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News from abroad

1. *The face of Professor Abdus Salam, Director of ICTP, lit up in discussion during the International Symposium on Contemporary Physics.*
2. *Professor Paulo Budini speaking at the dedication ceremony of the new building of ICTP.*

(Photos Rice, Trieste)

International Centre for Theoretical Physics

Motorists driving into Trieste in the month of June were greeted by a road-sign 'Contemporary Physics 400 metres ahead'. The International Centre for Theoretical Physics (ICTP) was holding a major symposium to inaugurate the fine new building which has just become its permanent home. While carpenters screwed together the last pieces of wood and electricians connected the last wires, about 350 leading physicists from countries throughout the world gathered, during the three weeks 7 - 29 June, for an 'International Symposium on Contemporary Physics'.

The Symposium

Professeur Abdus Salam, Director of ICTP, described the aim of the meeting as 'to review the whole spectrum of modern theoretical physics, to share the insights of different disciplines and to acquire, if possible, a deep sense of the scope and unifying nature of the subject'. Certainly, the range of the symposium was broad and the standing of its speakers high. The topics covered included biophysics, condensed matter including the solid state, nuclear and elementary particle physics, astrophysics, plasma physics, foundations of quantum theory, general relativity and cosmology. And among the participants were Nobel Prize winners M. A. Bethe, F. C. Crick, P. A. M. Dirac, W. Heisenberg, C. H. Townes, T. D. Lee, J. Schwinger and E. P. Wigner. It is about twelve years since the whole of physics was covered in such concentrated way in one place, and it was appropriate that ICTP should be that place.

ICTP

The idea of the International Centre for Theoretical Physics originated with Professor Abdus Salam, who proposed its creation to the International Atomic Energy Agency (IAEA), a subsidiary body of the United Nations, and it has been largely thanks to his continuing drive and enthusiasm that ICTP has established itself, within four years of being set up, as an excellent centre of theoretical research. Abdus Salam sees it as effectively the first department of a United Nations University having the particular aim to help theoretical physicists from the developing countries. As yet, these physicists usually cannot find in their home environments the intellectual stimulation which they need to make their research flourish. Work in theoretical physics is an obvious way to build up pure science in these countries since it does not require extensive investment in experimental equipment. Salam conceived the Centre as a place where the scientists could come for brief periods to sharpen their minds by working alongside the most distinguished men in physics. He is acutely aware of these problems and some of his other activities are obviously motivated by similar thinking. He serves on the United Nations Advisory Committee on Science and Technology and is chief scientific adviser to the government of his own country, Pakistan.

In achieving his aim, he has had the invaluable help of Professor Paulo Budini who has been instrumental particularly in securing the extensive support of the Italian government and the city and university of Trieste, which has been the mainstay of the Centre up to now.

After a planning stage, in which extensive use was made of the experience gained in the Theory Division at CERN and in the CERN Fellowship Programme, the Centre came into being in 1964, initially guaranteed for a period of four years. This period was extended by the IAEA for a further six years in 1967. Temporary premises were found in Trieste and Salam was appointed Director, with Budini as Deputy Director. Finance has been provided by the Italian government, Trieste, the IAEA, UNESCO and the Ford Foundation - the annual budget is around $500 000 of which Italy provides about $250 000.

Activities

The functions of the Centre are listed as —

a) to train fellows fom developing countries for research
b) to help in fostering the growth of theoretical physics at an advanced level in the developing countries
c) to conduct through its professors, visiting and guest scientists and fellows, research in the various fields of theoretical physics

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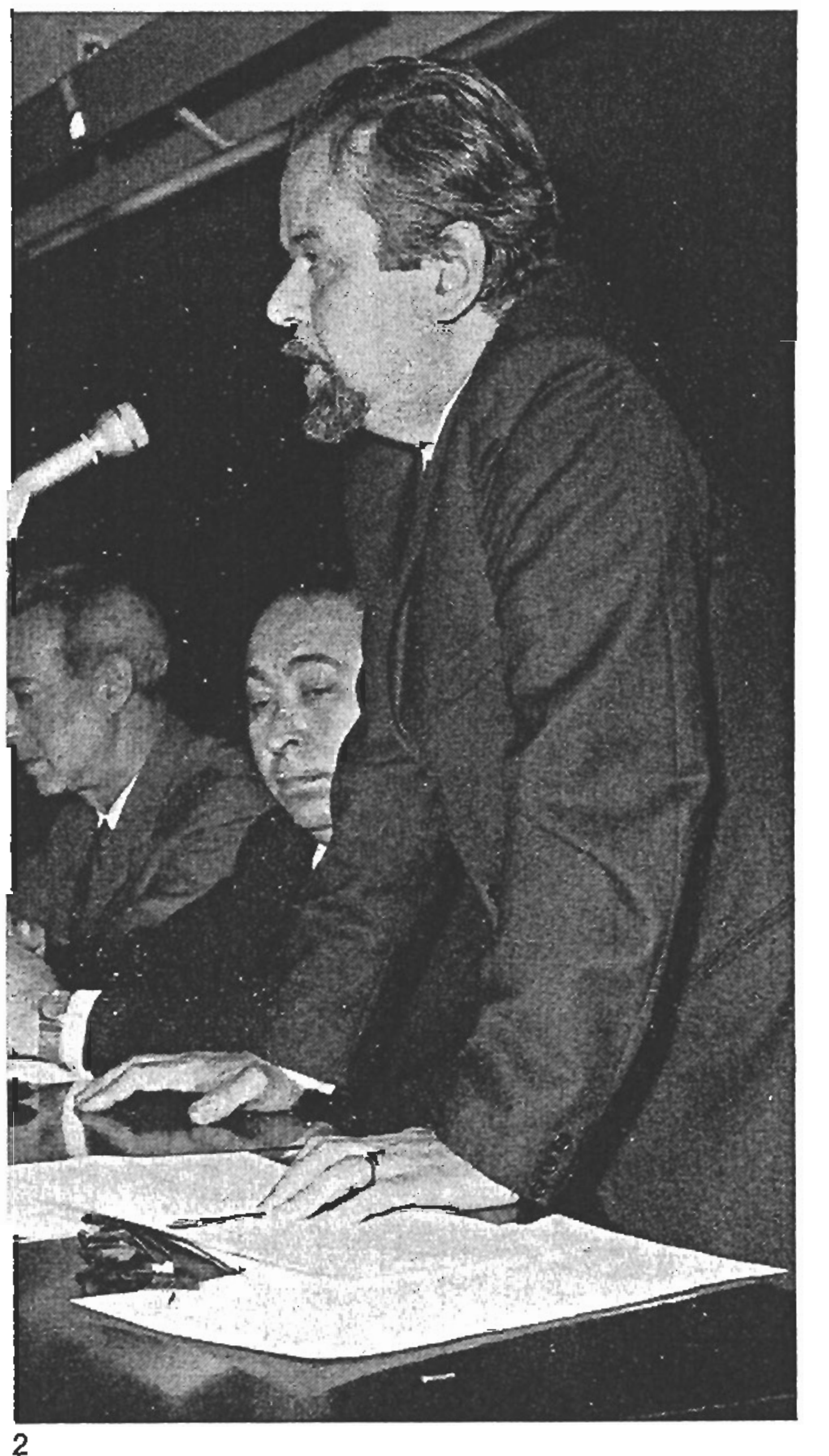

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3. *The building, designed by architects from Trieste University, which becomes the first permanent home of ICTP.*
4. *A photograph, taken during the dedication ceremony for the new building, showing, the fine main lecture hall.*

(Photos Rice, Trieste)

1. *A general view of the 2.5 GeV electron synchrotron at the University of Bonn. This photograph was taken before the shielding tunnel was completed.*

(Photo Bonn)

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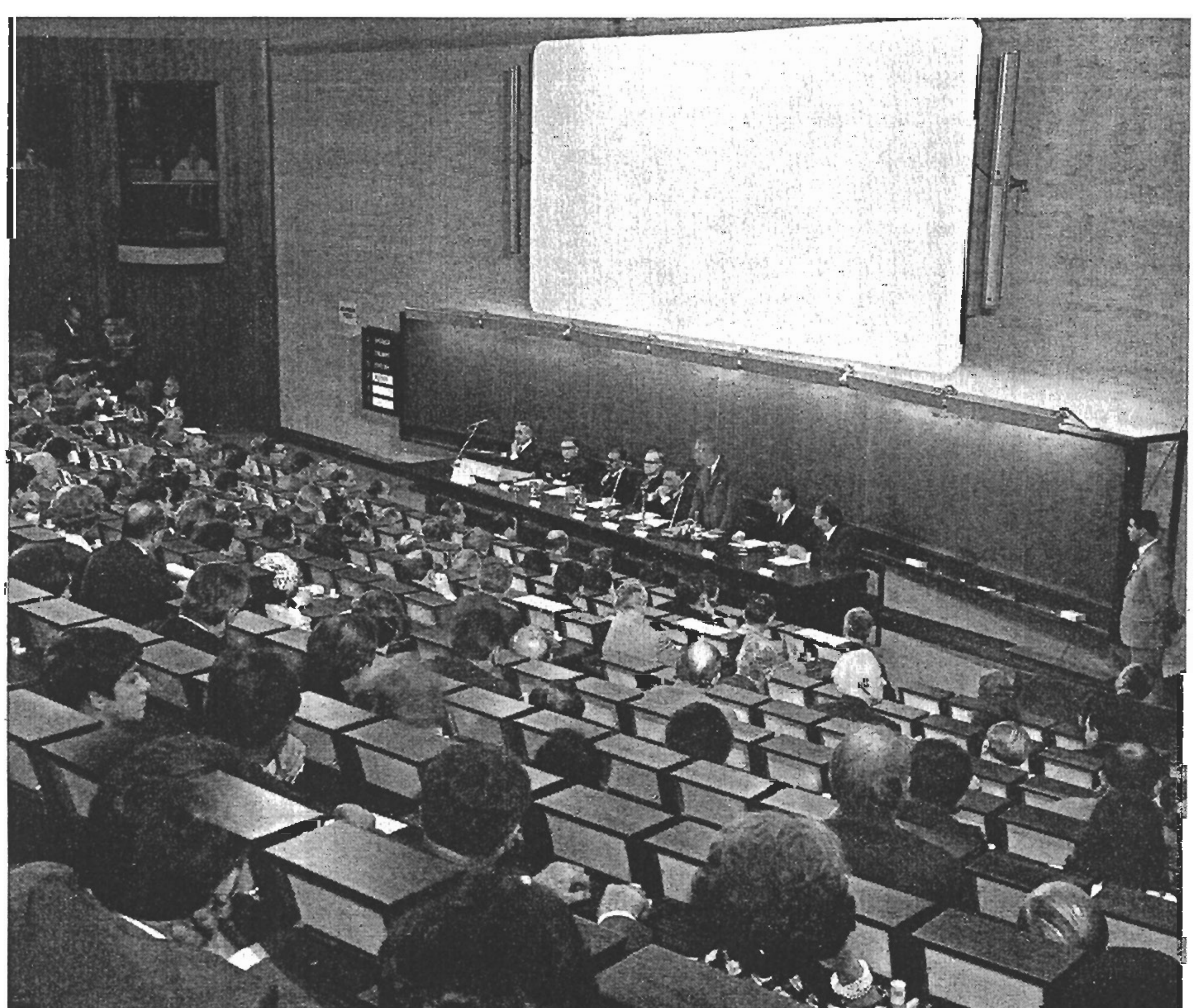

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d) to provide an international forum for personal contacts vital to research in theoretical physics.

The policy is to avoid specialization in any given area of theoretical physics and to be strictly inter-disciplinary.

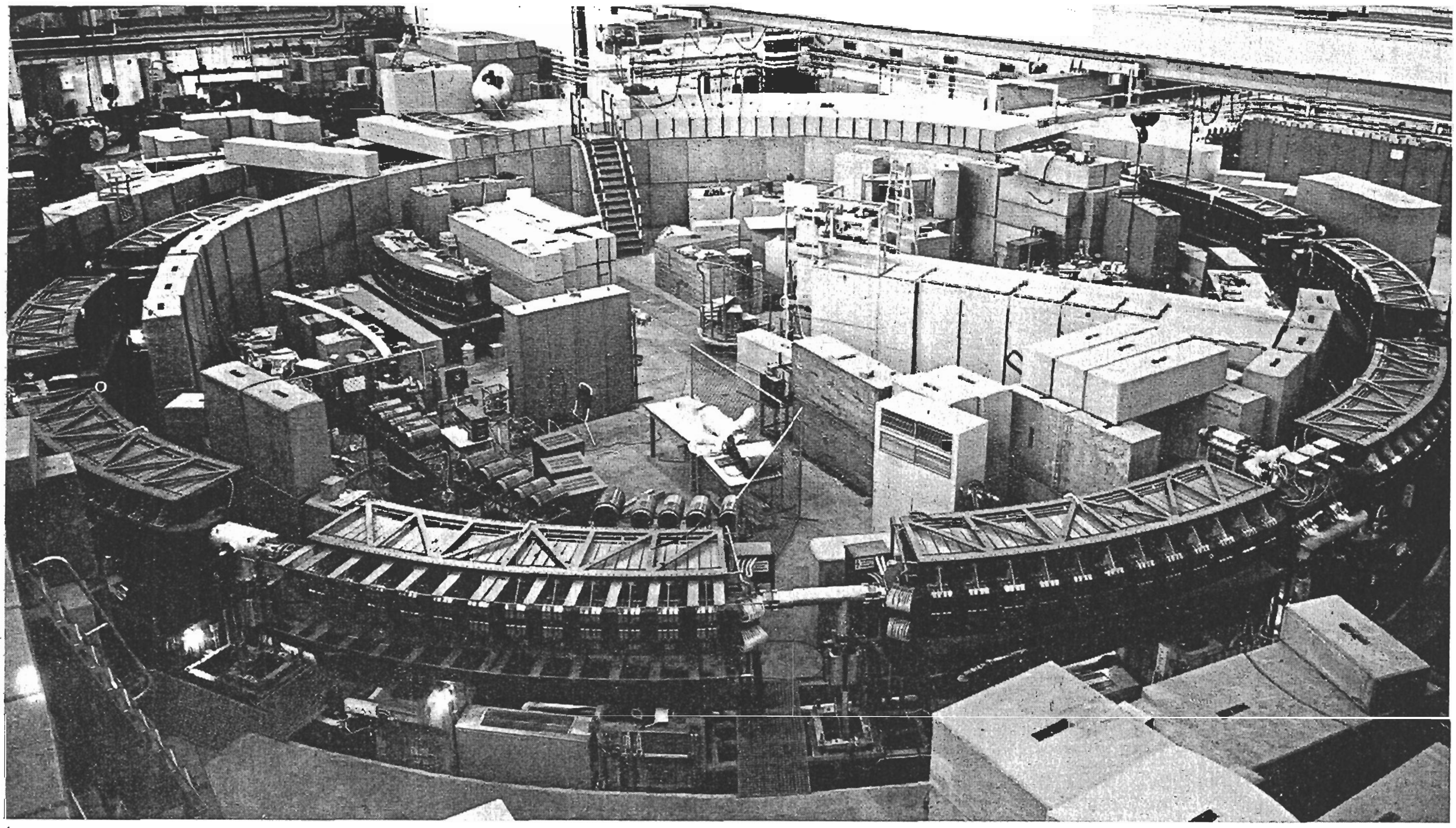
Several examples of the ways in which the Centre carries out these functions are worth picking out. The scientific personnel consists of a small nucleus of staff surrounded by a cloud of visitors who may be there for periods ranging from one month to two years. A very successful scheme has been the appointment of 'Associate Members'. These are distinguished scientists, selected from the developing countries, who are entitled to spend periods of up to four months per year working at the Centre. In this way, these physicists are not lost to their countries while still benefiting from contact with their peers from other lands. It is believed that the scheme has helped considerably towards staunching the flow of scientists from the developing countries. The selection of the Associate Members is done by the Scientific Committee which plays an important part in the life of the Centre. Its members are Chairman — S. Vallarta (Mexico), Secretary — A. Sanielevici (Rumania), A. Bohr (Denmark), R. E. Marshak (USA), A. Matveyev (UNESCO) A. Salam (ICTP), V. G. Soloviev (USSR), L. Van Hove (CERN) and H. Yukawa (Japan).

A major feature of each academic year is a blitz on particular topics in physics during extended seminars (lasting four to ten weeks). Many scientific big guns are brought together at the Centre to bombard a specific problem. The topics have included plasma physics, high-energy physics, nuclear physics and the theory of condensed matter.

Over the four years of its existence, 600 scientists from 53 countries (including 200 from 23 developing countries) have worked at the Centre. About 400 publications have resulted from their research.

New building

On 9 June the new premises of ICTP were dedicated. Mr. R. Ducci, Italian Ambassador to Austria and Representative to the IAEA, presented a golden key for the building to Dr. S. Eklund, the Director General of IAEA.



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The building, beautifully situated near Miramare castle, has been designed by architects from the University of Trieste and it is the university, city and region of Trieste who have financed its construction at a cost of 900 million lire.

It remains formally the property of the University of Trieste and is rented by the Centre at a nominal cost of $1 per year. The relationship of the Centre with the University of Trieste, particularly with its theoretical physics department, has always been very close.

The building is 90 m long covering an area of 1553 m^2. It has a splendid lecture hall with accommodation for 320 people, three other lecture rooms, a large library, and 65 offices for physicists.

Despite all this, the Centre is still not out of the financial wood. There remain difficulties due to lack of funds and the activities in the second half of this year may have to be severely curtailed. It is possible that UNESCO may enter fully into partnership with the IAEA in operating the Centre which could resolve many problems from 1970 onwards.

Bonn synchrotron

In 1967, a 2.5 GeV electron synchrotron was brought into operation at the University of Bonn, Federal Republic of Germany. This article describes the machine, its present performance and its experimental programme.

The history of high energy physics at Bonn began in 1953 when it was decided to construct a 500 MeV electron synchrotron. This came into operation in 1958 and was the first alternating gradient synchrotron in Europe. It has given over 30 000 hours of service and has an average beam intensity of 5×10^{11} electrons/s. Research with this machine has concentrated on photoproduction of pions, deuteron disintegration, and the structure of electron-photon showers.

By 1963 however, it had become obvious that, to keep pace with the development of high energy physics, a higher energy machine was needed and work began on a 2.5 GeV synchrotron. This slotted nicely between the electron machines at Cambridge (USA), DESY and Daresbury which have energies between 4 and 7 GeV and existing machines of energies around 1 GeV. The first electrons were accelerated in March 1967. It now operates 24 hours a day with one day a week for maintenance.

The machine

The synchrotron had to be squeezed into an area 30 X 60 m^2 and this dictated the use of rather higher magnetic fields (up to 10 kG) than usual in electron synchrotrons, to keep the machine radius down to 11 m. (The radius of an electron synchrotron is made as high as possible to reduce the energy lost by radiation from the orbiting particles and hence the fields in the ring magnets are usually low.) There are twelve magnet units around the ring each weighing 18.5 tons. They are powered with a peak current of 1380 A corresponding to a total stored energy of 370 kJ. The magnet aperture is 6 cm X 9 cm containing an all ceramic vacuum chamber where a pressure of 10^{-7} torr is maintained.

A 25 MeV linear injector feeds the ring with pulses 1 μs long. The peak injected current is 250 mA. To take advantage of a ring acceptance higher than the injector emittance, multi-turn injection is used.

The radio-frequency system operates at 499.67 MHz providing a peak energy gain per turn of 700 keV compared with an energy loss per turn at 2.5 GeV of 350 keV. There are two accelerating stations in the ring.

The maximum intensity achieved from the synchrotron is 5×10^{12} electrons/s. The average intensity is around 3×10^{12} electrons/s, corresponding to a circulating current of 0.2 μA. The pulse repetition rate is 50 Hz.

A slow ejection system, using the 3.5 half-integer resonance, was brought into operation in July 1967. It is now producing external electron beams in the energy range 0.5 to 2.0 GeV with spill-times up to 1 ms. An ejection efficiency of about 60 % is achieved. In addition, there are five tungsten targets installed in the ring to produce photon beams.

Experimental programme

Moving around the ring in the direction downstream from the injection point, the first experiment is the photoproduction of positive kaons and lambdas.

$$\gamma + p \rightarrow K^+ + \Lambda^0$$

It has been set up since the beginning of this year and work up to now has concentrated on improving a strong focusing spectrometer to distinguish between the positive kaons and positive pions. A spark chamber array is now being tested which will be used to measure the polarization of the lambda by observing the up-down asymmetry of the proton produced as the lambda decays.