

## Director's Report

In the past year, good progress has been made in all the programmes of the Centre. The Pelletron accelerator operation this year had been smooth with few problems. Attention to proper maintenance has kept the machine uptime for this period to the usual high level of 95.50% with beam utilization of 57.07% of the time. Accelerator Mass Spectrometry measurements with  $^{10}\text{Be}$  have attracted many groups for taking up geological studies.  $^{10}\text{Be}$  measurements have been performed with both Lake and Ocean sediment samples. AMS Facility development for  $^{26}\text{Al}$  and development of chemistry lab is in progress.

Last year first beam acceleration was successfully conducted with the full complement of superbuncher, the first LINAC module and rebuncher. The accelerated beam from the LINAC was delivered to the neutron array beam line in beam hall II and first nuclear physics experiment using this beam was conducted. Fission dynamics for the reaction  $^{16}\text{O} + ^{194}\text{Pt}$  at 120 MeV was studied with 16 neutron detectors in coincidence with complementary fission fragments. The fabrication of the second and third LINAC modules with sixteen resonators is going on in full swing. These modules are expected to be installed in the beam line within a year.

Support laboratories all gave excellent service with additional instrumentation for on-line monitoring. Major streamlining of ups power was done to reduce effects of erratic power supply. Integrated electronics module for neutron array, MWPC for coulomb excitation measurements developed.

A major achievement in the past year has been the setting up of the Indian National Gamma Array facility at IUAC. This has been the result of an outstanding effort by the staff of IUAC with a large number of students from different universities. First set of nuclear spectroscopy experiments have been conducted with this array. The experiments on reaction dynamics carried out with Pelletron beams include (i) study of incomplete fusion reactions using  $^{16}\text{O}$  beam (ii) Fusion-fission reactions near Coulomb barrier (iii) entrance channel effects in fusion dynamics and (iv) investigation of multi-neutron transfer reactions in  $^{40}\text{Ca}$  on  $^{68,70}\text{Zn}$ .

As in previous years, there have been a large number of experiments in materials science with energetic ion beams, on various types of materials such as polymers, metals, semiconductors, oxide materials, magnetic materials etc. The problems related to electronic sputtering, ion beam mixing, nanostructuring of the materials, surface modifications, materials modifications, ion beam induced epitaxial crystallization etc. were investigated.

Radiation effects on chromosome aberrations as a function of time are being studied in presence and absence of exogenous glutathione in CHO cells in the area of Radiation Biology. Studies related to melatonin protection in cell survival and apoptic death were carried out on cells from rat spleen and bone marrow.

Beam-foil experiments using single as well as two-foil target were continued. These experiments indicate new phenomena having important relevance to astrophysics. Position sensitive multi-hit time-of-flight measurement system has been used to study the fragmentation dynamics of complete and incomplete fragmentation process of importance to astrophysics.

Currently the facilities of the Centre are being used by faculty and students from 79 Universities, 50 Colleges and 56 Institutes.

As a part of Teaching Lab activities, three one-week workshops on “Physics with Homemade Equipments and Innovative Experiments (Phoenix)” were organized at IUAC and five workshops were conducted at various institutions all over India.

We look forward in the coming years to continued participation from the users in all research and development activities of the Centre.

**Amit Roy**

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