
Observation of edge states in topological Floquet systems

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Abstract

Floquet engineering, i.e., periodic modulation of a system’s parameters, has proven as a powerful experimental tool for the realization of quantum systems with exotic properties that have no static analog. In particular, the so-called anomalous Floquet phase displays topological properties even if the Chern number of the bulk band vanishes. (1) I will present an experimental system consists of bosonic atoms in a periodically driven honeycomb lattice. Depending on the driving parameters several out-of-equilibrium topological phases can be realized, including an anomalous phase (2). A programmable optical potentials enables the study of edge dynamics in such topological systems. I will report on the investigation of the real-space evolution of an initially localized wavepacket close to the edge after releasing it from a tightly-focused optical tweezer. The chiral nature of the edge state is observed, even in the anomalous Floquet phase, thereby directly revealing the topological nature of this phase. (3)

(1) Rudner, et al. Anomalous edge states and the bulk-edge correspondence for periodically-driven two dimensional systems, *Phys. Rev. X* 3, 031005 (2013)

(2) Wintersperger, et al. Realization of an anomalous Floquet topological system with ultracold atoms. *Nat. Phys.* 16, 1058–1063 (2020)

(3) Braun et al, *Nat. Phys* 20, 1306-1312 (2024)

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