

Abstract Submitted
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Investigation into the inadequacy of cRPA in reproducing screening in strongly correlated systems QIANG HAN, BISMAYAN CHAKRABARTI, KRISTJAN HAULE, Rutgers Univ — The accuracy of the constrained random phase approximation(cRPA) method is examined in multi-orbital Hubbard models containing all possible on-site density-density interactions. Using DMFT, we show that the effective model constructed using cRPA fails to reproduce the spectral properties of the original full model in a wide parameter range. By comparing quantities such as the density of states and quasiparticle residues of the full and the effective models, we show that cRPA systematically overestimates the screening of Hubbard U for DMFT impurity solvers. We instead examine a new method to estimate the true screening in the system using the local polarization, which is highly successful in reproducing spectra and which also shows that the true screening is far less than that predicted by RPA. Furthermore, we examine the fully screened interaction W using RPA and our new method and show that the RPA W is overscreened and also misses the signatures of local screening, which are clearly present in our new method.

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