

News from Abroad

Professor Merrison (left) escorting the Prime Minister (centre) and Sir Harry Melville (right) around the magnet ring of NINA when the Daresbury Laboratory was formally opened.

An aerial view of the Daresbury Laboratory bounded on the north side by the Bridgewater canal. NINA is in the circular building and its adjoining experimental hall is the tallest building on the site.

(Photos: Daresbury.)

Daresbury

The Daresbury Nuclear Physics Laboratory was formally opened on 16 June by the Prime Minister of the UK, the Rt. Hon. Harold Wilson.

The Laboratory houses a 4 GeV electron synchrotron, NINA, capable of very high beam intensity which produced its first full energy beam in December 1966, after a construction period of only three years (see CERN COURIER, vol. 7, page 12). The machine was put to use for physics almost immediately and by now teams from the Universities of Glasgow, Liverpool, Manchester, Lancaster and Sheffield are involved in the experimental programme.

Experiments include investigations on the photoproduction of neutral pions and eta mesons, and of neutral kaons; elastic electron-proton scattering; wide-angle electron and muon pair production; inelastic electron-proton scattering, in particular, the electro-production of nucleon isobars.

In his speech at the Opening Ceremony, the Prime Minister paid tribute to the Director Professor Alec Merrison, and his staff for the speed at which the Laboratory became operational, and wished the Laboratory well in its future research programme. Professor Merrison has been seconded from the staff of Liverpool University to become Director of Daresbury, and he continues to lecture at the University. He spent several years at CERN in its early days (his signature can be found on page 128 among those celebrating the first beam in the synchro-cyclotron).

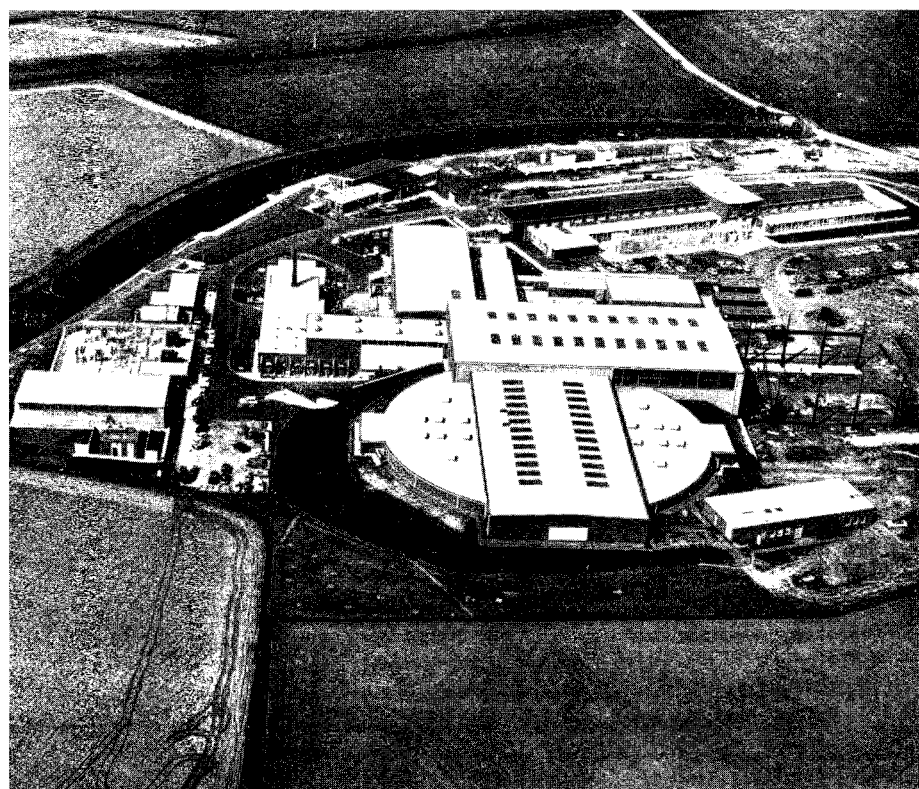
Referring to future support for sub-nuclear physics, the Prime Minister said that CERN had already proved successful, not only in its prime scientific purpose but as a manifestation of European collaboration in an advanced scientific field, and that the Government of the UK was giving most sympathetic consideration to the proposed project for a 300 GeV machine.

DESY

It has been found necessary to change the vacuum chamber of the 6 GeV electron



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synchrotron at DESY, Hamburg, Federal Republic of Germany. The accelerator ring is 100 m in diameter with a vacuum vessel cross-section of 48 x 144 mm. The initial chamber material of organic resin has suffered radiation damage, causing high out-gassing rates in the vacuum chamber. A new chamber is being constructed of alumina ceramic.

Erevan

The 6 GeV electron synchrotron under construction of Erevan, USSR, is scheduled for completion in August.

Excavation work for the machine started in 1960. The ring vacuum chamber is 70 metres in diameter with a cross-section of 42 x 120 mm. There are 48 magnets (in FOFDOD sequence) and 24 accelerating cavities. Injection is at 50 MeV from a linear accelerator. The pulse repetition rate is 100 pulses/second. Hydrogen and heavy liquid bubble chambers and spark chambers, including a wide gap (30 cm) chamber, will be used in the experimental programme.

Weston

The Director, Professor R. Wilson, of the National Accelerator Laboratory at Weston, Illinois, USA, where it is intended to construct the 200 GeV proton synchrotron, has made several statements in recent months concerning the new accelerator and the Laboratory.

At a two day conference of accelerator builders and users organized at Argonne by the Universities Research Association (an association of 46 Universities in the USA who will manage the National Accelerator Laboratory), Professor Wilson stated that his approach to the accelerator construction will be as far as possible similar to that he has used in the construction of electron accelerators at Cornell University. He hopes to rely on a comparatively small staff at Weston itself with the minimum administrative structure. He also hopes to use the machine himself as an experimentalist. Professor Wilson has set up a Physics Advisory Committee, chaired by R. Cool from Brookhaven, to

have the advice of the rest of the Physics community.

Design effort on the machine has started, working on a cost estimate of \$ 240 million, with a reasonable amount in addition if it is decided to make provision for eventually going to higher energies (for example, an extra \$20 million is estimated for the magnet ring, if provision for an increase in energy to 300 GeV is to be incorporated; the design team will consider rings capable of up to 500 GeV).

Professor Wilson hopes for full authorization of the project for fiscal year 1969; authorization will be requested in Spring 1968. A construction period of 5 to 6 years, after full authorization, is anticipated. For fiscal year 1968, the US Atomic Energy Commission requested \$10 million, but this request was regarded as being in some jeopardy because of the failure so far to achieve a guarantee of non-discrimination in housing at the Weston site. In fact, the Joint Congressional Committee on Atomic Energy, JCCAE, allocated \$7.3 million which it believed to be sufficient to meet the first year capital requirements.

A sub-committee of the JCCAE has recommended that the design intensity be set at 3×10^{13} protons per pulse rather than 3×10^{12} proposed for budgetary reasons, and that the accelerator should have experimental areas which are consistent with the national scope and purpose of the machine. They also support careful study of the possibility of increasing the energy eventually to 300 GeV or higher.

Argonne

Construction of what will be the world's largest bubble chamber has started at the Argonne National Laboratory, USA.

The chamber will contain about 32 000 litres of liquid hydrogen in a tank of cylindrical construction with diameter about 4 metres. A superconducting magnet will give a field of 20 kilogauss over the useful volume and the optics will involve the use of a bright-field illumination system with Scotchlite on the interior walls.

The total cost of the project is estimated at \$17 million. It is hoped to have the chamber ready for commissioning in 1969. It will be used at the 12.5 GeV ZGS (Zero Gradient Synchrotron) at Argonne.

Unitary symmetries and their application to high-energy physics

by M. Gourdin (Amsterdam, North Holland Publishing Company, 1967, 110 sh.)

Of all the great theoretical ideas of recent years in elementary particle physics, the one which has met with the greatest success and which seems assured of a long life is certainly that connected with unitary symmetries. It may even be said that SU(3) has now become a habit with physicists and that whatever its future may be, some of it will surely remain at least in their manner of thinking. For the moment at any rate, no high-energy physicist can afford to ignore it; the mathematician, the experimentalist, and the theoretical phenomenologist, each find a use for it.

So it was both natural and useful that a publication should appear to give a synthesis of the enormous amount of work on this subject in recent years. We are indebted to Professor M. Gourdin for having undertaken this task.

'Unitary Symmetries' is intended to collect together for the largest possible public, both the physical and mathematical aspects of unitary symmetries. The author has accentuated the physics side of the problem as can clearly be seen from the way the book is arranged. The first part, devoted purely to physics, takes up two-thirds of the book. The SU(3) group and its experimental consequences are dealt with in detail: classification of elementary particles, charge operators, formulae of mass, etc... Each of the three types of interactions, strong, electromagnetic and weak, is reviewed in turn: 3 and 4-body coupling (with an impressive number of formulae), decay of resonances, for strong interactions; differences of electromagnetic mass, form factors, photoproduction, for electromagnetic interactions; currents, leptonic and non-leptonic decays for weak interactions.

This first part, which in our opinion is the most useful, is followed by four rather concise chapters on the SU(6) group. This is dealt with in the same way as the SU(3)