

Ground State Properties of Neutron Magic Isotones

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Abstract : In the present investigation, we have employed RMF+BCS (relativistic mean-field plus BCS) approach to carry out a systematic study for the ground state properties of the entire chains of even-even neutron magic nuclei represented by isotones of traditional neutron magic numbers $N = 8, 20, 40, 50, 82,$ and 126 . The main body of the results of our calculations includes the binding energy, deformation, two proton separation energies, rms radii of the proton and neutron distributions as well as the proton and neutron density profiles etc. Several of these results have been given in the form of a series of graphs for a ready reference. In addition, the possible locations of the proton and neutron drip-lines as well as the (Z,N) values for the shell closures as suggested by the detailed analyzes of the single particle spectra, and the two proton and two-neutron separation energies for the different isotonic chains are also discussed in detail.

Keywords : relativistic mean field theory, neutron magic nuclei, shell closure, separation energy, deformation

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