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Transport and magneto-transport study of ultrathin WSe_2 ZHENXI YIN, JING LI, JUNJIE WANG, JUN ZHU, Pennsylvania State Univ — Atomically thin transition metal dichalcogenides is a promising materials platform for a new generation of electronic and spintronic applications. We fabricate monolayer and bilayer hBN/graphene/WSe_2 four-terminal devices using a dry van der Waals transfer technique, where few-layer graphene serves as the electrical contact to WSe_2. We discuss the importance of temperature control at each step of the transfer process. A High κ HfO_2 back gate enables the devices to reach high carrier densities of a few $\times 10^{13}/\mathrm{cm}^2$. The graphene contacts are ambipolar, ohmic and enable four-terminal measurements at low temperatures. We measure the magnetic field dependence of ρ_{xx} for both electrons and holes in the same device. As the Fermi level is continuously tuned from the valence band to the conduction band, the magneto-resistance exhibits a variety of behavior including weak localization, weak anti-localization and more complex non-monotonic field dependences. We compare our data with theoretical models.

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