

Abstract Submitted
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**Probing the electronic state in the strong topological metals
 $\text{Zr}_2\text{Te}_2\text{P}$, $\text{Hf}_2\text{Te}_2\text{P}$, and $\text{Zr}_2\text{Te}_2\text{As}$ and their structural analogue $\text{Ti}_2\text{Te}_2\text{P}$ ¹**

K.-W CHEN, N. ARYAL, NHMFL, S. DAS, D. GRAF, S. MEMARAN, National High Magnetic Field Laboratory, Florida State University, S. ZHANG, NHMFL, J. DAI, E. FRANTZESKAKIS, F. FORTUNA, A. SANTANDER-SYRO, CSNSM, L. BALICAS, E. MANOUSAKIS, R. BAUMBACH, NHMFL — Recent work shows that $\text{Zr}_2\text{Te}_2\text{P}$ is a strong topological metal with time reversal symmetry protected surface Dirac cones at the Γ and K points (in the hexagonal basis), bulk bands with a possible Dirac-like character at the Γ point, and conventional (quadratically dispersing) bulk electronic bands centered around the K point. We report results for the broader family of materials $X_2\text{Te}_2M$ ($X = \text{Ti}, \text{Zr}, \text{Hf}$, and $M = \text{P}, \text{As}$), where we find remarkable agreement between the calculated electronic states and those measured through quantum oscillations in the magnetic torque. Analysis of the quantum oscillations additionally reveals small ($m^* < 0.1 m_e$) charge carrier masses and non-trivial Berry phases for the Fermi surfaces at the Γ point, and more conventional behavior for the bands that are centered around the K point. These results will be discussed with attention to the relationship between topologically protected surface states and bulk metallic conduction. We also discuss prospects for designing new materials in this structure.

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