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Current-carrying quasi-steady states in a periodically driven many-body system MARK RUDNER, Niels Bohr Institute, Copenhagen University, NETANEL LINDNER, Technion, EREZ BERG, Weizmann Institute — We investigate many-body dynamics in a one-dimensional interacting periodically driven system, based on a partially-filled version of Thoulesss topologically quantized adiabatic pump. The corresponding single particle Floquet bands are chiral, with the Floquet spectrum realizing nontrivial cycles around the quasienergy Brillouin zone. For non-integer filling the system is gapless; here the driving cannot be adiabatic and the system is expected to rapidly absorb energy from the driving field. We identify parameter regimes where scattering between Floquet bands of opposite chirality is exponentially suppressed, opening a long time window where the many-body evolution separately conserves the occupations of the two chiral bands. Within this intermediate time regime we predict that the system reaches a quasi-steady state with uniform crystal momentum occupation within each Floquet band. This state furthermore carries a non-vanishing current given directly by the difference of densities in the right and left moving chiral bands. This remarkable behavior, which holds for both bosons and fermions, may be readily studied experimentally in recently developed cold atom systems.

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