

# Frontiers in Gamma Ray Spectroscopy

## FIG18



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## Energy Dependent Spin Distribution Measurements in $^{16}\text{O}+^{159}\text{Tb}$ System

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### Content :

Recent experiments have indicated that the significant fusion incompleteness plays an important role in heavy ion induced reactions even at energies as low as  $\approx 4-7$  MeV/nucleon. The enhancement in the measured cross-sections of  $\alpha$ -emitting channels as compared to that predicted by statistical models, has been attributed to the incomplete fusion (ICF) processes. Here, information about the angular momenta associated with complete fusion (CF) and ICF processes could not be obtained, in general. As such, to obtain the information of input angular momenta involved in such reactions, the in-beam gamma spectroscopy experiment involving particle- $\gamma$ -coincidence experiments have been performed at the IUAC, New Delhi, INDIA using Gamma Detector Array (GDA) coupled to a Charged Particle Detector Array (CPDA) setup, for  $^{16}\text{O}+^{159}\text{Tb}$  system at four sets of energies i.e.,  $\approx 83.5, 88.5, 93.5$  and  $97.6$  MeV. Coincidences were recorded between prompt  $\gamma$ -rays using HPGe detectors of the GDA set up and charged particles ( $Z=1,2$ ) detected by the CPDA. The spin distributions of ICF channels are found to be distinctly different from those observed for CF channels. The spin distribution(s) of CF products are found to reflect strong feeding through broad range spin population towards the band head. However, the spin distribution(s) associated with ICF channels are found to arise from the narrow spin population. Further, the mean input angular momentum involved in the ICF reactions are larger than for CF reactions, as such ICF reactions may be considered to be a promising tool for populating high spin states. Details of the analysis and results will be presented.

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