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Nuclei in the mass region A ˜ 180-200, show various nuclear shapes. The active proton and neutron orbitals in this mass region are pih9/2, pih11/2, nui13/2, etc. where nui13/2 is a unique parity orbital. The uniqueness in parity of nui13/2 prevents mixing and allows one to study uniquely, the effect of this high-j orbital on the high spin structure of nuclei. The nui13/2 orbital is completely filled at neutron number N = 114 for spherical nuclei. Nuclear deformation breaks the spherical symmetry and the orbitals split into (2j+1)/2 number of levels based on different omega(projection of nucleonic angular momentum on the symmetry axis of the nucleus) quantum numbers. The high and low omega components of the high-j nui13/2 orbital come down in energy drastically for both oblate and prolate deformations. Thus the effect of different components of the valance nui13/2 orbital on the nuclear shape can be investigated from the study of the excited states in nuclei in this mass region with different neutron numbers.Recently, in 195Tl (N=114), two chiral band structures have been reported based on 3-qp and 5-qp configurations [1]. These configurations involve 2 and 4 particles in nui13/2 orbitals. The fact that the chiral rotation of a nucleus arises due to the triaxial core, it indicates that neutrons in i13/2 orbitals generates triaxiality in this nucleus. On the other hand the lighter Os and Pt nuclei, for which the neutron Fermi level lies below N = 114, are reported to be gamma-soft [2].Therefore, it is interesting to study the nuclear structure as a function of number of neutrons in nui13/2 orbital.
In this conference, the details of the experimental investigation of the high spin spectroscopy of 197Tl (N=116), and 187Os (N=111) nuclei will be presented. These were studied by□-ray spectroscopic technique at VECC using alpha beams from the K-130 cyclotron.The VENUS (VECC Nuclear Spectroscopy array) and INGA (Indian National Gamma Array) were used to detect the discrete gamma rays. These two nuclei with neutron number above and below N=114, would provide a better understanding on nuclear shape across N=114. The band structures in both the nuclei have been extended considerably and band crossings have been identified for the first time. Several non-yrast band structures have also been found in these nuclei.
References:
[1]T. Roy et al., Phys. Lett. B 782 768 (2018)
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