Abstract Submitted
for the DAMOP15 Meeting of
The American Physical Society

Ground State Properties of the 1/2 Flux Harper Hamiltonian[1]
COLIN KENNEDY, WILLIAM CODY BURTON, WOO CHANG CHUNG, WOLFGANG KETTERLE, Massachusetts Inst of Tech-MIT — The Harper Hamiltonian describes the motion of charged particles in an applied magnetic field - the spectrum of which exhibits the famed Hofstadter's butterfly. Recent advances in driven optical lattices have made great strides in simulating nontrivial Hamiltonians, such as the Harper model, in the time-averaged sense. We report on the realization of the ground state of bosons in the Harper Hamiltonian for 1/2 flux per plaquette utilizing a tilted two-dimensional lattice with laser assisted tunneling. We detail progress in studying various ground state properties of the 1/2 flux Harper Hamiltonian including ground state degeneracies, gauge-dependent observables, effects of micromotion, adiabatic loading schemes, and emergence and decay of coherence. Additionally, we describe prospects for flux rectification using a period-tripled superlattice and generalizations to three dimensions.

[1]MIT-Harvard Center for Ultracold Atoms, Research Laboratory of Electronics, Department of Physics, Massachusetts Institute of Technology

Colin Kennedy
Massachusetts Inst of Tech-MIT

Date submitted: 30 Jan 2015 Electronic form version 1.4