ISOVECTOR PROPERTIES OF THE NUCLEAR EQUATION OF STATE FROMTHE QUARK-MESON COUPLING MODEL

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The in-medium modification of the internal structure of the nucleon can have a significant effect on nuclear structures and reactions. The quark-meson coupling (QMC) model is a microscopic mean-field approach to the quantum many-body problem which takes into account the quark structure of the nucleon.
In this work, the QMC density functional was used to produce a set of Skyrme interactions. Extracting Skyrme parameters from a microscopic theory, rather than phenomenologically, should give more reliable predictions. In conjunction with Hartree-Fock calculations, the Skyrme-QMC (SQMC) parameterisations have been used to investigate the importance of the isovector terms of the nucleon-nucleon interaction in the nuclear equation of state.
The spin-orbit part of the functional is important for both structure and reactions. In particular, it induces strong dissipation in heavy-ion collisions. Here, the spin-orbit interaction is microscopically derived from the relativistic QMC model. The isovector dependence of the spin-orbit term is remarkably similar to that of the UNEDF1 phenomenological density functional. Results investigating the impact of the isovector spin-orbit term along a Sn (Z=50) isotopic chain will be presented.