Abstract Submitted
for the DAMOP11 Meeting of
The American Physical Society

Adiabaticty timescales in Optical Lattices STEFAN NATU, ERICH MUELLER, Cornell University, KADEN HAZZARD, JILA, NIST and University of Colorado, Boulder and — We study the timescales for adiabaticity of trapped cold bosons subject to a time-varying lattice potential using a dynamic Gutzwiller mean-field theory. We explain apparently contradictory experimental observations by demonstrating a clear separation of timescales for local dynamics ($\sim$ ms) and global mass redistribution ($\sim$ 1s). We provide a simple explanation for the short and fast timescales, finding that while density/energy transport is dominated by low energy phonons, particle-hole excitations dominate the physics for fast ramps. This is particularly relevant to experiments using bandmapping to probe local observables. Furthermore, we show how mass transport shuts off within Mott domains, causing to a chemical potential gradient within the sample that fails to equilibrate on experimental timescales.

Stefan Natu
Cornell University

Date submitted: 31 Jan 2011 Electronic form version 1.4