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Emergence of different band structures in odd-odd Tl nuclei

Study of nuclei near proton shell closure $Z = 82$ is important, as interplay between different shapes has been observed in this region. Recent experiments show triaxial shapes, in addition to the symmetric oblate shapes, in odd-odd Tl nuclei in $A \sim 190$ region. The proton Fermi level for Tl lies near the $3s_{1/2}$ orbital, but highly shape driving $h_{9/2}$ and $i_{13/2}$ Nilsson orbitals intrude in this region at moderate deformation, the neutron Fermi level also lies near $i_{13/2}$ orbital, above $N = 100$. The interplay of these orbitals is responsible to induce different shapes which are manifested in different band structures. The shape of Tl isotopes varies from near spherical in neutron rich $^{202,204}\text{Tl}$ [1,2] to different deformed structures in neutron deficit Tl isotopes. Triaxial shapes in odd-A and odd-odd isotopes are manifested as Chiral and t-bands in $^{193,194,195,198}\text{Tl}$ [3,4,5,6]. Magnetic Rotational (MR) bands were observed in $^{194,197}\text{Tl}$ [7,8]. On the other hand, $^{189,191}\text{Tl}$ have prolate-oblate shape coexistence [9,10]. However, not much is known for odd-odd $^{190,192}\text{Tl}$ which seem to be the transitional ones between axial and non-axial shapes in Tl isotopes.

We have performed two experiments using ^{30}Si and ^{16}O beams from BARC-TIFR Pelletron LINAC facility and K-130 cyclotron at VECC in India, respectively, to study these nuclei by fusion-evaporation reaction. The INGA setup with up to 17 clover HPGe detectors were used to detect the prompt gamma rays. The level schemes of these nuclei are established and extended with confirmed J^π assignments of the levels. The new results show the evidence of the presence of MR band and octupole correlation in these nuclei. Details will be presented in the conference.

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