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Projected Configuration Interaction Method for Heavy Nuclei[1]
MIHAI HOROI, ZAOCHUN GAO, Department of Physics, Central Michigan University, Mount Pleasant, MI 48859 — The nuclear Configuration Interaction (CI) method using a spherical single particle (s.p.) basis has been very successful in describing the properties of the low-lying states of the light and medium size nuclei. The main shortcoming of this methods is related to the exploding dimensions that could make the calculations unfeasable even when one changes the number of nucleons and/or s.p. states by one unit. In addition, the relation of the correlated spherical wave functions to the mean field picture is either indirect or very difficult to make. The Projected Configuration Interaction (PCI) method starts from a collection of mean-field wave functions, and builds up correlated wave functions of good symmetry. It relies on the Generator Coordinator Method (GCM) techniques, but it improves the past approaches by a very efficient method of selecting the basis states. We compare the results of this method with the results of the full CI calculations in the sd and fp shell, as well as with the standard GCM, the Quantum Monte Carlo Diagonalization (QMCD) method (e.g. Phys. Rev. C **59**, R1846 (1999)), and the complex MONSTER/VAMPIR method (e.g. Nucl. Phys A **571**, 77 (1994)).

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