Abstract Submitted
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Role of spin-orbit coupling and evolution of the electronic structure of WTe_2 under an external magnetic field[1] DANIEL RHODES, SUVADIP DAS, QIU RUN ZHANG, NHMFL, FSU, BIN ZENG, NIHAR PRADHAN, NHMFL, NAOKI KIKUGAWA, NHMFL, NIMS, EFSTRATIOS MANOUSAKIS, NHMFL, FSU, LUIS BALICAS, NHMFL — Here, we present a study on the temperature and angular dependence of the Shubnikov–de Haas (SdH) effect in the semimetal WTe_2. This compound has been shown to display a large, nonsaturating magnetoresistance which was attributed to nearly perfectly compensated densities of electrons and holes. We observe four fundamental SdH frequencies and attribute them to spin-orbit split, electron-like, and hole-like Fermi-surface (FS) cross-sectional areas. Their angular dependence is consistent with ellipsoidal FSs that suggest a modest excess in the density of electrons with respect to that of the holes. We show that DFT calculations fail to correctly describe the FSs of WTe_2 and find evidence for field-dependent FS cross-sectional areas. We also observe a pronounced field-induced renormalization of the effective masses. Our observations suggest that the electronic structure of WTe_2 evolves with the magnetic field due to the Zeeman splitting. This evolution is likely to contribute to its pronounced magnetoresistivity.

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