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Conduction and Valence Band Offsets in WSe2-Graphene Heterostructures[1] KYOUNGHWAN KIM, STEFANO LARENTIS, BABAK FALLAHAZAD, KAYOUNG LEE, JIAMIN XUE, DAVID DILLEN, CHRIS CORBET, EMANUEL TUTUC, Univ of Texas, Austin — We investigate the electron transport in graphene-WSe_2 heterostructures realized using a layer-by-layer transfer. Lateral electron transport shows ambipolar behavior characteristic of graphene, with a marked saturation at high positive (negative) gate bias, associated with the population of the conduction (valence) band in WSe_2. The graphene carrier density dependence on gate bias was extracted from magneto-transport measurements. Using WSe_2 as a top dielectric in dual-gate graphene field-effect transistors, we determine the WSe_2 dielectric constant along the c-axis. By combining the graphene density dependence on gate bias in back-gated graphene-WSe_2 heterostructures with the WSe_2 dielectric constant, we determine the offset between the graphene charge neutrality point and the WSe_2 conduction and valence bands.

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