



Bjorn Wiik (left), coordinator of the HERA proposal, with Werner Holler, builder of the 4 metre-long model of the HERA tunnel seen in the background.

(Photo DESY)

imum innovation. The effort would be modest enough to be discontinued after one or two runs (or 3 to 4 months) to be replaced by a newer device. Proposers are invited to consider the virtue of being ready for possible low-luminosity measurements of collisions at about 2 TeV by the end of 1983.

This new possibility is seen as a challenge to the high energy community to come up with an imaginative solution that is complementary to or competitive with the present colliding beam detector project at Fermilab.

DESY HERA ahead

Preparation of a detailed proposal for the construction of the HERA electron-proton storage ring was the subject of a meeting at DESY on 7-8 April, third in a series. A longer work-

New electroweak tests at PETRA

One of the special attractions of electron-positron annihilation is that all the accessible quarks are produced 'democratically'. At the energies available in the PETRA electron-positron storage ring at DESY, five species of quark (up, down, strange, charmed and bottom) are involved in the annihilation into quark and antiquark and subsequent production of hadrons.

In addition, the effects of the weak neutral current are larger at PETRA energies, making it possible to study the weak couplings of the heavier quarks as well as the basic up/down doublet. This means that the standard electroweak model, which accu-

rately describes the low energy weak interactions of the first 'generation' of quarks (u and d) and their associated leptons, can be put to the test both at higher energies and in the context of the weak neutral current couplings of the heavier quarks.

Recent analyses of data from the JADE and Mark-J experiments have concentrated on a careful measurement of the total cross-section for hadron production throughout the available energy range. The results give values for the weak coupling constants of the quarks which are in agreement with the predictions of the standard electroweak model. A value of 0.22

was obtained for the standard mixing parameter ($\sin^2\theta$), in fair agreement with the value obtained from scattering experiments with electron and neutrino beams, even though at PETRA the majority of the annihilation cross-section into hadrons is due to contributions from the heavier (s, c and b) quarks. This result is consistent with the hypothesis that the weak couplings of the heavier quarks are the same as those of their lighter counterparts, indicating that the pattern of both the weak and electric charges of the quarks are repeated in successive generations.

The MBNIM electronics package has been developed at CERN to improve trigger logic.

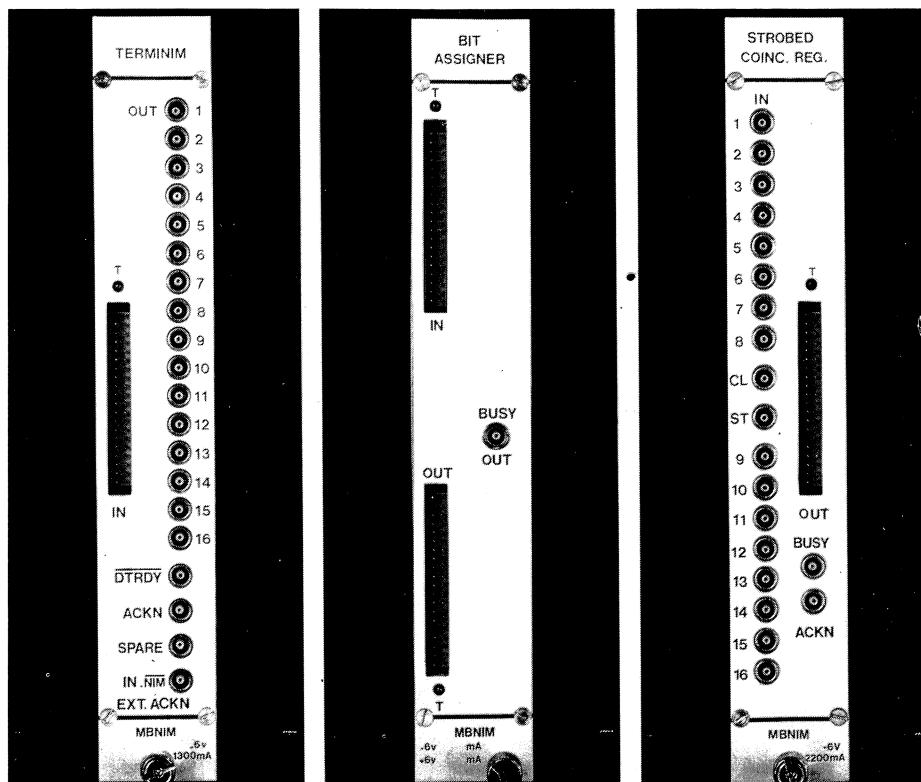
(Photo CERN 125.7.6.78)

shop was held between 15 February and 7 March. About 50 physicists and engineers from 22 institutes are actively participating in this work, and as was expected, significant contributions are coming from outside DESY.

In the latest meeting, the original HERA proposal (see May 1980 issue, page 99) was re-examined and found to be essentially sound. Nevertheless several improvements were made. The interaction regions were redesigned, particularly with regard to the magnets used to 'turn' the particle spins and obtain longitudinal polarization. This provides an elegant way of studying parity-violating weak interactions between quarks and leptons. The new position of the polarization magnets makes it possible to simplify the layout of the four interaction regions. Both machines are now totally independent in energy and the amount of synchrotron radiation which reaches the interaction region has been considerably reduced.

Another improvement concerns the superconducting bending magnets of the proton ring. Careful investigation has shown that it is possible to use a 'cold bore' instead of the 'warm' vacuum chamber previously proposed. This makes it possible to reduce the coil diameter from 100 to 75 mm, while keeping the same beam aperture and reducing the energy stored in the superconducting magnets by a factor of nearly two. The magnets required for HERA are now practically the same as those successfully built at Fermilab. The time required to organize industrial production of these magnets can now be considerably reduced and would not delay the project. A first written version of the detailed HERA proposal, including all these new aspects, will soon be ready.

Particular encouragement came



from the recent publication of the final report of the Advisory Committee for future planning of large projects in fundamental research, appointed by the German Ministry of Research and led by K. Pinkau (see page 210). The very clear statement recommending both LEP and HERA was received with great satisfaction. Preliminary work for HERA should be started immediately in order to clarify all the potential problems of superconducting magnet production and the building of the underground ring.

CERN Fast trigger logic off the shelf

These days increasing use is being made of general purpose spectrometers which can be readily adapted for a wide range of different experi-

ments and cater for a wide base of users. A good example is the Omega spectrometer in the West Experimental Area at CERN (see December 1980 issue, page 400).

To help make Omega as user-friendly as possible, the electronics team decided to develop a triggering package to handle a wide variety of different experimental requirements. With such improved trigger logic, the rate of taking data could be minimized as early as possible in the decision-making process, providing refined data samples and minimizing the need for subsequent off-line computer power.

The result is MBNIM (Multi-Bit Nuclear Instruments Modules), covering the basic functions required nowadays for experimental trigger logic. As well as Omega, it has now also been incorporated at CERN into triggers for the Split Field Magnet at the Intersecting Storage Rings, for