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Temperature-Induced Lifshitz Transition in WTe_2[1] NA HYUN JO, YUN WU, Ames Laboratory/ISU, MASAYUKI OCHI, RIKEN, LUNAN HUANG, DAIXIANG MOU, SERGEY L. BUD'KO, P.C. CANFIELD, Ames Laboratory/ISU, NANDINI TRIVEDI, Ohio State University, RYOTARO ARITA, RIKEN/Tohoku University, ADAM KAMINSKI, Ames Laboratory/ISU — We use thermoeletric power (TEP), temperature- and field-dependent resistivity, and ultrahigh resolution, tunable, vacuum ultraviolet laser-based, angle-resolved photoemission spectroscopy (ARPES) measurements to study the electronic properties of WTe_2, a compound that manifests exceptionally large, temperature-dependent magnetoresistance. The Fermi surface consists of two pairs of electron and two pairs of hole pockets along the $X - \Gamma - X$ direction. We find a rare example of a temperature-induced Lifshitz transition at $T \approx 160$ K. Temperature dependent TEP shows a change of slope at $T \approx 175$ K and Kohler's rule was breakdown in the 70-140 K range. ARPES temperature scans confirm that the hole pockets completely disappear around 160 K. Our electronic structure calculations show a clear and substantial shift of the chemical potential $\mu(T)$ due to the semimetal nature of this material driven by modest changes in temperature. [PRL 115, 166602 (2015)]

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