

Abstract Submitted
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Population dynamics of Floquet-Bloch states on the surface of a topological insulator FAHAD MAHMOOD, DILLON GARDNER, Massachusetts Inst of Tech-MIT, YEW SAN HOR, Missouri University of Science and Technology, YOUNG LEE, NUH GEDIK, Massachusetts Inst of Tech-MIT — Floquet-Bloch bands emerge in solid-state systems due to a coherent interaction between light and matter. Using time and angle resolved photoemission spectroscopy; we demonstrate that intense ultrashort midinfrared pulses hybridize with the surface Dirac fermions of a topological insulator to form states periodic in both momentum and energy. These states exhibit band gaps at avoided crossings which are dependent on the incident light polarization and the electron momentum. Circularly polarized light induces an additional gap at the Dirac point by naturally breaking time reversal symmetry. We further characterize these bands as a function of the incident light intensity and pump-probe delay time to understand the excitation and decay mechanisms of electrons in the Floquet-Bloch states.

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