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Towards nonperturbative nonlocal correlations in the 2d Hubbard Model with the fRG

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The DMF2RG has been introduced to overcome the weak-coupling limitation of the fermionic functional renormalization group (fRG). This approach builds on the idea to exploit the dynamical mean-field theory (DMFT) as starting point for the fRG flow, thus capturing local nonperturbative correlations via DMFT together with perturbative nonlocal correlations generated during the flow. We show how nonlocal nonperturbative correlations can be also incorporated in the DMF2RG scheme by using cellular DMFT (CDMFT) for a 2×2 cluster instead of single-site DMFT as starting point of the flow. Both CDMFT and fRG implementations have been formulated within the single-boson exchange decomposition, which has already proven to be an insightful bosonization scheme. We illustrate the ability of this novel approach to efficiently capture nonlocal nonperturbative correlations in the 2d Hubbard model.

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