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Damping of dipole oscillations of one-dimensional Bose gases induced by quantum phase slips IPPEI DANSHITA, Yukawa Institute for Theoretical Physics, Kyoto University — Motivated by the experiments studying the transport of one-dimensional (1D) Bose gases in optical lattices, we analyze the dynamics of damped dipole oscillations of 1D Bose gases by means of numerically exact time-evolving block decimation method. We find a broad parameter region in which the damping rate of the oscillation is proportional to the nucleation rate of a quantum phase slip divided by the flow velocity and exhibits a power-law behavior with respect to the flow velocity. From this relation, we argue that the suppression of the 1D transport observed in the experiments is mainly due to quantum phase slips. We also suggest that the damping rate obeys a universal damping behavior at finite temperatures.

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