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Description of superdeformed bands of Pb isotopes using SU(3) symmetry of Interacting Boson Model

The dynamical SU(3) symmetry of the Interacting Boson Model (IBM) has been employed to study the systematic of superdeformed (SD) bands in Pb isotopes for the first time. This SU(3) symmetry describes the characteristics of deformed nuclei in a generalized way. For each SD band in Pb isotopes, the level spins are suggested. The model parameters are determined using a computer-based program to minimize the root mean square (RMS) deviation of the calculated SU(3) symmetry transition energies Eγ from the observed values considering the spin value of the lowest level. The calculated Eγ agrees well with all SD bands' experimental data. This indicates that the SU(3) symmetry of the IBM model is robust in describing the nuclear structure and collective motion of SD bands in Pb isotopes. The variation of the kinematic $\Im(1)$ and dynamic $\Im(2)$ moments of inertia as a function of rotational frequency $\hbar\omega$ and NpNn product obtained using spherical magic numbers have been examined.

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