

Partial Dynamical Symmetry in Odd-Mass Nuclei

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Abstract

The concept of dynamical symmetry (DS) has been widely used to interpret nuclear structure. A given DS admits an analytic solution for all states of the system, with characteristic degeneracies, quantum numbers and selection rules. Familiar examples are the $U(5)$, $SU(3)$ and $O(6)$ DSs of the interacting boson model, which encode the dynamics of spherical, axially-deformed and γ -unstable nuclear shapes. The majority of nuclei, however, exhibit strong deviations from these solvable benchmarks. More often one finds that the assumed symmetry is not obeyed uniformly, *i.e.*, is fulfilled by some of the states but not by others. The need to break the DSs, but still preserve important symmetry remnants, has led to the introduction of partial dynamical symmetry (PDS) [1]. For the latter case, only selected eigenstates of the Hamiltonian retain solvability and good symmetry, while other states are mixed. Bosonic Hamiltonians with PDS have been applied to nuclear spectroscopy, where extensive tests provide empirical evidence for their relevance to a broad range of nuclei [2–4]. Fermionic shell model Hamiltonians with PDS have been applied to light nuclei [5] and seniority isomers [6]. These empirical manifestations suggest a more pervasive role of PDSs in nuclei than heretofore realized.

All examples of PDS considered so far, were confined to systems of a given statistics. In the present contribution, we extend the PDS concept to mixed systems of bosons and fermions, of relevance to odd-mass nuclei [7]. As a first example of such novel symmetry construction, spectral features of ^{195}Pt are analyzed in the framework of the interacting boson fermion model.

References

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