LONGITUDINAL WOBBLING IN 133LA

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The excitation modes of nuclei which depend on the shape have always been a fascinating area of study in contemporary nuclear physics research. The different rotational modes of triaxial nuclei are chirality and wobbling. A characteristic signature of the rotational gammaray spectrum for a wobbling nucleus is the observation of DI = 1, E2 interband transitions between the first wobbling band (nw = 1) and the yrast band (nw = 0). Based on the variation of the wobbling frequency with angular momentum of the nucleus, the wobbling motion can be further classified into two types: transverse wobbling and longitudinal wobbling.

Recently, in 135Pr, transverse wobbling mode has been observed at low spin and this was explained using the Tilted Axis Cranking (TAC) and Quasiparticle Triaxial Rotor (QTR) calculations. In the present work, an effort was made to look for the wobbling motion in the isotone, 133La (N = 76). The longitudinal wobbling nature for this nucleus was established from the experimental angular distribution, Directional Correlation from Oriented states (DCO) and polarization measurements and the corresponding theoretical calculations for all the interband transitions. A microscopic model, Triaxial Projected Shell Model (TPSM), was employed to explain this transverse-longitudinal transmutation.