Weakly Interacting Disordered Electron Systems\textsuperscript{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 ($\Sigma_{c}^{(S^{\text{OPT}})}(\vec{g})(i,j \neq i)$) up to $O[U^2]$ 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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