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**Controlling the electrostatic accumulation at the graphene edge, and effects on carrier transport** MENYOUNG LEE, PATRICK GALLAGHER, Stanford University, GRACE PAN, Yale University, KENJI WATANABE, TAKASHI TANIGUCHI, National Institute for Materials Science, Japan, DAVID GOLDHABER-GORDON, Stanford University — In graphene without doping, the local carrier density at any point is directly proportional to the net charge density induced by the electric field effect. For any finite sized sample, this induced charge distribution is inhomogeneous over macroscopic length scales and of a form determined by the actual geometry of the device. In contrast to gate-confined 2DEGs in modulation-doped semiconductor heterostructures, the carrier density accumulated at the boundary is greater than in the 2D bulk [1], and many experiments and potential applications need to take this effect into account. We will discuss experiments on boron nitride-encapsulated graphene devices (with low disorder and high mobility) that are designed to explicitly tune the electrostatic accumulation at the boundary, from over-accumulation (the situation in typical experiments) to a nearly flat band condition, and further into a regime where the 2D bulk and the edge have opposite charge. In clean devices where the mean free path exceeds the sample width and boundary scattering dominates, the effect of the electrostatic accumulation on carrier transport is pronounced.

[1] P. G. Silvestrov and K. B. Efetov, PRB 77 155436 (2008)

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