

ABSTRACT

Deformed Hartree-Fock (HF) calculations for some light nuclei are performed in a large configuration space for some 1p and 2s-1d shell nuclei. An expression for single particle separation energies taking into account centre-of-mass motion is derived. It is shown that the separation energy and the variational determinantal state of a nucleus are independent of the form of the Hamiltonian used. The interactions employed are the Skyrme and Sussex interactions. A modification in the density dependent Skyrme interaction is proposed such that the deformed density is replaced by the 'band averaged scalar' density that makes the Hamiltonian rotationally invariant rendering the spectroscopic calculations feasible. Projected HF energy spectra are calculated using the projection formalism. Calculations for the nuclei ^8Be , ^{12}C and ^{20}Ne show that the introduction of scalar density dependence gives spread out spectra providing very good agreement with experiments. Projected HF calculations are performed for the nuclei ^8Li , ^8Be , ^8B and ^{12}C with density independent Skyrme interaction and also with the Sussex interaction. It is found that the two-body spin-orbit interaction is quite important in the ^{12}C region. The electromagnetic properties calculated for the above nuclei are compared with the experiments.