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Transport properties of the bulk state in bilayer WTe_2 WENJIN ZHAO, ZAIYAO FEI, TAUNO PALOMAKI, QIDI SHAO, XIAODONG XU, DAVID COBDEN, University of Washington — Three-dimensional WTe_2 was recently reported to have a large, non-saturating magnetoresistance. Monolayer WTe_2, on the other hand, was recently predicted to be a topologically nontrivial semimetal. However, we find that monolayer WTe_2 encapsulated in h-boron nitride becomes insulating in the 2D bulk at temperatures below about 100 K, while the edge remains conducting, as in a topological insulator. In bilayer WTe_2, we find that the 2D bulk behaves similarly to that in monolayer WTe_2 but at lower temperatures (insulating below ˜20 K). The edge conduction, however, is absent in the bilayer, providing the opportunity to study the bulk state without complications from the edge. By fabricating a Hall bar device in a bilayer, we can therefore determine the magnetoresistance and the Hall effect and their dependence on temperature and gate voltage.

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