

Exotic rotations and seniority isomers in Nd nuclei

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The existence of triaxial nuclei has been the subject of a long standing debate. The possibility of soft and rigid triaxiality has been proposed very early, and many theoretical and experimental studies have been devoted to this intriguing phenomenon since then. More recently two unique fingerprints of triaxiality in nuclei have been intensively studied: the wobbling motion [1] and the dynamic chirality [2]. These exotic types of motion were observed in specific regions of the nuclear chart: the wobbling motion in the odd-even Lu nuclei with $A \sim 160$ [3], the chirality primarily in the odd-odd and odd-even nuclei with $A \sim 130$ nuclei [4, 5]. We have recently studied the Nd nuclei up to very high spins and identified several bands, which were interpreted as the manifestation of various types of collective motion: tilted axis rotation, principal axis rotation along the short and long axes, wobbling motion, chiral bands [6]. Another phenomenon revealed by our recent results on the Nd nuclei with neutron numbers just below the $N=82$ shell closure, is the shape coexistence. It is induced by the existence of some high-spin seniority isomers which are built on a spherical shape and are surrounded by triaxial bands. The shape coexistence phenomenon is well described by Cranked Nilsson Strutinsky calculations. All these types of excitation and their interpretation will be discussed and exemplified with recent results obtained on Nd nuclei.

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