

A Typical Medium Dynamical Cluster Approximation for the Study of Anderson Localization in Three Dimensions

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We develop a systematic typical medium dynamical cluster approximation that provides a proper description of the Anderson localization transition in three dimensions (3D). Our method successfully captures the localization phenomenon both in the low and large disorder regimes. As a function of cluster size, our method systematically recovers the re-entrance behavior of the mobility edge and obtains the correct critical disorder strength for Anderson localization in 3D. It also greatly reduces the computational cost required to study localization, enabling first principles calculations and calculations including the effect of interactions.