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Exotic rotations in Ba and Nd nuclei

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Abstract

The breaking of symmetries in quantum systems is one of the key issues in nuclear physics. In particular, the spontaneous symmetry breaking in rotating nuclei leads to exotic collective modes, like the chiral motion, which is an unique fingerprint of triaxiality in nuclei and have been intensively studied in recent years. We are currently involved in the study of Lanthanide nuclei. New results have been obtained recently and interpreted as the manifestation of a stable triaxial nuclear shape, presenting various types of collective motion, like tilted axis and principal axis rotation, chiral motion, rotation of nuclei with oblate shape at very high spins. Chiral bands in even-even nuclei, which were taught to be unfavored energetically, unstable against 3D rotation and difficult to observe, have been instead identified very recently in ^{136}Nd. The experimental evidence of such bands will be presented and their theoretical interpretation will be discussed. The experimental evidence of multiple chiral bands in several Lanthanides, as well as the presence of competing collective oblate rotation up to very high spins in Nd nuclei will also be discussed.