

## Gamma-ray spectroscopy in 70As

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### Introduction

The structures of the odd-odd nuclei in mass region  $\approx 70$  attract more attention because both single particle and collective excitations with different shapes, namely prolate, oblate and tri-axial have been observed in this region. At low spins, properties of the nuclei are governed by  $1f_{5/2}$ ,  $2p_{3/2}$  and  $2p_{1/2}$  spherical shell model orbitals. However, the high spin states and excitation energies are due to the particle-hole excitation from the  $1f_{7/2}$  to  $1g_{9/2}$  high-j intruder orbitals. In the odd-odd nucleus  $70\text{As}$ , the low lying states were experimentally well investigated by the works of Brink et al. [1] and Filevich et al. [2] using proton, alpha and light-ions as projectile. The study of the high spin states of  $70\text{As}$ , using  $^{16}\text{O}$  beam was done by Badika et al. [3] and they could populate up to  $11+$  and tentatively up to the  $13+$  state at 4.076 MeV. The lifetime measurements of  $11+$  and  $13+$  levels, by Garcia Bermudez et al. [4] indicated an enhancement in  $B(E2)$  values of the 981 keV and 1343 keV transitions. The work by B. Mukherjee et al. [14], using HIRA+GDA at IUAC extended level scheme up to 8.9 MeV with tentative spin parity  $19+$ . Authors have reported three rotational bands, with two positive parity bands which are the signature partners of each other. However the signature partner of the negative parity band could not be established in this work. To get more information about the nuclear structure of  $70\text{As}$ , an experiment was performed using INGA array of 16 Compton suppressed HPGe clover detectors at IUAC, New Delhi.

### Experiment and Analysis

Excited states in  $70\text{As}$  were populated through in-beam  $\gamma$ -ray spectroscopic techniques using the  $^{48}\text{Ti}(^{28}\text{Si}, \alpha\text{pn})$  fusion-evaporation reaction at a beam energy of 100 MeV. Emitted  $\gamma$ -rays of excited nuclei were detected in the  $\gamma$ - $\gamma$  coincidence mode using 16 Compton suppressed Ge clover detectors of the Indian National Gamma Array (INGA). Few new transitions have been observed and are being placed in the level scheme. Spin and parity assignments are also in progress by extracting the DCO and Polarization asymmetry values of the  $\gamma$ -rays.

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