Shape evolution in ^{136}Sm

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The neutron deficient even-even Sm isotopes with N ~ 74 have shown interesting shape transitions and shape coexistence with increasing angular momentum. In ^{134}Sm nucleus, ground state deformations have a stable prolate ($\gamma = 0^{\circ}$) shape [1] and in case of ^{138}Sm significant triaxiality has been observed [1, 2]. Total Routhian Surface (TRS) calculations suggest ^{136}Sm as a transitional γ-soft nucleus between the prolate ^{134}Sm and the triaxial ^{138}Sm isotopes. The study of evolution of shape in yrast band of ^{136}Sm driven by the alignment of high-j quasiparticles is of primary interest in the present work.

The lifetimes of excited states of ground state rotational band in ^{136}Sm were measured using Doppler Shift Attenuation method (DSAM). In the current work, the transitional quadrupole moments (Q_t) were deduced for the states $I^{\pi} = 8^{+}$ to $I^{\pi} = 22^{+}$ from the lineshape analysis of the decaying transitions. The experimental results were compared with that of total routhian surface (TRS) and triaxial projected shell model (TPSM) calculations. The evidence of the shape transition and shape coexistence will be discussed based on the comparison of the theoretical and experimental Q_t values at different spins.

References

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