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Quasiparticle Interference of Surface States in Type-II Weyl Semimetal WTe_2 WENHAN ZHANG, Rutgers University, QUANSHENG WU, ETH Zurich, LUNYONG ZHANG, Max Planck POSTECH/Korea Research Initiative, SANG-WOOK CHEONG, Rutgers University, ALEXEY SOLUYANOV, ETH Zurich, WEIDA WU, Rutgers University, WEIDA WU TEAM, ALEXEY A. SOLUYANOV TEAM, SANG-WOOK CHEONG TEAM — Topological Weyl semimetal (TWS) is a metal, where low energy excitations behave like Weyl fermions of high-energy physics. It was recently shown that due to the lower symmetry of condensed matter systems, they can realize two distinct types of Weyl fermions. The type-I Weyl fermion in a metal is formed by a linear crossing of two bands at a point in the crystalline momentum space - Brillouin zone (BZ). The second type TWSs host type-II Weyl points appearing at the touching points of electron and hole pockets, which is a result of tilted linear dispersion. The type-II TWS was predicted to exist in several compounds, including WTe_2. Several ARPES studies of WTe_2 were reported so far, having contradictory conclusions on the topological nature of observed Fermi arcs. In this work, we report the results of spectroscopic imaging with a scanning tunneling microscope and first principle calculations, establishing clear quasiparticle interference features of the surface states of WTe_2. Our work provides a strong evidence for surface state scattering. Although the surface Fermi arcs are clearly observed, it is still difficult to prove the existence of predicted Type-II Weyl points in the bulk.

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