

Abstract Submitted
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Magnetically Generated Spin-Orbit Coupling for Ultracold Atoms¹ BRANDON ANDERSON, IAN SPIELMAN, Joint Quantum Institute, GEDIMINAS JUZELIUNAS, Vilnius University — We present a new technique for producing two- and three-dimensional Rashba-type spin-orbit couplings for ultracold 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.

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