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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

There has been progress in several fronts at IUAC in the past year. The Pelletron accelerator had an uptime of 98.7% and beam utilisation of 59.1% in this period. A new modified MC-SNICS source has been installed allowing much easier operation of the ion source. The Low Energy ion beam facility has been upgraded and installed with three beam lines and regular experiments have begun. The Rutherford Backscattering set-up has been used for analysis of more than 2000 samples. The superconducting linac was operated with two full modules for experiments in nuclear physics with substantially enhanced beam energies. In the high current injector project, the prototype RFQ and DTL were tested at high power levels to validate the design and work has began on the units that would go on line. The beam optics of the entire high current injector has been worked out in detail and finalised. A new He refrigerator was commissioned successfully and would soon be connected to the linac distribution.

Two compact radiation shielding doors designed in-house were fabricated and installed in the beam hall III saving valuable space for the spectrometer HYRA and the neutron array.

In nuclear physics, angular momentum distribution measurements showed the presence of incomplete fusion in reactions at much lower energies than previously observed. Perturbed angular distribution measurements were measured in an external magnetic field to determine g factors in several nuclei.

Studies of heavy ion induced fusion-fission dynamics were continued at near barrier energies. In conjunction with the 32-element NaI detector sum-spin spectrometer from TIFR installed at the target position, the angular momentum effects in reaction dynamics were probed. The existing neutron array facility consisting of 24 liquid scintillators and two MWPC detectors for fission fragment setup has been used for measuring pre- & post scission neutron multiplicity from heavy ion induced fission reactions. This facility will soon be upgraded by the large array of neutron detectors funded by DST, for which the mechanical structure has been designed and 50 more detectors were procured.

Giant resonances in middle mass nuclei were studied through fusion reactions with the spin spectrometer in coincidence with the large NaI(Tl) detector HIGRASP and also a novel LaBr + NaI detector developed at TIFR to probe the shape evolution effects at high excitations in nuclei.

The ion beam irradiation experiments mainly concerned with electronic sputtering, ion beam mixing, ion beam modification of materials etc. The in-situ x-ray reflectivity set up was used for a test experiment successfully. Interesting results were obtained on tuning of surface plasmon resonances by ion beams in Silver-silica nano-composites. Enhancement of thermoelectric properties were found in PbTe films on ion bombardment whereas the performance deteriorate under thermal annealing. Enhancement in sensing of LPG was observed in nanocrystalline ZnO thin film. Schottky devices using ZnO nanorods were shown to have rectifying response as a result of irradiation by 80 MeV O ions.

A new system dedicated for Accelerator Mass Spectrometry using ^{14}C has been sanctioned by the Ministry of Earth Sciences and it will enhance the activities in earth sciences and help diversify research in other areas at the Centre.

The Centre continues to receive generous support of the UGC and other Govt. funding agencies for expansion of its facilities and we expect the users to make full use of the expanded facilities of the Centre in the coming years.

Amit Roy

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