

Abstract Submitted
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Observation of chiral edge states in a rotating BEC RICHARD FLETCHER, VALENTIN CREPEL, AIRLIA SHAFFER, CEDRIC WILSON, PARTH PATEL, ZHENJIE YAN, BOLA MALEK, BISWAROOP MUKHERJEE, MARTIN ZWIERLEIN, Massachusetts Institute of Technology MIT — Charged particles in a magnetic field exhibit modes which propagate along the system boundary, and possess a chirality arising from the broken time-reversal symmetry. These modes are protected, showing an immunity to backscattering which would involve tunneling of particles across the sample, and play a crucial role in the quantised transverse resistivity in quantum Hall systems. Here, we engineer chiral edge states in a rotating Bose-Einstein condensate, by projecting a sharp optical boundary wall. Using high resolution in situ imaging we resolve their spatial width set by the zero-point cyclotron motion. By adding controllable optical disorder we demonstrate robustness of the edge states to boundary imperfections, and observe the crucial role of the underlying phase-space structure on their evolution and stability.

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