



Nuclear Theory

Testing the density matrix expansion against ab initio calculations of trapped neutron drops

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Microscopic input to a universal nuclear energy density functional can be provided through the density matrix expansion (DME), which has recently been revived and improved. Several DME implementation strategies are tested for neutron drop systems in harmonic traps by comparing to Hartree-Fock (HF) and ab initio no-core full configuration (NCFC) calculations with a model interaction (Minnesota potential). The new DME with exact treatment of Hartree contributions is found to best reproduce HF results and supplementing the functional with fit Skyrme-like contact terms shows systematic improvement toward the full NCFC results.

Comments: 10 pages, 5 figures

Subjects: **Nuclear Theory (nucl-th)**; High Energy Physics - Phenomenology (hep-ph)

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