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Iterative backflow renormalization procedure for many-body ground state wave functions of strongly interacting normal Fermi liquids MICHELE RUGGERI, DEMOCRITOS National Simulation Center, Istituto Officina dei Materiali del CNR and SISSA, Via Bonomea 265, I-34136 Trieste, Italy, MICHELE TADDEI, Dipartimento di Fisica, Sapienza Universita' di Roma, Piazzale A. Moro 2, I-00185, Roma, Italy, SAVERIO MORONI, DEMOCRITOS National Simulation Center, Istituto Officina dei Materiali del CNR and SISSA, Via Bonomea 265, I-34136 Trieste, Italy, MARKUS HOLZMANN, LPMMC, UMR 5493 of CNRS, Universite' Grenoble Alpes, F-38100 Grenoble, France and Institut Laue Langevin, BP 156, F-38042 Grenoble Cedex 9, France — We propose a new trial wavefunction for the ground state of a normal Fermi liquid. We apply iterative backflow transformations to obtain a sequence of renormalized coordinates. At each iteration two and three body correlations between quasiparticles are taken into account. We use these wavefunctions to compute the ground state energy of liquid ^{3}He at freezing density in two dimensions with Variational and Diffusion - Fixed Node Monte Carlo simulations. Comparing with exact transient estimate results for systems with small number of particles, we find that variance extrapolations provide accurate results for the true ground state together with stringent lower bounds. For larger systems these bounds can in turn be used to quantify the systematic bias of fixed-node calculations. These wave functions are size consistent and the scaling of their computational complexity with the number of particles is the same as for standard backflow wave functions.

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