

Abstract Submitted
for the DAMOP14 Meeting of
The American Physical Society

On the stability of a Floquet Bose-Einstein condensate in a one-dimensional optical lattice¹ SAYAN CHOUDHURY, ERICH MUELLER, Cornell Univ — Motivated by recent experimental observations (C.V. Parker *et al.*, Nature Physics, **9**, 769 (2013)), we analyze the stability of a Bose-Einstein condensate (BEC) in an one-dimensional lattice subjected to periodic shaking. In such a system there is no thermodynamic ground state, but there may be a long-lived steady-state, described as an eigenstate of a “Floquet Hamiltonian.” We calculate how scattering processes lead to a decay of the Floquet state. We map out the phase diagram of the system and find regions where the BEC is stable and regions where the BEC is unstable. We show that Parker et al. perform their experiment in the stable region, which accounts for the long life-time of the condensate (~ 1 second). We also estimate the scattering rate of the bosons in the region where the BEC is unstable.

¹Grant Support: NSF PHY-1068165

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Date submitted: 30 Jan 2014

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