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Functional renormalization group for the Hubbard model at infinite on-site repulsion via Hubbard X-operators

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Exact functional renormalization group (FRG) flow equations for quantum systems can be derived directly within an operator formalism without using functional integrals. This simple insight opens new possibilities for applying FRG methods to models for strongly correlated electrons with projected Hilbert spaces, such as the t model, obtained from the Hubbard model at infinite on-site repulsion. By representing this model in terms of Hubbard X-operators, we derive exact flow equations for the time-ordered correlation functions of the X-operators (X-FRG), which allow us to calculate the electronic correlation functions in the projected Hilbert space. We use our approach to investigate the “hidden Fermi liquid” state of this model where the Hamiltonian consists only of the projected kinetic energy.

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