Universal scaling of spin mixing dynamics in a strongly interacting one-dimensional Fermi gas

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Abstract

We study the spin-mixing dynamics of a one-dimensional strongly repulsive Fermi gas under harmonic confinement. By employing a mapping onto an inhomogeneous isotropic Heisenberg model and the symmetries under particle exchange, we follow the dynamics till very long times. Starting from an initial spin-separated state, we observe superdiffusion, spin-dipolar large amplitude oscillations and thermalization. We report a universal scaling of the oscillations with particle number N^1/4, implying a slow-down of the motion and the decrease of the zero-temperature spin drag coefficient as the particle number grows. We study the spin-mixing dynamics of a one-dimensional strongly repulsive Fermi gas under harmonic confinement. By employing a mapping onto an inhomogeneous isotropic Heisenberg model and the symmetries under particle exchange, we follow the dynamics till very long times. Starting from an initial spin-separated state, we observe superdiffusion, spin-dipolar large amplitude oscillations and thermalization. We report a universal scaling of the oscillations with particle number N^1/4, implying a slow-down of the motion and the decrease of the zero-temperature spin drag coefficient as the particle number grows.

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