Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Semimetal-Metal Transition and Quantum Electronic Transport in Ultrathin WTe_2 VALLA FATEMI, SANFENG WU, Massachusetts Inst of Tech-MIT, QUINN D. GIBSON, Princeton University, KENJI WATANABE, TAKASHI TANIGUCHI, Advanced Materials Laboratory, National Institute for Materials Science, Tsukuba, Japan, ROBERT J. CAVA, Princeton University, PABLO JARILLO-HERRERO, Massachusetts Inst of Tech-MIT — We report low-temperature electronic transport measurements of ultrathin WTe_2. By encapsulating samples inside a glove-box, we can approach the intrinsic electronic transport physics of the system. We find that tri-layer samples remain semimetallic, similar to bulk crystals. We tune the system from an intrinsic semimetallic state into a simple metallic state by doping via an electrostatic gate, which results in total suppression of magnetoresistance and disappearance of the hole pocket in Shubnikov-de Haas oscillations. However, the magnetoresistance of semimetallic 2D WTe_2 follows a distinctly sub-quadratic power law, in contrast to bulk crystals which show nearly quadratic behavior, suggesting new physics in the 2D limit. Finally, we report on our progress towards electronic transport in the monolayer limit.

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Date submitted: 14 Nov 2016 Electronic form version 1.4