DAMOP12-2012-000108

Abstract for an Invited Paper
for the DAMOP12 Meeting of
the American Physical Society

Glassy Behavior in a Binary Atomic Mixture

DOMINIK SCHNEBLE, Department of Physics and Astronomy, Stony Brook University, Stony Brook, NY 11794-3800

Atomic mixtures in component-specific optical lattices allow for the study of a broad range of interaction-induced phenomena. In a recent experiment [1], we have studied the effects of randomly localized impurity atoms on transport behavior of lattice-modulated 1D Bose gases, and compared them to quasidisorder from an incommensurate lattice. Whereas deeply in the strongly interacting regime the two realizations of disorder have comparable effects, both producing signatures of Bose-glass formation, we found dramatic difference near the superfluid-to-insulator transition. In this transition region, the random, uncorrelated disorder of the impurities leads to a shift of the critical lattice depth for the breakdown of transport in the 1D Bose gas, while no such shift is seen for the correlated quasidisorder of the incommensurate optical lattice. Our findings, which are consistent with recent predictions for interacting bosons in one dimension, illustrate the important role of correlations in disordered atomic systems.

[1] B. Gadway et al, PRL **107**, 145306 (2011)