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S. Gandolfi, J. Carlson, T-2: The equation of state of nuclear matter

The knowledge of the equation of state (EOS) of nuclear matter, particularly with different proton fractions, is of fundamental importance for both nuclear physics and astrophysics. The EOS provides constraints on the bulk properties of nuclear density functionals often used to predict the properties of heavy nuclei including those with large neutron excesses. The calculation of the EOS of nuclear matter using realistic nuclear forces is one of the most challenging problems for many-body nuclear physics.

- We have calculated the equation of state of symmetric nuclear matter (same number of protons and neutrons) using a realistic nucleon-nucleon interaction. As expected, the saturation point is not reproduced because of the missing three-body force.
- For the first time we have performed a calculation of the energy of nuclear matter at fixed density as a function of the proton fraction. The quadratic behavior seems to be well reproduced.

- S. Gandolfi, A. Lovato, J. Carlson, Kevin E. Schmidt, *From the lightest nuclei to the equation of state of asymmetric nuclear matter with realistic nuclear interactions*, Phys. Rev. C 90, 061306(R) (2014).

- J. Carlson, S. Gandolfi, F. Pederiva, Steven C. Pieper, R. Schiavilla, K.E. Schmidt, R.B. Wiringa, *Quantum Monte Carlo methods for nuclear physics*, arXiv:1412.3081, accepted in Rev. Mod. Phys.

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