

Abstract Submitted
for the DAMOP13 Meeting of
The American Physical Society

How can we probe the atom mass currents induced by synthetic gauge fields?¹ ARUN PARAMEKANTI, MATTHEW KILLI, STEFAN TROTZKY, University of Toronto — Ultracold atomic fermions and bosons in an optical lattice can have quantum ground states which support equilibrium currents in the presence of synthetic magnetic fields or spin orbit coupling. As a tool to uncover these mass currents, we propose using an anisotropic quantum quench of the optical lattice which dynamically converts the current patterns into measurable density patterns. Using analytical calculations and numerical simulations, we show that this scheme can probe diverse equilibrium bulk current patterns in Bose superfluids and Fermi fluids induced by synthetic magnetic fields, as well as detect the chiral edge currents in topological states of atomic matter such as quantum Hall and quantum spin Hall insulators.

¹This work is supported by NSERC of Canada and the Canadian Institute for Advanced Research.

Arun Paramekanti
University of Toronto

Date submitted: 03 Jan 2013

Electronic form version 1.4