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Introduction of effective charges in the Vector Boson Model

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Abstract.

This work implements the Vector Boson Model (VBM) with broken SU(3) symmetry [1] to provide an algebraic description of collective spectra and transition rates in even-even deformed nuclei, spanning regions with weak, medium, and strong mutual displacement of the ground- and γ- band. The study builds upon previous theoretical development by involving the most recent experimental data [2] to test the model at high angular momentum values for a variety of SU(3) irreducible representations (irreps). We introduce irrep-dependent effective charges and explore the root mean square (RMS) deviation of the theoretical results relative to experimental measurements. The irreps that give the best descriptions for the considered nuclei are then compared to the theoretical predictions of the proxy SU(3) model [3, 4]. The results confirm the applicability of the VBM for a precise description of spectra and transitions in deformed atomic nuclei.

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