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Spin-orbit splitting of neutron states in N=20 isotones within the covariant density functional theory

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Abstract

Spin-orbit splitting is an essential ingredient for our understanding of the shell structure in nuclei. One of the most important advantages of relativistic mean-field (RMF) models in nuclear physics is the fact that the large spin-orbit (SO) potential emerges automatically from the inclusion of Lorentz-scalar and -vector potentials in the Dirac equation. Here, we investigate the size of $2p$ and $1f$ splittings for the isotone chain ^{40}Ca, ^{38}Ar, ^{36}S, and ^{34}Si using various covariant density functionals. They are compared with the results of non relativistic models and with recent experimental data.