

A New Approach to the Study of Weakly-bound Nuclei in Mean-field Theories

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The structure of weakly-bound systems such as neutron-rich nuclei is strongly affected by the presence of the continuum. Several techniques were developed in the past to incorporate these effects into the mean-field or shell-model description of nuclear structure. We would like to discuss a new type of mean-field approach that involves the construction of a basis imbedding continuum effects. The main advantage of working in a basis is that once the matrix elements of the interaction are determined, the whole body of mean-field and beyond mean-field techniques (symmetry breaking, collective motion, pairing, etc.) can be used straightforwardly at a minimal cost. We will discuss the validity of our method, suggest a way to optimize further the basis states by disregarding some of them, and present the first applications obtained in the framework of the Hartree-Fock-Bogoliubov theory with the Gogny interaction.