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The exchange term of self-consistent relativistic mean field calculations

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With the success of the Walecka model [1] in describing the basic ground state properties of finite nuclei and nuclear matter, the use of relativistic effective nucleon-nucleon interactions in Dirac-Hartree calculations has become a standard tool for many nuclear physicists. The relativistic effects naturally contained in these models have also justified their use in the study of dense nuclear matter, such as in compact stars [2,3]. However, nonrelativistic Skyrme and Gogny models [4,5] still provide much higher precision estimates of nuclear ground state masses [6] and deformations than those of relativistic models [7,8]. Comparisons between the two types of models show that the discrepancies of the relativistic models are larger for nuclei with larger proton-neutron asymmetry. Since the exchange term plays an important role in the asymmetry dependence of the nuclear binding energy, we investigate here its contribution to the description of asymmetric nuclear matter.

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Altas energias

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