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**Dimensionality effects on electronic properties of lateral two-dimensional junctions** HENRY YU, ALEX KUTANA, BORIS I. YAKOBSON, Materials Science and NanoEngineering, Rice University — We study lateral junctions of two-dimensional materials, including graphene, 2D BN, and transition metal dichalcogenides. A common feature of low-dimensional contacts is that unlike bulk devices, local charge transfer near the contact cannot equilibrate Fermi levels throughout the material, necessitating nonlocal charge redistribution. These nonlocal charges will affect the physical properties of the junction. We obtain the solution for carrier and potential distributions in symmetric and asymmetric 2D junctions with different densities of states and doping levels, using a macroscopic model and DFT calculations. The scaling of the depletion length with doping level and built-in voltage is determined by the dimensionality of the junction. The implications for operation of low-dimensional devices are discussed.

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