

Abnormal Features of Two Quasiparticle Rotational Bands in Rare Earths

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Abstract : The behaviour of the rotational bands should be smooth but due to large amount of inertia and decreased pairing it is not so. Many experiments have been done in the last few decades, and a large amount of data is available for comprehensive study in this region. Peculiar features like signature dependence, signature inversion, and signature reversal are observed in many two quasiparticle rotational bands of doubly odd and doubly even nuclei. At high rotational frequencies, signature and parity are the only two good quantum numbers available to label a state. Signature quantum number is denoted by α . Even-angular momentum states of a rotational band have $\alpha = 0$, and the odd-angular momentum states have $\alpha = 1$. It has been observed that the odd-spin members lie lower in energy up to a certain spin I_c ; the normal signature dependence is restored afterwards. This anomalous feature is termed as signature inversion. The systematic of signature inversion in high-j orbitals for doubly odd rare earth nuclei have been done. Many unusual features like signature dependence, signature inversion and signature reversal are observed in rotational bands of even-even/odd-odd nuclei. Attempts have been made to understand these phenomena using several models. These features have been analyzed within the framework of the Two Quasiparticle Plus Rotor Model (TQPRM).

Keywords : rotational bands, signature dependence, signature quantum number, two quasiparticle

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