

Analytical description of shape transition in nuclear alternating parity bands

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Abstract

© 2018 Chinese Physical Society and the Institute of High Energy Physics of the Chinese Academy of Sciences and the Institute of Modern Physics of the Chinese Academy of Sciences and IOP Publishing Ltd. The angular momentum dependencies of parity splitting and electric dipole transitions in the alternating parity bands of heavy nuclei have been analyzed. It is shown that these dependencies can be treated in a universal manner with a single critical angular momentum parameter, which characterizes phase transition from octupole vibrations to the stable octupole deformation. Using the simple but useful model of axially-symmetric reflection-asymmetric mode, the analytical expressions for parity splitting and electric dipole transitional moment have been obtained. The findings are in good agreement with the experimental data for various isotopes of Ra, Th, U, and Pu.

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Keywords

Angular momentum, Octupole deformation, Phase transition

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