

Complete many-body localization in the t - J model caused by random magnetic field

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The presence of many body localization (MBL) in models of spin- $1/2$ fermions poses a challenging problem.

The disorder in the charge sector doesn't lead to full MBL whereby, at least, the spin degrees of freedom remain delocalized. I will present our results on the dynamics of a single hole in one dimensional t - J model subject to a random magnetic field. Strong disorder that couples only to the spin sector localizes both spin and charge degrees of freedom. While we cannot precisely pinpoint the threshold disorder, we conjecture that there are two distinct transitions. Weaker disorder first causes localization in the spin sector. Carriers become localized for somewhat stronger disorder, when the spin localization length is of the order of a single lattice spacing.