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Nearest neighbor interaction in the Path Integral Renormalization Group method[1] WASANTHI DE SILVA, R. TORSTEN CLAY, Mississippi State University — The Path Integral Renormalization Group (PIRG) method is an efficient numerical algorithm for studying ground state properties of strongly correlated electron systems. The many-body ground state wave function is approximated by an optimized linear combination of Slater determinants which satisfies the variational principle. A major advantage of PIRG is that is does not suffer the Fermion sign problem of quantum Monte Carlo. Results are exact in the noninteracting limit and can be enhanced using space and spin symmetries. Many observables can be calculated using Wick's theorem. PIRG has been used predominantly for the Hubbard model with a single on-site Coulomb interaction U. We describe an extension of PIRG to the extended Hubbard model (EHM) including U and a nearest-neighbor interaction V. The EHM is particularly important in models of charge-transfer solids (organic superconductors) and at $\frac{1}{4}$-filling drives a charge-ordered state. The presence of lattice frustration also makes studying these systems difficult. We test the method with comparisons to small clusters and long one dimensional chains, and show preliminary results for a coupled-chain model for the $(TMTTF)_2X$ materials.

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