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Persistent Hall response after a quantum quench in Dirac systems JUSTIN WILSON, JUSTIN SONG, GIL REFAEL, Caltech — The geometry and topology of quantum states play a central role in producing novel types of responses, such as the quantum anomalous Hall effect. These have featured prominently in topological materials in equilibrium as well as driven systems in the steady state. Here we unveil how quantum geometry yields radically new types of responses in systems far from equilibrium such as that realized in a quantum quench. To illustrate this, we consider quenches of two-band systems with spin-orbit coupling (e.g. Dirac systems). We find that quenching a time-reversal broken gap gives a Hall-type response that persists even at long times. Intimately tied to the quantum geometry of the underlying Hilbert space, the unconventional persistent Hall response yield clear signatures in quench protocols that can be implemented in cold atoms set-ups.

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