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Recent applications of symmetry conserving configuration mixing methods to describe nuclear spectra

Experimental excitation energies and transition probabilities of the atomic nucleus provide information about its underlying shell structure, deformation, etc., and, eventually, about the nuclear interactions. To understand better these structural properties we have to compare with theoretical calculations. During the last two decades beyond-mean-field techniques using energy density functionals (EDF) have been developed to provide reliable predictions and physically sound interpretations of nuclear spectra at low excitation energies. In particular, the so-called symmetry conserving configuration mixing (SCCM) method based on the Gogny EDF has been used to study the appearance/degradation of shell closures, shape evolution/mixing/coexistence, etc., in different regions of the nuclear chart. In this talk I will briefly review the main aspects of the theoretical framework and I will focus on some recent studies of the quadrupole and octupole shape evolution in neutron rich nuclei.

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