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Study of the Jacobi shape transition in A ≈ 30 nuclei

The study of exotic Jacobi shapes in nuclei have attracted much attention in recent times [1-4]. The presence of a distinct low energy component around 10 MeV in the giant dipole resonance (GDR) spectrum, originating from Coriolis splitting in a highly deformed rotating nucleus, can be used as a signature of the Jacobi shape transition. The measurement of high energy γ rays from the decay of GDR in 31P nucleus and a self-conjugate α-cluster nucleus 28Si, populated at the same initial excitation energy and angular momenta, was carried out to study the Jacobi shape transition [5]. While the Jacobi shape transition is observed in 31P, the self-conjugate α-cluster nucleus 28Si exhibits a vastly different GDR lineshape characteristic of a prolate deformed nucleus. Based on these observations is 28Si [5] and 32S [6], it is proposed that the nuclear orbiting phenomenon exhibited by α-cluster nuclei hinders the Jacobi shape transition. Further, the present work suggests a possibility to investigate the nuclear orbiting phenomenon using high energy γ rays as a probe.

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