Director's Report

The year 2004-05 has seen expansion of activities of the Centre in several directions. The Pelletron accelerator maintained an uptime of 96% with 53.1% time utilized for conducting experiments. A good fraction of time was devoted for conditioning the machine for reaching high terminal potential. This year the maximum terminal potential reached was 15.3 MV. For pulsed beam runs the multiharmonic buncher has been used successfully in conjunction with travelling wave deflector and chopper, which allowed delivery of higher currents even at larger time separation between pulses. The AMS facility is nearly complete with the Wien filter assembly and was tested through the detection of ^{14}C. The set-up is now geared for use with ^{10}Be.

The accelerator augmentation project reached a major landmark on 24 September last year, when for the first time a pulsed beam of $^{28}Si^{7+}$ was accelerated through five resonators mounted in the first linac module. The entire system consisting of the multiharmonic buncher, sweeper, superbuncher and the resonators in the linac module were phase locked for a period of more than eight hours and thus validated the entire system of resonators, cryogenics and rf electronics for acceleration of beam, although the energy gain was very modest. The fabrication of resonators has made good progress with the fabrication of two fully indigenous resonators. The process for fabrication of 15 more resonators has been initiated. The cryogenics group has in addition to running the helium and nitrogen refrigerators efficiently for linac tests, developed vortex tubes and a liquid nitrogen driven motor. The four beam lines in beam hall II have been set up and all the utilities are being installed. The main shielding walls that would demarcate the two experimental areas in the beam hall have been put in place.

Plasma was generated successfully in the high Tc ECR source after installation of the source at the Centre. A specially designed large gap analysing magnet has been procured for this source and is under installation. The low energy beam optics for the high current injector has been optimised. The low energy ion beam facility continues to provide an wide variety of multiply charged ions for experiments in materials science and atomic physics. An interesting experiment involving multiply charged ions and liquid microdroplets has been performed in this period.

The user support laboratories, viz, target lab, vacuum lab, detector lab, data support lab and the utilities continued their excellent work of serving a large user community.

Among experimental facilities, a neutron chamber has been designed and fabricated. The in-situ X-ray diffraction set-up has been procured and positioned in the beamline. The room temperature part of first stage of HYRA spectrometer has been fabricated and would soon be installed in Beam Hall II. The superconducting quadrupoles have been

designed and fabrication process is being worked out. Funding for the INGA array has been sanctioned from Department of Science & Technology with which the Nuclear Physics activities would get a considerable boost. Atomic physics beam line in Hall I has been dismantled and is being reassembled in Beam Hall II.

The electronics for GDA was reassembled and this facility has been used for measuring lifetimes of nuclear states and also for g-factor measurements. Fission hindrance measurements were made using the HIRA spectrometer. A number of experiments were carried out to understand fission dynamics near the Coulomb barrier and entrance channel effects.

Materials Science continues to attract a large number of users and experiments were conduced in the areas of polymers, metal-semiconductor interfaces, semiconductors, oxide materials, magnetic materials. Interesting results were obtained in recrystallisation of silicon nitride and formation of conducting channels in fullerene using Swift Heavy ions. Investigations on single event upset on radiation sensitive electronic components were continued using the low flux irradiation facility.

Experiments in radiation biology were on cell inactivation and chromosome aberration and influence of high let radiation on germination properties of mustard seeds.

The programme of design of innovative experiments for teaching laboratories has gathered momentum and several workshops have been held with enthusiastic participation from teachers and students in the universities and colleges across the country. This has greatly encouraged us to undertake more such workshops in association with Indian Association of Physics Teachers and Indian Physics Association.

We look forward to an exciting new year to exploit the new facilities added to the Centre and urge all users to think of novel experiments.

April 2005 **Amit Roy**