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Investigation on single particle excitation in 63Zn

Introduction

Detail study on nuclear structure in mass region A~60 reveals various interesting phenomena. Both single particle and collective excitations with various shapes, namely, prolate, oblate and triaxial have been observed in this region in many Cu, Zn and Ni nuclei [1,2,3,4,5]. Here the lower excitations are due to the negative parity 2p3/2 , 1f5/2 and 2p1/2 orbitals but most of the high spin states are mainly due to the presence of the high j 1f7/2 and 1g9/2 intruder orbitals. Strongly coupled rotational band was first observed in 64Zn [6] in this mass region and this band showed similar characteristics of those smoothly terminating rotational bands in the Sn-Sb nuclei of the A~110 region. Normal and super deformed bands have been identified in 61,65Zn isotopes . But evidence of such extreme situation as in 61,65Zn is yet to be explored in 63Zn.The most recent study with 16O beam [7] used 12 Compton suppressed HPGe detectors along with 14 BGO detectors which predicted rotational like states at lower excitation energy rather than at higher excitation energy. To get more insight into the nuclear structure of 63Zn, an experiment was performed using more efficient array of 14 Compton suppressed HPGe clover detectors at IUAC, New Delhi.

Experiment and Analysis

Investigation on excited states in 63Zn were done through in-beam γ-ray spectroscopic techniques using the 52Cr(18O, 3n) fusion-evaporation reaction at a beam energy of 72.5 MeV [8]. Detection of emitted γ-rays of excited nuclei were performed in the coincidence mode using fourteen Compton suppressed Ge clover detectors of the Indian National Gamma-ray Array (INGA). Based on the γ-γ coincidence data, thirteen new transitions have been placed in the level scheme according to the coincidence relationship and intensity balance. Spin and parity assignments have been done by extracting the DCO and Polarization asymmetry values of the γ-rays.

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References

[1] B. Mukherjee et al., Phys. Rev. C 64, 024304 (2001).
[2] L. - L. Andersson et al., Phys. Rev. C 79, 024312 (2009).
[3] C. Andreoiu et al., Phys. Rev. C 62, 051301(R) (2000).
[4] M. Albers et al., Phys. Rev. C 88, 054314 (2013).
[5] S. Rai et al., Int. J. Mod. Phys. E 25, 1650099 (2016).
[6] A. Galindo-Uribarri et al., Phys. Lett. B 422, 45 (1998).
[7] A. K. Singh et al., Phys. Rev. C 57, 4 (1998).
[8]S. Rai et al., Eur. Phys. J. A 54, 84 (2018).

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