

Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Magnetically generated spin-orbit coupling for ultracold atoms¹

BRANDON ANDERSON, IAN SPIELMAN, Joint Quantum Institute, GEDIMINAS JUZELIŪNAS, Vilnius University — We present a new technique for producing two and three dimensional Rashba-type spin-orbit coupling for ultra cold atoms without involving light. The method relies on a sequence of pulsed inhomogeneous magnetic fields imprinting suitable phase gradients on the atoms. For sufficiently short pulse durations, the time-averaged Hamiltonian well approximates the Rashba Hamiltonian. Higher order corrections to the energy spectrum are calculated exactly for spin-1/2 and perturbatively for higher spins. The pulse sequence does not modify the form of rotationally symmetric atom atom interactions. Finally, we present a straightforward implementation of this pulse sequence on an atom-chip.

¹NSF Physics Frontiers Center, ARO Atomtronics MURI, and Lithuanian Research Council Project No. MIP-082/2012

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Date submitted: 15 Nov 2013

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