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Dissipative Dynamics of a Bose-Einstein Condensate in an Optical Speckle Potential PAATA KAKASHVILI, NORDITA, SATYAN G. BHONGALE, HAN PU, Department of Physics and Astronomy, Rice University, CARLOS J. BOLECH, Physics Department, The University of Cincinnati — Progress in ultra-cold atomic physics allows to engineer and probe analogs of condensed matter systems, which are not plagued by imperfections. In addition, it is also possible to study effects of impurities and disorder, which can be controlled with a great precision. Disorder potential can be imposed by applying an optical-speckle field to a cloud of ultra-cold atoms. The optical speckle is produced by passing a laser beam through a diffusive piece of glass. We propose a theoretical model to understand the hydrodynamic transport of a Bose-Einstein condensate through an optical-speckle potential. Analytic expressions are derived to describe dissipation mechanisms in the limit of weak disorder, such that the depletion of the condensate induced by the speckle potential may be neglected. Comparison of our predictions with the experimental data for large-amplitude dipole oscillations of the condensate shows a striking agreement. Thus, the adequacy of the model in correctly capturing the essential aspects of dissipation in such transport experiments is demonstrated.

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