

Recent Results from Digital INGA at BARC-TIFR Pelletron
Linac Accelerator Facility and Future Plans

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Study of nuclei under varying rotational stress plays an important role in understanding different phenomena in nuclear structure. Discrete gamma ray spectroscopy using large array of Compton suppressed high purity germanium detectors continues to provide new insights on the novel quantal rotations of atomic nuclei. The Indian National Gamma Detector Array (INGA) is set up at TIFR-BARC accelerator facility at Mumbai, as a part of a collaboration between BARC, IUAC, SINP, TIFR, UGC-CSR-KC, VECC and different Universities. The array is designed for 24 Compton suppressed clover detectors providing around 5% photopeak efficiency. Recently, a digital data acquisition system with 96 channels (based on Pixie-16 modules developed by XIA LLC) has been implemented for this Compton suppressed clover array. The timing properties of fast scintillator detectors with the existing DDAQ have been investigated. This facilitates the lifetime measurements of isomeric states from 1 nsec to few microsec during the usual gamma-gamma coincidence measurement. Conventional systems with analog shaping has been replaced by digital system that provides higher throughput, better energy resolution and better stability for the multi-detector Compton suppressed clover array. Around forty experiments have been completed in the current campaign at Mumbai. Selected results from this array will be presented which highlights the novel excitations of spinning nuclei. A detailed GEANT4 simulation results of the HPGe detector array in different configurations will be presented. This would highlight the scope for improving the selectivity and photopeak efficiency of the large gamma detector array in future.

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