Abstract

We study the localization bounds for quantum many-body systems at positive spatial density in disordered media. Specifically, we consider dynamics of interacting bosons in the mean-field regime, subjected to a disordered potential which is either random or quasi-periodic. We prove that starting from a factorized and spatially localized initial wave function, the corresponding time-evolution propagates with a small velocity due to the disorder. This provides an example of a disordered quantum many-body system with provably slow transport behavior in any spatial dimension. The main technical novelty in the proof is an interaction picture analysis relative to the localization bounds of the associated one-body dynamics.