THE PHILIPPINE SPECTROMETER

by Jose O. Juliano*

A notable project for international collaboration, in which participants from Indonesia, Korea, Thailand, China and the Philippines are working together, has been launched in the Philippines with Indian assistance under the aegis of the Agency. This is a regional training and research programme using a neutron crystal spectrometer, which has been established since January 1965 at the Philippine Atomic Research Centre in Diliman, Quezon City, Philippines. It is called the IPA Project after the signatories to a five-year trilateral agreement, namely, the Government of India, the Republic of the Philippines, and the International Atomic Energy Agency. The programme is administered by a Joint Committee composed of one representative each of the Philippines, India and the Agency.

The objective of this cooperative venture is to establish a research centre on neutron diffraction in which scientists and technicians from any Member State of IAEA in South Asia, South-East Asia and Pacific, or Far East regions could come to participate in research and training. Studies in solid state physics, such as the structure determination of alloys and organic crystals, studies on the orientation of magnetic moments in the lattice of magnetic substances, and other problems based on elastic and inelastic scattering of neutrons are undertaken. There are a number of research reactors in this region where neutron spectrometers can be utilized and the recent establishment of this cooperative international research and training programme has been a timely one for this area of the world. Indeed, a number of other countries have shown a strong growing interest in the development of the project.

India helped to initiate the project by providing a neutron crystal spectrometer which, with its accessory electronics, was built at Trombay. India also provided the services of a senior scientist of international repute, Dr. P.K. Iyengar, and of a technical physicist with considerable experience in the field of neutron diffraction, Mr. J.N. Soni. Dr. Iyengar returned to India in June 1965 and Dr. Satya Murthy took his place as the IAEA technical expert for the project. The Philippines provided the appropriate facilities for carrying out the training and research work at the one-megawatt research reactor PRR-I of the Philippine Atomic Research Centre. The Head of the Physics Department at the Centre, Dr. Q.O. Navarro, has been designated Project Director. The Agency contributes financial assistance to meet equipment transport costs, travel expenses and allowances of experts, and to provide up to five fellowships annually.

The first training course for those receiving IAEA fellowships under this programme started on 1 December 1964 with a three-week orientation period in Trombay. The fellows then went to Manila, and on 15 January 1965

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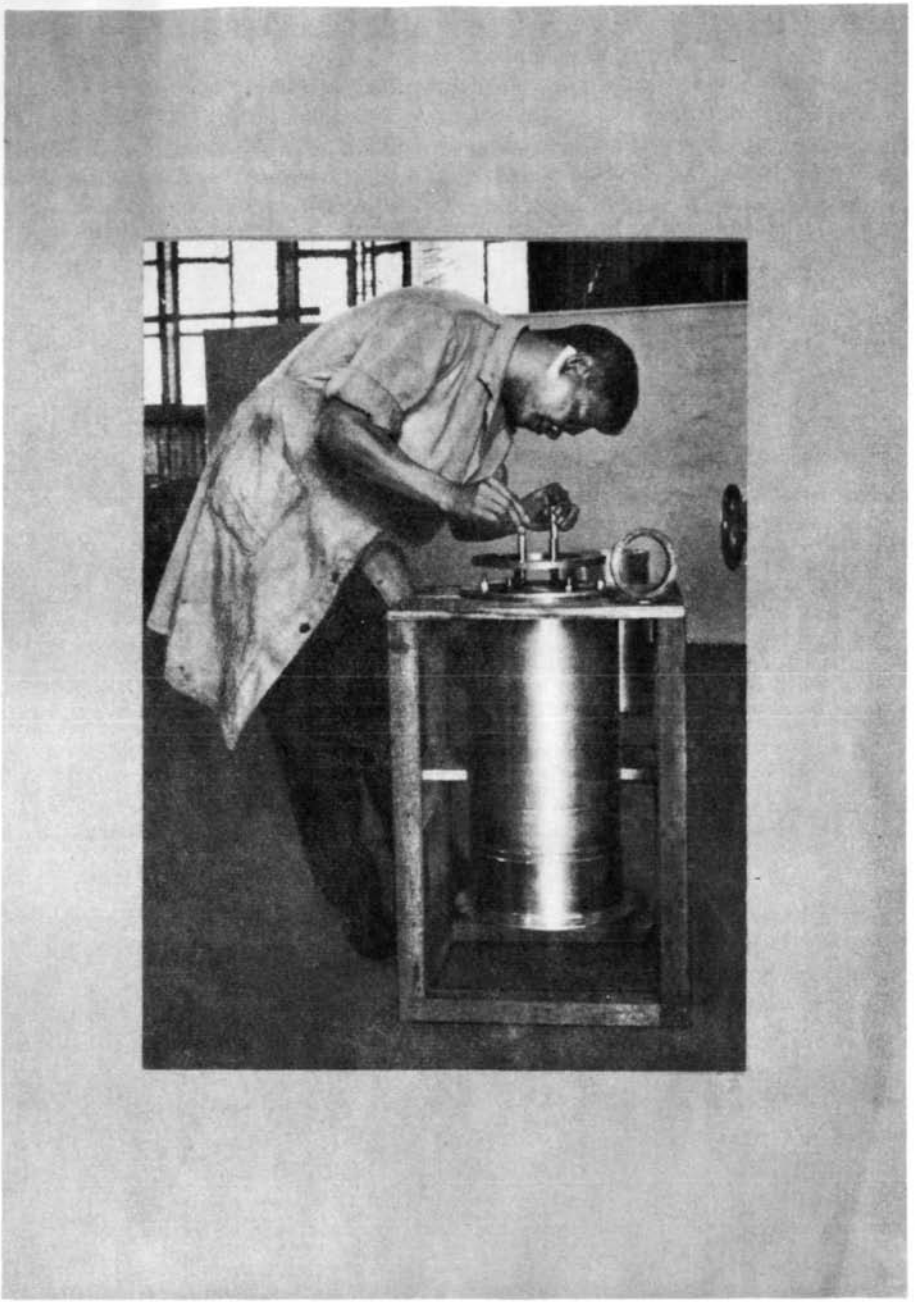
Fellow preparing a sample for study with the Philippine neutron crystal spectrometer (Photo: Philippine Atomic Research Center)

the programme was formally inaugurated at the Atomic Research Centre in Quezon City. The first year's fellows were from Indonesia, Korea, Thailand, and China.

Since January, the participants and experts of the project have been working harmoniously. If there was anything that made them work so well together as a team, it was the fact that each one understood the problems of the others, since each one came from a developing country where the laboratories are not as well equipped as those in some of the more advanced countries. It was a test of the ingenuity of every participant to "make do", where necessary, with whatever was readily available in order to carry out the experiments. In each case, they were successful. Within a very short time the spectrometer was assembled and aligned, and a research investigation dealing with the removal of second order neutrons by a method involving oriented single crystals was completed. The paper describing this work has since been accepted for publication in the well-known international journal, "Nuclear Instruments and Methods".

With regard to the training aspect of the programme, emphasis is being placed on obtaining experience in the local fabrication and design of sundry auxillary equipment like cryostats and shields. In addition, lectures are given on the theory, application and experimental methods used in neutron diffraction research. Group discussions and seminars on solid state theory and related topics are given by the participants themselves. A programme in the study of magnetic alloys leading to the determination of spin orientations



Assembling a cryostat to be used in conjunction with the spectrometer (Photo: Philippine Atomic Research Center)

and studies on hydrogen positions in hydrates by neutron diffraction is under way.

In order to facilitate the expansion of the experimental programme, the design and construction of a triple axis spectrometer has been undertaken. The various components of this new apparatus are being fabricated entirely at the Philippine Centre. By participating in the design and construction of this new machine, the IPA fellows will acquire considerable information on the problems of fabricating such precision instruments and will obtain valuable experience which will be useful in setting up similar devices when they return to their respective countries.

This IAEA-sponsored project is the first of its kind in the region and to those most intimately involved in the work, it has been a very definite success so far. The primary importance of such a project lies in the potential contribution it can make in helping to alleviate the very serious problem of lack of trained scientists needed for the effective utilization of research reactors, and in the potential development of large schools of fundamental research in this area of the world.