

Frontiers in Gamma Ray Spectroscopy

FIG18

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Signature inversion in doubly odd ^{128}I

Content :

Many doubly odd nuclei in the mass region ~ 130 have been studied earlier for the phenomena of signature splitting, signature inversion and Chirality e. g. ^{126}I [1], and ^{128}I was also a good candidate. However, being close to β -stability line, it was difficult to populate ^{128}I via compound nuclear reaction. In our preliminary investigations, we observed a good cross section ~ 80 mb [2] of incomplete fusion reaction $^{124}\text{Sn} (11\text{B}, \alpha 3\text{n}) ^{128}\text{I}$. Using this reaction at beam energy 70 MeV, we performed an experiment at the Linac-Pelletron accelerator facility (TIFR, Mumbai) with INGA set-up consisting of 21 HPGe clover detectors. An enriched and self-supporting target foil of ^{124}Sn (thickness ~ 2.2 mg/cm²) was used. The data sorting was done using MARCOS code [3]. We deduced the level scheme of ^{128}I consisting of 46 γ -transitions grouped in 4 bands. Our level scheme differed significantly from the one by Ding et al. [4]. We observed signature inversion in the negative parity yrast band built on 8^+ for the first time. The observed signature inversion was well reproduced by the total Routhian surface (TRS) [5] and particle rotor model (PRM) [6] calculations. We assigned $\pi g_{7/2} \otimes \nu h_{11/2}$ configuration to this band. The cause of signature inversion could be the shape change of the triaxial nucleus from near collective prolate to near collective oblate. Another excited positive parity band is currently being investigated and the results will be presented.

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