Emergence of SU(3) Symmetry in Deformed Nuclei

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SU(3) symmetry emerges in deformed nuclei with nearly equal number of valence protons and neutrons away from closed shells [1]. The nucleon orbitals are defined by the K[N$n_z\Lambda$] quantum numbers of the Nilsson model. It has been proved, that the spatial overlap among nucleons with differences $\Delta K[\Delta N \Delta n_z \Delta\Lambda] = 0[110]$ is maximum [2]. As a consequence, an orbital of a valence nucleon can be replaced by its twin orbital. Through this approximation the resulting clump of valence orbitals has SU(3) symmetry. Since a symmetry has been achieved, the Hamiltonian of the nucleus can consist of operators which preserve it. Among these operators is a three body interaction operator [3] which succesfully breaks the degeneracy of the β_1 and γ_1 bands, predicted by the IBM [4]. Furthermore the model predicts high values of B(E2) transition probabilities between the γ_1 and the ground state band. Preliminary results indicate that both the breaking of the degeneracy and the high B(E2) values are in agreement with the experimental data.

References

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