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Typical Medium Dynamical Cluster Simulations of Interacting and Strongly Disordered Systems

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The simulation of strongly disordered interacting electronic systems is notoriously difficult due to the problems associated with identifying the localization transition while simultaneously capturing the many body effects due to the interactions. Methods that are able to identify the edge generally require the simulation of so many sites that the calculation is well beyond what may be done with conventional many-body methods. In this talk I will discuss the typical medium dynamical cluster approximation which converges quickly with the cluster size and thus enables the study of Anderson localization in interacting or realistic systems. In three dimensions, we find that weak interactions do not change the essential nature of the Anderson localization transition, which is one of the central questions in the field of many-body localization. However, in 2D, we find that weak interactions restore the transition. I will also present results from simulations of chemically realistic systems.