

Frontiers in Gamma Ray Spectroscopy

FIG18



Contribution ID : 60

Possibility of wobbling excitation in the even-even ^{142}Gd nucleus

Content :

Atomic nuclei possess a wide variety of shapes in both their ground and excited states. The shapes may range from spherical to deformed, from quadrupole to octupole, and even more exotic shapes, such as super-deformed and tetrahedral. For deformed nuclei, they in general possess an axially symmetric shape. The loss of axial symmetry would lead to a triaxial shape. The wobbling motion and chirality are regarded as fingerprints of stable triaxial nuclei. Evidence for wobbling (collectively enhanced E2 transitions between the one- and zero-phonon rotational bands) has been observed only in odd-A triaxial strongly deformed nuclei around $Z \sim 72$, $N \sim 94$ though, Bohr and Mottelson had predicted it for the triaxial even-even nuclei many years ago.

A recent study on the even-even ^{138}Nd nucleus hints that wobbling mode may exist in the low and medium spin triaxial deformed states. Similar evidence of the triaxial deformed band has been explored above the $10+$ excited state in ^{142}Gd . To investigate the possibility of wobbling mode in ^{142}Gd above this state an experiment has been performed at TIFR, Mumbai in which the nucleus of interest populated with $\sim 35\%$ of the total cross-section. The newly observed connecting transitions and their electromagnetic properties are similar to those of wobbling excitation but yet not confirmed. This will be discussed in details.

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Session classification : --not yet classified--

Track classification : --not yet classified--

Type : Poster