

Nuclei structure around shell closure $N = 82$

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Abstract

The nuclei with $A=140$ having a few holes in the $N = 82$ shell closure offer a fertile region to investigate the shape evolution. They are spherical or only slightly deformed in the ground state and at small angular momenta, but they can get deformed at high spins as evidenced by recent experimental results. The investigation of Ce isotopes with neutron number close to $N = 82$ is very important to study the dipole bands showing magnetic rotation at the highest spins.

We have studied the structure of the observed high spin states of ^{138}Ce nucleus [T. Bhattacharjee et al., Nuclear Physics A 825 (2009) 16–38]. Several positive and negative parities configurations of the dipole bands are investigated on the basis of cranked Nilsson-Strutinsky (CNS) and tilted axis cranking (TAC) calculations where we have assigned the configurations that have the best agreement with the results of the experimental work for this nuclei.

Keywords: shell closure, shape evolution, parameters deformation, CNS, TAC