Abstract Submitted
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Energy Functionals from Low-Momentum Potentials[1] S.K. BOGNER, Ohio State University — The nonperturbative nature of conventional inter-nucleon interactions is strongly scale or resolution dependent, and can be radically modified by using the renormalization group to lower the momentum cutoff of the two-nucleon potential. Recent calculations demonstrate that using low-momentum potentials ("$V_{\mathrm{low}\ k}$") with consistent three-body forces leads to saturating nuclear matter at the Hartree-Fock level, with rapidly converging perturbative corrections in the particle-particle channel [a]. With these interactions, the density matrix expansion (DME) becomes a natural tool for the microscopic construction of a universal energy functional for nuclei [b]. By varying the cutoff, the resolution dependence of the functional can be studied. The use of sharp momentum cutoffs in $V_{\mathrm{low}\ k}$ complicates the application of the DME in coordinate space. This problem is resolved with the recent generalization of $V_{\mathrm{low}\ k}$ to smooth cutoff regulators.

[a]S. K. Bogner, A. Schwenk, R. J. Furnstahl and A. Nogga, Nucl. Phys. A **763**, 59 (2005).
[b]J. W. Negele and D. Vautherin, Phys. Rev. C **5**, 1472 (1972).

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