

ANNUAL REPORT

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अन्तर-विश्वविद्यालय त्वरक केन्द्र

Inter-University Accelerator Centre

(विश्वविद्यालय अनुदान आयोग का स्वायत्त केन्द्र)

(An Autonomous Inter-University Centre of UGC)

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DIRECTOR'S REPORT

The past year has been quite eventful for the Inter-University Accelerator Centre. Beam acceleration through the entire Superconducting Linac booster with its full complement of three linac modules took place this year. With the new liquid helium plant integrated with the linac and the efforts towards automation has borne fruit enabling the full system to work very smoothly for about three months for several experiments. The Pelletron continued to deliver beams of a wide variety of heavy ions throughout the year with a high uptime.

The Low Energy Ion Beam facility has been revamped in the new building and is being used for a wide variety of experiments in materials science and atomic & molecular physics. A new ^{14}C system funded by the Ministry of Earth Sciences has been ordered for studies in geology, environment and other sciences. This will greatly expand the AMS capability at IUAC.

The high current injector programme has made steady progress and the high voltage deck for the ECR source has been installed in beam hall III and is now waiting for shifting of the source. The vacuum chamber for the RFQ was aligned in the beam hall III and the first tank for the Drift tube linac is undergoing off-line tests. Two prototype low beta cavities were made with a design optimised for achieving high field gradient and these would form an important part of the transition region from the HCI to Superconducting linac.

The National Array of Neutron Detectors got its impressive geodesic dome support structure and nearly 50 detectors have been mounted in position with their electronics and is ready for use. Several experiments explored the effect of shell closure in fusion reactions using the 4π spin spectrometer along with the gas-filled recoil separator HYRA.

First experiments with a gamma detector at the focal plane of HYRA was conducted successfully to search for isomeric state decay. A large number of experiments were conducted in materials science, notably in the area of nanostructure formation and electronic sputtering. Semiconductor to metal transition in nanocrystalline ZnO has been observed due to SHI irradiation induced disorder and strain in crystallites. SHI irradiation of graphene was found to induce annealing and purification effects in it. It was demonstrated that SHI irradiation can tailor the ferromagnetic response of Pd nanoparticles embedded in silica. Interesting difference were found in energy loss of heavy ions traversing metal and insulating foils. The ASPIRE system for radiation biology has been updated for irradiation with pre-set doses.

The students have continued to perform well and have got several awards based on work at the Centre. My congratulations to Abhishek Yadav, AMU for best thesis award, to Jasmeet Kaur, PU for best poster award in DAE Nuclear Physics symposium and to Vijay Raj Sharma, AMU for one of the five best posters award in ICRTNP-2012.

I would like to thank the University Grants Commission for the generous support provided and shall hope that the User community will continue to utilise the facilities created to their full potential.

Amit Roy

July 2013