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Description of Phase Transitions between Alternating Parity Bands with the Symplectic Interacting Vector Boson Model

V. P. Garistov[1], **A. I. Georgieva**[2]

[1]Institute of Nuclear Research and Nuclear Energy,
Bulgarian Academy of Sciences, 1784 Sofia, Bulgaria
[2]Institute of Electronics, Bulgarian Academy of Sciences,
1784 Sofia, Bulgaria

Abstract

Using the symplectic extension of the Interacting Vector Boson Model /IVBM/ [1]we obtain rather accurate description of the energies of the alternating parity bands in sequences of nuclei in the rare-earth and actinide regions. These results allow us to investigate the dependence of the parity splitting between the $K^\pi = 0^+$ and $K^\pi = 0^-$ bands [2] on the model parameters of the Hamiltonian and the choice of quantum numbers of the model basis states of each nucleus corresponding to the observed experimental states in these bands. Analyzing these results we study the shape transitions in the evolution of excited states in these bands by expressing the parameters of the model's hamiltonian as parameters of an generalized rotor, which define in a natural way the degree of deformation of each band. The dependence of these transitions on the bands'head configurations is also considered [3]. As a result we obtain an analytic expression for the parity splitting.

References

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