Contribution ID: **34** Type: **Oral**

# Investigation of high spin states near N=50 shell closure in search for emergence of collectivity using INGA

*Wednesday, 12 June 2013 09:45 (15 minutes)*

The excited states of nuclei near closed shell at high angular momentum states have attracted lot of attention in theoretical and experimental research. They provide suitable laboratory for testing the interactions of shell model states, possible presence of high spin isomers and help in understanding the emergence of collectivity as the higher orbitals are occupied. An experimental program has been pursued with INGA coupled with a digital data acquisition system to look for emergence of collectivity at high spin in nuclei near shell closure [1]. The Indian National Gamma Detector Array(INGA) is set up at Pelletron Linac 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. In the present work, we will discuss the initial results from the spectroscopic study of the high spin states of the 89Zr and 90Nb. High spin states in these nuclei were investigated using 13C + 80Se and 28Si + 65Cu reactions. The excited levels have been observed up to 12 MeV excitation energy and spin ~ 49/2hbar in 89Zr [2]. The DCO and polarization measurements were carried out to assign the spin and parity of different states. The measured results will be compared with the shell model calculations. In addition, a regular dipole band has been observed which is extended up to 49/2 hbar. Results of Cranking model and deformed Hartree-Fock model calculations agree well with the measured level energies and transition strengths, indicating the emergence of collectivity at high spin in 89Zr. Future plan to couple a highly segmented charged particle array to INGA for such investigations will be discussed.

References:
1. R. Palit et al., Nucl. Instr. and Meth. A 680, 90 (2012).
2. S. Saha et al., Phys. Rev. C 86, 034315 (2012).

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**Session Classification:** Session 9