams. There was also an external telescope of scintillators and Geiger counters which spotted the formation of neutral hydrogen atoms emerging through a thin walled vacuum chamber at the cooling section. This could be used to optimise the lining up of the two beams by looking for the maximum production of the neutral atoms.

The experiment showed that cooling occurs when the proton and electron velocities are identical to one part in a thousand or better. When this is achieved, the effect of the electron beam on the proton beam is to reduce its energy spread, to reduce the amplitude of the proton betatron oscillations and to increase the proton beam lifetime. This does not necessarily say that electron cooling is the best route

to intense antiproton beams but it does confirm the original thinking that went into the electron cooling concept.

Three other storage rings are in operation at the Institute. VEPP-2, a 500 MeV electron-positron machine, works mainly as injector for VEPP 2', a 660 MeV electron-positron machine which has low beta insertions to increase the luminosity. VEPP 3 is a 3 GeV electron-positron machine. Its performance remains limited by inadequate positron intensities. There is no high energy electron linac to help in positron production; they are obtained by bombarding a tungsten target with 450 MeV electrons which gives a low yield of 250 MeV positrons.

For the future, VEPP 4, which was originally intended as a 25 GeV proton-antiproton machine incorporating electron cooling, has been redesigned as a 6 GeV electron-positron machine. To tackle the positron beam intensity problem, a linac is likely to be built. It is hoped to bring VEPP 4 into action in 1978.

INFN Conference on applications in biomedicine

A conference dedicated to 'biomedicine and the methodology of fundamental nuclear physics' was held at Istituto Superiore di Sanita in Rome on 14, 15 February. It was the first of a series of interdisciplinary conferences organised by INFN (Istituto Nazionale di Fisico Nucleare) the aim of which, as stated by Prof. C. Villi, President of INFN, at a Press Conference, is to encourage the 'fall out' of knowledge acquired in nuclear physics research into other fields of research and technology. In the case of biomedicine, there is occasional application of nuclear techniques but use is rarely