Abstract Submitted
for the DAMOP18 Meeting of
The American Physical Society

Long-time expansion of a Bose-Einstein condensate: Does the interacting many-particle system show Anderson localization? JOACHIM BURGDOERFER, STEFAN DONSA, HARALD HOFSTÄTTER, Vienna Univ. of Technology, OTHMAR KOCH, University of Vienna, IVA BREZINOVA, Vienna Univ. of Technology — We numerically explore the long-time expansion of a one-dimensional Bose-Einstein condensate (BEC) in a disorder potential employing the Gross-Pitaevskii equation. We address the fundamental question whether unique signatures of Anderson localization are observable in the presence of particle-particle interactions. We compare different expansion scenarios in which particle-particle interactions are selectively switched on or off. Using typical experimental parameters, we show that the time scale for which the nonequilibrium dynamics of the interacting system begins to diverge from that of the noninteracting system exceeds the observation times up to now accessible in the experiment. We find evidence that the long-time evolution of the wave packet is characterized by (sub)diffusive spreading and a growing effective localization length suggesting that interactions destroy Anderson localization.
[1] S. Donsa et al., Phys. Rev. A **96** (4), 043630 (2017).

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Date submitted: 26 Jan 2018 Electronic form version 1.4