

Frontiers in Gamma Ray Spectroscopy

FIG18



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EXPLORING THE COLLECTIVE AND NON-COLLECTIVE BAND STRUCTURES IN ^{123}Xe

Content :

The nuclei in the mass region $A \approx 125$ lie between the spherical Tin nuclei and strongly deformed Cerium nuclei; so are transitional with respect to their shapes at low and high angular momenta. The presence of an $h_{11/2}$ intruder orbital, accessible to both protons and neutrons, govern the shape of the nucleus as these $h_{11/2}$ nucleons have opposite deformation driving effects. Therefore, the aftermath of this interplay makes this region compelling to study shape evolutions from low to higher spin regions as the nucleus can have a prolate, an oblate or a triaxial shape depending on the alignment of these $h_{11/2}$ nucleons. An experiment involving a heavy-ion fusion evaporation reaction was carried out at ANL, USA where the high spin states of ^{123}Xe were populated using $^{80}\text{Se}(^{48}\text{Ca}, 5n)^{123}\text{Xe}$ where a ^{48}Ca beam having 207 MeV beam energy and an intensity of 4 pnA was bombarded on a gold-backed ^{80}Se target. The coincidence events were recorded with the Gammasphere spectrometer. The previously known level scheme was confirmed and enriched with the addition of 5 new band structures and several interband transitions. Cranked Nilsson-Strutinsky calculations were performed and compared to the experimental results in order to assign configurations to the bands.

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