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Weakly Interacting Disordered Electron Systems[1] C.E. EKUMA, H. TERLETSKA, S. YANG, K.-M. TAM, Department of Physics & Astronomy and Center for Computation & Technology, Louisiana State University, Baton Rouge, LA 70803, USA, N.S. VIDHYADHIRAJA, Theoretical Sciences Unit, Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore, 560064, India, J. MORENO, M. JARRELL, Department of Physics & Astronomy and Center for Computation & Technology, Louisiana State University, Baton Rouge, LA 70803, USA — We report on the interplay of interactions and disorder within the typical medium dynamical cluster approximation using the Anderson-Hubbard model. By the systematical incorporation of non-local spatial correlations and the diagonal disorder on an equal footing, we study the initial effects of electron interactions (U) in one (1D), two (2D), and three (3D) dimensions. Treating the interacting non-local cluster self-energy ($\Sigma_c^{(SOPT)}[\tilde{\mathcal{G}}](i, j \neq i)$) up to $\mathcal{O}\left[\mathcal{U}^{\in}\right]$ order in the perturbation expansion, we obtain the ground-state phase diagram in 3D for the disorder induced paramagnetic metal to insulator transition in the presence of weak interactions. We find that the critical disorder strength (W_c), required to localize all states, increases with increasing U; implying that the metallic phase is stabilized by interactions. In 2D, our results agree with previous findings on the destruction of the insulating phase by U, while in 1D, we find strong competition between both phases.

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