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Modeling Low-Density Nuclear Matter with Neural-Network Quantum States

Friday, 27 September 2024 14:40 (40 minutes)

The structure of low-nuclear density nuclear matter is of great importance to the physics of neutron star crusts. One of the important aspects of this structure is the transition from roughly spherical neutron rich nuclei to uniform matter. Models for both of these extremes exist but the transition is less easily understood. In this presentation I will discuss my results from variational Monte Carlo calculations using neural-network quantum states which show that this method can model nuclear matter in this density region efficiently and more accurately than other Monte Carlo methods.
The results to be shown come from calculations at several densities and proton fractions using a pionless effective field theory Hamiltonian. From these results I will show predictions for clustering, symmetry energy, and proton fraction for the beta-equilibrated ground state.

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