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Shape coexistence and E(5) symmetric structure in light Ge isotope

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Abstract

One of the most significant challenges in modern science is to understand the construction procedure of complex many-body objects and their behaviour. Such challenges recur across the spectrum of physical systems spanning from atomic nuclei to nano-scale systems. In the atomic nucleus, researchers try to apprehend its configuration from nucleons (protons and neutrons) and their interactions in the context of quantum mechanics and conservation laws. The present work focuses on the crucial current topic that reflects the challenges mentioned above, namely quantal phase transitions in the equilibrium shapes of the atomic nucleus as a function of their nucleonic constituents. Recently, the low lying level structure of the ^{68}Ge nucleus have been populated via the ^{58}Ni(^{16}O, α2p)^{68}Ge fusion evaporation reaction with a beam energy of 85 MeV. The deexciting gamma rays were detected using the Indian National Gamma Array (INGA) facility at Tata Institute of Fundamental Research, Mumbai, India [1]. The mixing probabilities of ΔI=0 (mixed with E2 and M1) transitions between the yrast band and excited 0_2^+ band reveal the shape coexistence at lower spin states. Further, the evidence for the second-order critical point E(5) symmetric structure has been reported from observing two new excited 0^+ states and energy systematics. The structural characteristics of observed bands have been interpreted in terms of the LSSM and IBA model calculations.

References

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