The Pakistan Ambassador recalled that his country's first research reactor at Pinstech was placed under the Agency Safeguards System by an agreement signed in 1964. He expressed appreciation of the help of the Government of USA and of the IAEA, and the gratitude owed to the Government of Canada in providing the scientific, technical and financial help enabling Pakistan to undertake the KANUPP project. When completed in 1970 it would stand as a symbol of his country's entry into the field of nuclear power and help to speed up economic and industrial development.

Ambassador Smyth pointed out that even though the amount of material was so small that safeguards did not have to be applied, nevertheless the experience of the past six or seven years in negotiating agreements and carrying them out had helped to prepare the Agency for the very important tasks which presumably it was now facing under the Non-Proliferation Treaty.

Dr. Eklund found it gratifying that it had been possible to assist a power project which was itself a notable example of how a developing country could apply nuclear technology in its programme of industrial development.

TRIESTE'S LESSON IN SCIENTIFIC COMMUNICATION

The opening of the new home of the International Centre for Theoretical Physics in Trieste also marked the start of a most important manifestation in science — a review of the whole of contemporary physics carried out by world leaders of scientific thought. Eight Nobel Laureates were included among more than 300 distinguished participants.

During three weeks of concentrated lectures and even more concentrated private discussions, these world leaders of scientific thought in all branches of physics were able to explain to each other the goals for which they were striving, the methods they were adopting and the results they had achieved. Many of them are responsible for national or university programmes, and the opinion was generally expressed that one of the immediate benefits would be a reappraisal of research priorities in the light of what had been learned. When the proceedings are published by the IAEA in some months' time they will provide a unique compendium of studies ranging from the most minute particles of the atom to the structure of cosmos, covering the facts which have been established and many of the theories on which future experiments will be based.

As an indication of the span of human knowledge and the accumulation in one place of current knowledge, those taking part included senior physicists who have influenced work and thought for many years and many of the younger men who are extending the limits both of observation and theory — from those who were contemporaries of Einstein to those who are re-examining his theories, and from those whose experimental machines probe the components of atoms to those who count space satellites and huge radio-telescopes among their equipment. Others have achieved eminence using as their tools only pencil and paper or chalk and blackboard to illustrate their theories. The forty-three countries represented among the 320 who attended included the large and the small, the advanced and the developing, those with all modern facilities and those who have been able to use the Trieste Centre as a way of preventing a "brain drain". It was a remarkable, though of course not surprising, demonstration of the universality of brainpower.

One of the main objects was for leaders in various disciplines to survey the work in progress for the benefit of workers in other fields. For this reason no sensational discoveries were revealed, although there was a great deal of recent information and many interesting arguments. Professor Marshall Rosenbluth, one the highest authorities on plasma physics, commented at the end "I have not become an expert in any other area, but I have picked up enough of the feeling of the basic problems in other areas to realize where they overlap. It has been a very helpful cross-fertilization". In the same context Professor I.M. Khalatnikov, an expert in the quantum theory of condensed matter, gave it as his view that there had not been such a meeting in his lifetime and probably not during the life of many physicists. He considered it very important that they had been able to get together with the senior and younger scientists.

Similar views were expressed by Professor Bruno Coppi, an Italian physicist now working in USA, who described it as both a scientific and human experience of a lifetime. "We really have been able to cross boundaries between disciplines", he said "I learned that there is a great deal in common between the results achieved by astro-physicists and plasma physicists. I feel there is no longer any hierarchy of individual disciplines. Like myself, many of my colleagues are going away even more enthusiastic about our own work because we realize the problems faced by those doing other types of work. It has been a tremendous achievement to get so many people of this calibre together for so long. We all had the idea that we could not communicate, but now we find we can. In particular we have found there is a great deal of interrelationship between astro-physics, the space programme and plasma physics."

TRUTH HAS NO BOUNDARIES

"Never before has the International Centre for Theoretical Physics, and I would even say the Agency, attempted to convene a meeting between so many outstanding scientists to assess the situation in a whole scientific discipline of basic importance for atomic energy for the promotion of which the International Atomic Energy Agency was formed in 1956".

H.A. Bethe

W. Heisenberg

E. Lifschitz

P.A.M. Dirac

O. Klein

J. Schwinger

T.D. Lee

F.C. Crick and Abdus Salam

Photos: Rice, Trieste

This statement was made by the Director General, Dr. Sigvard Eklund, when opening the symposium.

"We are living" continued Dr. Eklund "in a time when science opens endless horizons. The new vistas may bring us well-being or destruction — this is a dilemma inherent in most human activities. Science is by its very nature international for truth knows no international boundaries. We in the International Atomic Energy Agency are utilizing the international character of science to help us achieve our ultimate aims: to serve the peace of the world. But with the wise fathers of the Agency I also believe that the organization can be of service to science."

Professor Abdus Salam, Director of the Centre, and originator of the idea for the symposium, outlined its purpose. "The intention" he said "is 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. We are all aware of the dangers of specialization and the narrowness which has become the lot of physics and indeed of most science in the recent past. I have often looked with envy at periods in physics, even 25 years ago, when most of those whom we admire could move from one discipline to another with remarkable facility, cross-fertilizing each. As time has gone on this breed of men has become more and more scarce. We felt that the time had come when we should consciously broaden our horizons spending effort and time over it."

The International Centre for Theoretical Physics was set up in 1964 by the Agency, with the generous assistance of the Government of Italy and the city and region of Trieste, "to foster, through training and research, the

advancement of theoretical physics, with special regard to the needs of the developing countries". Substantial assistance has been granted by UNESCO and the Ford Foundation. Of particular importance in this context is the scheme of associateships, by which talented physicists from developing countries may visit the Centre for regular periods of several months a year, while continuing to spend the remainder of their time in their own countries.

PLEASURE IN NEW SUBJECTS

When the last scientific session, on general relativity and cosmology, concluded on 28 June, Professor Abdus Salam spoke of what had been generally agreed to be two remarkable features of the symposium. One was the pleasure of hearing about new subjects from the men who helped to create them, and the other was the good fortune which made it possible to have with them some of the "grand old men" of science with their civilizing influence. They were the only men now able to range over the whole subject, though as a result of the conference others might in years to come find themselves in a similar position. He expressed deep thanks to the City of Trieste, to Professor Budini and the Consortium responsible for building the Centre, which had also provided much in the way of entertainment, to all connected with organizing the event, and to the Nobel Laureates who attended.

P.A.M. Dirac (Nobel Prize for Physics 1933) considered it a happy idea of Professor Salam's to hold a symposium covering the whole field of physics. They had observed a succession of physicists of different disciplines coming and going. It had been useful to have the opportunity of meeting them, exchanging ideas and getting new thoughts out of the process. He expressed the deep gratitude they all felt and the appreciation of the enormous amount of effort it must have cost Professor Salam to arrange the conference. They were happy that the new building provided by Italy and built by Trieste had been available in time, and despite the inability of physicists to solve problems of acoustics the engineers in Trieste had been very successful. It had been a notable and profitable period.

E.P. Wigner (Nobel Prize for Physics 1963), who with Professor Dirac had been present throughout all the meetings, was deeply grateful to the younger people for having shown so much patience towards "the often obvious ignorance". of their elders. He himself had learned an enormous amount.

THE EVENING LECTURES

A series of lectures under the general title "From A Life of Physics" was given by five of the most senior physicists. Four of them, H.A. Bethe, P.A.M. Dirac, W. Heisenberg and E.P. Wigner, were Nobel Laureates and the fifth, O. Klein, is a member of the Nobel Prize Committee.

Bethe outlined some of the problems which had both interested him and afforded great satisfaction — the theory of the stopping power of atoms for charged particles; examination with Peierls of theories relating to the deuteron; bringing order into the details of masses of atomic nuclei; writing articles covering all existing knowledge of nuclear physics; a theory relating to alloys; and much other work in both pure and applied physics. For the last 13 years he had been working on nuclear matter, and now it was possible to explain most of the facts which seemed mysterious in the 1930's.

After dealing with the development of quantum mechanics, in which he participated, Heisenberg (Nobel Prize for Physics 1932) gave many examples of the way theoretical physicists work, based on his own great experience. He believed they should try to keep in touch with the developments from all experiments, thus obtaining the whole picture before trying to fix a theory.

Many examples of the sequels to work by theoretical physicists were given by Dirac, whose Nobel Prize was awarded in 1933 for the discovery of the relativistic wave equation. A whole new branch of physics had arisen from the study by Einstein of an inconsistency in the laws governing light effects in special conditions. In the discovery of quantum mechanics by two men the genius of Heisenberg enabled him to pick out important facts from an enormous mass of spectroscopic information. Schroedinger, on the other had, worked theoretically and came to the right equation by rather indirect methods. After reviewing progress made in a large number of problems by building up mathematical beauty from experimental data Dirac gave the opinion that before being able to tackle the more serious difficulties presented by newly discovered particles there must be a solution of the problems of electrodynamics.

E.P. Wigner, one of whose theories of nuclear behaviour was dramatically demonstrated by the Windscale (UK) reactor incident of 1957, devoted his talk to his philosophy of the motives of scientists, the changing aspects of scientific life, and the attitude of scientists towards society. Extended extracts are given in a separate article in this Bulletin.

Klein dealt with a number of developments in which he had participated, and how work in different places had contributed to the evolution of formulae and equations, as with the relativistic wave equation for particles.

In the scientific sessions the mass of information given to provide an idea of the problems being tackled in the whole range of physics included contributions from many outstanding scientists. F.C. Crick, one of the leaders in genetics, J. Schwinger, who reviewed his own work in quantum electrodynamics, C.H. Townes on quantum optics and T.D. Lee on particle physics were Nobel Laureates who took part. Biophysics, theories of matter, particle physics, condensed matter and nuclear physics, low and high energy physics, quantum and classical physics, plasma physics, general relativity and cosmology were among the general classifications of subjects. In the discussions concerning outer space and phenomena even beyond the universe many recent observations from the world's largest observation centres were given and theories

put forward on quasars (remote sources of extremely intense radiation) and the recently noted pulsars (pulsating radio frequency sources of undecided character). Massive stars which collapse, never to be seen again, as well as other more "natural" processes of stellar life and death were discussed.

DEDICATION OF THE NEW PREMISES

The Centre's new premises were dedicated on Sunday, 9 June. Mr. Roberto Ducci, Ambassador for Italy to Austria and Resident Representative to the IAEA, on behalf of his Government, cut the ribbon to open the building and presented a golden key to Dr. Sigvard Eklund.

Representatives of the Italian Government, of other Member States of the IAEA, of the Region and of the City and University of Trieste were among those who attended.

Professor Paolo Budini, Deputy Director of the Centre, gave a report on the various phases of building the new premises, on behalf of the Trieste Committee responsible. Mr. Marcello Spaccini, Major of Trieste, Mr. Alfredo Berzanti, President of the Region, and Professor Agostino Grigone, Rector of the University, all offered their good wishes.

In accepting the golden key, Dr. Eklund expressed the thanks of the IAEA to the Italian Government, the Region and all organizations which had assisted in providing the new home for the Centre. Since its creation in 1964 the aims of the Centre had been:

— To train young physicists, especially from developing countries, for research;
— To help in fostering the growth of advanced studied of theoretical physics, especially in developing countries;
— To conduct original research; and
— To provide an international forum for personal contacts between theoretical physicists from countries at all stages of development.

The quality of the research work performed had been recognized in the scientific world, and the late Professor Robert Oppenheimer once wrote that "there had seldom been a case of a scientific institution developing so successfully in such a short time". The fact that about 400 publications had been issued spoke for itself. This success would not have been possible had there not been such good co-operation between the Italian authorities and the Agency and had there not been such enthusiastic leaders of the Centre as Professors Salam and Budini. It was appropriate also to acknowledge the valuable guidance given by the Scientific Council, chaired by Professor Sandoval Vallarta.

It had been a special source of gratification to see how successful they had been in assisting scientists in the developing countries. Of the 600 scientists from 53 countries who had worked there, 200 had come from 34 developing countries. The Trieste Centre had been instrumental in creating conditions for qualified scientists from developing countries to belong to a truly international scientific community without giving up their work for their own countries.

They have now the opportunity to visit the Centre for a short period every year to become acquainted with the most recent progress in their special fields of interest. This had helped to stem some of the brain drain from developing countries.

Their most difficult problem had been that of financing the operations, said Dr. Eklund. In spite of the Italian generosity and the contributions received, there was still a wide gap between the ambitions of the leading people of the institute and its resources. They were, however, most gratified by UNESCO's interest, which might make it possible to resolve some difficulties from 1970 onwards by UNESCO entering into a full partnership with the Agency in operating the Centre.

On their relations with Trieste he said "I do not think that a community of the size of Trieste has ever before shown such generosity towards an international organization".

Ambassador Ducci emphasized the satisfaction felt by the Italian Government at the fact that a permanent seat for the Centre had now been inaugurated. The research being carried out by the best specialists of the world would, they had no doubt, contribute to the general good of mankind, to peace, and to the brotherhood of nations, races and social groups.

A view of the lecture hall in the new premises of the Trieste Centre. Photo: Rice, Trieste

Part of the Library in the new Trieste Centre. Photo: Rice, Trieste

Professor Salam expressed appreciation of the valuable help given by the Italian Government and the authorities of Trieste.

The new building, attractively situated near Miramare Castle, is 90 meters long and has a floor area of 1,553 square metres. The architects were Professors Pio Montasi, Roberto Costa and Antonio Guacci of the University of Trieste and the total budget for construction was 900 million lire (approximately $1.5 million). A number of institutions, industries, firms and individuals have made contributions of cash or equipment.