Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Quantized magnetization density in periodically driven systems FREDERIK NATHAN, MARK RUDNER, Copenhagen University, NETANEL LINDNER, Technion Israel Institute of Technology, EREZ BERG, Weizmann Institute of Science and University of Chicago, GIL REFAEL, Caltech — We identify a new bulk quantized observable the magnetization density – that serves as a topological order parameter for periodically driven systems in which all bulk Floquet eigenstates are localized by disorder. While all Floquet states are localized when considered stroboscopically over a full period, the micromotion within the driving period may carry a nontrivial orbital magnetization. We find that the time-averaged magnetization density when the system is filled with fermions is quantized in units of the inverse driving period. We furthermore show that a quantized current flows around the boundary of any filled region of finite extent. The quantization has a topological origin: we relate the time-averaged magnetization density to the winding number characterizing the new phase identified in Phys. Rev. X 6, 021013 (2016). We thus establish that the winding number invariant can be accessed directly in bulk measurements, and propose an experimental protocol to do so using interferometry in a system of cold atoms in an optical lattice.

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Date submitted: 11 Nov 2016 Electronic form version 1.4