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Large Artificial Magnetic Fields Realized in a Synthetic Two-Dimensional Lattice LAUREN AYCOCK, Joint Quantum Institute/ Cornell University/ National Institute of Standards and Technology/ University of Maryland, BEN STUHL, HSIN-I LU, DINA GENKINA, JQI/NIST/UMD, MARCELL GALL, JQI/NIST/UMD/Universitat Heidelberg, IAN SPIELMAN, JQI/NIST/UMD —
We experimentally realize a large artificial magnetic field for a ^{87}Rb Bose-Einstein condensate in a synthetic two-dimensional lattice [1]. This lattice combines a 1064nm 1D optical lattice along 'x' in real space while the 3 internal states of the manifold F=1 define a 3-site wide lattice in a second, synthetic dimension. These internal states are either Rf- or Raman-coupled with a bichromatic light field allowing for tunneling in this synthetic dimension. The finite number of sites in this dimension naturally creates a hard walled potential ideal for studying edge states. The wavelength ratio between the optical lattice potential and the Raman coupling fields imprints a phase around each plaquette, creating a large, artificial magnetic field. We observe cyclotron orbits of the atoms and measure the edge state currents for opposite flux and varying group velocities. [1] A. Celi, P. Massignan, J. Ruseckas, N. Goldman, I. B. Spielman, G. Juzeliunas, and M. Lewenstein,Phys. Rev. Lett. 112, 043001 (2014)

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