Director's Report

The past year has seen several projects come to fruition resulting in new equipment being available to the users of Inter-University Accelerator Centre. The Pelletron Accelerator provided a wide variety of ion beams keeping a high uptime of ~ 98% and the beam utilisation by users of ~ 62%. A major breakdown of the optical fibre cables was fixed and a new SF_6 chiller assembly has been put in operation. Accelerator Mass Spectrometry experiments for ^{10}Be have been performed.

Ion beams from the Pelletron was accelerated through the first Linac module and ^{28}Si beam was delivered for an experiment with neutron array and then for checking the HYRA spectrometer in gas-filled mode. Efforts made to improve the ruggedness of the Linac system in this year has been successful. Fabrication of the resonators for the next two modules is nearing completion and likely to be completed by the end of the year. The cryogenic system functioned well and the LN_2 plant has been upgraded to double its capacity. A novel design of a LN_2 driven car was developed in collaboration with Delhi College of Engineering. The high Tc ECR source has been run regularly for exploring different working parameters of the source and the x-ray produced under different conditions were measured to gain insight about the plasma. The prototype RFQ with straight vanes have been field mapped and the modulated vanes are under fabrication. The low energy ion beam facility has been run regularly to provide highly charged ion beams for both Atomic Physics and Materials Science experiments.

The supporting laboratories, viz., target lab, vacuum lab, electronics lab, data support lab, health physics lab, workshop and the utilities have contributed in good measure to smooth running of the system with high uptime as an users facility.

The charged particle detector array was used extensively in coincidence with the GDA for study of reaction dynamics of incomplete fusion reactions. Studies of fission hindrance in the mass ~200 region was continued and the role of transfer in sub-barrier fusion was probed in depth. The collaboration with GSI, Darmstadt has performed one set of experiments on Coulomb excitation at IUAC and then followed it up at GSI. The first stage of recoil spectrometer HYRA has been tested both in vacuum mode and then in gas-filled mode with beam. The mounting assembly for INGA array is under fabrication and likely to be completed this year for installation and experiments.

The XRD set-up was used for in-situ measurement of growth of Au nanoparticles with ion beam irradiation. Formation of nanostructures with ion beam bombardment has been identified as a thrust area and is drawing a large number of users. A micro Raman set up has been procured and is in the process of being installed as an in-situ facility in Beam Hall II. Extensive studies on oxide materials and formation of nanostructures in them have been carried out.

The molecular dissociation studies on methanol under highly charged ions showed evidence for bond rearrangement and alignment resulting in formation of H^{3+} ions. A position sensitive proportional counter developed in-house for Doppler tuned spectroscopy has been tested in beam. The radiation biology experiments were continued using the modified beam line.

A new version of the Phoenix kit, which is cheaper and more user friendly was developed. The teaching community is finding this kit very useful. I hope that experiments with this kit will be incorporated in the regular college syllabus.

The coming year is the beginning of XI Plan period and we look forward to new and exciting ideas from the user community for experiments at IUAC.

June 2007 **Amit Roy**