

Frontiers in Gamma Ray Spectroscopy

FIG18



Contribution ID : 59

Spectroscopic Investigations of Excited States of ^{70}Ge Nucleus

Content :

The spectroscopic study of high spin states in $A = 70$ region have been attracted considerable interest due to occurrence of various exotic phenomena like shape co-existence, shape evolution, bandcrossing, back-bending, band termination, chirality, magnetic rotation etc.[1,2]. In even-even ^{70}Ge nucleus, the protons and neutrons occupy the same orbitals, $\pi(g_{9/2})$ and $\nu(g_{9/2})$ and hence easily aligned at similar rotational frequencies resulting into back-bending and band-crossing for positive and negative parity bands [3]. In the present work, high-spin states were populated using $^{58}\text{Ni}(^{16}\text{O}, 4p\gamma)^{70}\text{Ge}$ fusion evaporation reaction at a beam energy of 85 MeV. The experiment was performed at Tata Institute of Fundamental Research (TIFR), Mumbai and emitted gamma rays were detected by Indian National Gamma detector Array (INGA). The level structure of ^{70}Ge has been extensively studied by matrix and cube. The yrast positive parity 0^+ band has been extended up-to 16^+ state which shows the neutron alignment in $\nu(g_{9/2})$ orbitals at 10^+ state. However, the second 0^+ band has been extended up-to 12^+ state with the addition of new $\Delta I=2$ transition along with $\Delta I=0$ interconnecting transitions. The negative parity bands have been extended upto 21^- state by addition of four new gamma transitions. We have also observed a new negative-parity decoupled band and a possible gamma vibrational band. In order to confirm the nature of transitions, we have performed the direction correlation of the orientated (DCO) measurements.

[1] R. Palit et al., Phys. Rev. C. 63, 024313 (2001)

[2] T. Trivedi et al., Phys. Rev. C. 80, 047302(2009)

[3] M. Sugawara et al., Phys. Rev. C. 81, 024309(2010)

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Session classification : --not yet classified--

Track classification : --not yet classified--

Type : Poster