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Topology of a two-dimensional spin-orbit coupled Bose gas ANA VALDES-CURIEL, University of Maryland, College Park, DIMITRIS TRYPOGEORGOS, INO-CNR BEC Center and Dipartimento di Fisica, Universit di Trento, QIYU LIANG, University of Maryland, College Park, RUSSELL ANDERSON, School of Physics and Astronomy, Monash University, IAN SPIELMAN, National Institute of Standards and Technology and the University of Maryland — Spin-orbit coupling is a necessary ingredient in phenomena such as the quantum spin-Hall effect and topological insulators. We explore a new cold atom realization of two-dimensional spin- orbit coupling using far-detuned Raman transitions and a strong radio-frequency magnetic field, all within the ground state hyperfine manifold. We characterize the spin and momentum resolved dispersion relation using Fourier transform spectroscopy and observe a robust Dirac point that can be moved by changing the Raman power balance or detuning. Furthermore, using three arm Ramsey interferometer we detect a momentum dependent phase winding around the Dirac point and use it to calculate topological invariants.

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