Abstract Submitted
for the DAMOP18 Meeting of
The American Physical Society

Microscopy of the interacting Harper-Hofstadter model on a real-space ladder ROBERT SCHITTKO, ERIC TAI, ALEXANDER LUKIN, MATTHEW RISPOLI, TIM MENKE, DAN BORGNIA, Harvard University, PHILIPP PREISS, Heidelberg University, FABIAN GRUSDT, Harvard University, ADAM KAUFMAN, University of Colorado Boulder, MARKUS GREINER, Harvard University — While artificial gauge fields in optical lattices have become an increasingly prominent topic in quantum gas research, the corresponding experiments have mostly been restricted to the regime of weak interactions. Here, using microscopic atomic control and detection, we investigate a strongly-interacting two-body system which is described by the interacting Harper-Hofstadter model. Specifically, we create a ladder-like real-space lattice and deterministically populate it with two atoms in a chosen quantum state. We subsequently observe chiral dynamics in the two-particle evolution, which are shown to depend on the freely-tunable flux of the artificial gauge field. Our experimental platform combines all of the necessary components for investigations of highly-entangled topological states, and our observations lay the groundwork for future experiments in the fractional quantum Hall regime.

Robert Schittko
Harvard University

Date submitted: 26 Jan 2018 Electronic form version 1.4