EXOTIC ROTATION IN WEAKLY DEFORMED AND TRIAXIAL NUCLEI

Abstract

by

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Antimagnetic rotation in weakly deformed nuclei ^{100,101}Pd, and chiral rotation in triaxial nuclei ^{135,136}Nd have been investigated by means of γ-ray spectroscopic measurements. These two modes of rotation are quite different from "standard" rotational motion observed in well deformed nuclei. In these new modes, the total angular momentum either originates purely from a few particles in high-j orbitals, or these orbitals couple to collective motion of a triaxial core. Two cascades of four "rotational-band-like" transitions were observed in ^{100}Pd and ^{101}Pd, respectively, and have been proposed as corresponding to antimagnetic rotation, based on the observed spectroscopic properties and a comparison with calculations in the configuration-dependent cranking Nilsson-Strutinsky formalism. Two ΔI=1 bands with close excitation energies and the same parity were observed in ^{135}Nd. These bands are directly linked by ΔI=1 and ΔI=2 transitions. The chiral nature of these two bands is confirmed by comparison with three-dimensional tilted axis cranking calculations. This is the first observation of a three-quasiparticle chiral structure and establishes the primarily geometric nature of this phenomenon. Although there are no chiral partner bands observed in even-even nucleus ^{136}Nd from our data, TAC calculations indeed give chiral solutions related to several $\Delta I = 1$ bands in the nucleus ^{136}Nd.