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Comparison of functional renormalization group and dynamic cluster quantum Monte Carlo results for the 2D Hubbard model[1]

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The Functional Renormalization Group (FRG) provides a method for determining the evolution of the 4-point scattering vertex of the Hubbard model as the temperature is lowered. Although it is usually implemented using perturbation theory, the general belief is that if the starting values of the coupling constants are chosen judiciously and the renormalization flow stopped at an appropriate point, the resulting vertex can provide unbiased information about the scattering processes that determine the low temperature properties of the system. Here, for a half-filled 2D Hubbard model, we compare a 1-loop FRG calculation with a Dynamic Cluster quantum Monte Carlo Approximation (DCA) calculation with the goal of examining this belief.

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