Int. Workshop “Shapes and Dynamics of Atomic Nuclei: Contemporary Aspects”
ed. Nikolay Minkov, Heron Press, Sofia 2015

Extended Microscopic Theory for the $N \sim Z$ Nuclei

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Abstract

A symmetry adapted realization of the Pairing-plus-Quadrupole Model /PQM/ has been explored in the framework of the Elliott’s SU(3) Model. The aim is to obtain the complementary and competing features of the pairing and quadrupole interactions in the model Hamiltonian, containing both of them as limiting cases or dynamical symmetries. For the purpose, one or two control parameters are introduced which account for the relative importance of each term in the Hamiltonian and serve to describe the effect of phase transition. The calculations are performed for nuclei in a single (e.g. ds) shell as well as in a more elaborated (e.g. $ds + f_{7/2}$, pseudo-$ds + f_{7/2}$, $ds + fp$, pseudo-$ds + fp$) two-shell model spaces. Results will be reported for the excitation spectra, wave function contents, electromagnetic transitions and shapes. We also address the issue how these quantities evolve with the use of various Hamiltonians and model spaces.