Contribution ID: **24** Type: **not specified**

A Novel Interpretation of the Wobbling Motion in 163Lu

One of the fingerprints for nuclear triaxiality, i.e., wobbling motion, present in ^{163}Lu is described within a semi-classical formalism that introduces the concepts of Signature Partner Bands and Parity Partner Bands, which are amended to a Particle-Rotor Model. These two ideas help re-defining the band structure of this isotope in such a way that the experimental wobbling spectrum can be accurately reproduced with a set of equations that depend on the moments of inertia of the nucleus and the triaxiality parameter. Besides the energy spectrum, a geometrical representation of the classical energy function is realized within a phase space that characterizes the motion of the entire particle + rotor system. Moreover, a three-dimensional sketch that shows the allowed trajectories of the system (defined as intersections between the energy ellipsoid and the angular momentum sphere) is realized for several values of excitation energy and spin. The current re-interpretation of the wobbling bands for ^{163}Lu proves to be a useful approach for providing a realistic description of the wobbling phenomenon, and moreover it gives an insight into the classical geometry that arises in triaxial shapes.

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Session Classification: Novel aspects and signatures of QPTs in nuclei

Track Classification: Novel aspects and signatures of QPTs in nuclei