Abstract Submitted
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Imaging nonlocal transport in graphene using scanning gate microscopy[1] MALCOLM CONNOLLY, ZIWEI DOU, University of Cambridge, SEI MORIKAWA, Institute of Industrial Science, University of Tokyo, SHU-WEI WANG, CHARLES SMITH, University of Cambridge, KENJI WATANABE, TAKASHI TANIGUCHI, National Institute for Materials Science, SATORU MASUBUCHI, TOMOKI MACHIDA, Institute of Industrial Science, University of Tokyo — Nonlocal transport measurements are designed to detect when charge injected by a current probe induces voltages far from the classical current path. While a range of exotic forces can induce nonlocal transport of Dirac fermions in graphene such as bandstructure topology [1], Zeeman spin Hall [2], and many-body interactions [3], it is important to understand the role of density fluctuations around the Dirac point where nonlocality can be most pronounced. We use scanning gate microscopy to image current flow and nonlocal signals directly in high-mobility graphene encapsulated by hexagonal boron nitride. Despite being located several mean-free paths from the current injector, Hall voltage probes parallel with current path display an order of magnitude larger nonlocal signal than expected around the Dirac point. SGM images captured at different carrier density are consistent with current spreading due to percolation. Such long range charge transport should be considered when designing devices and calculating the relaxation length of nonlocal currents. [1] R. V. Gorbachev, *et al.*, Science, 346, 6208, 448-451 (2014) [2] D. A. Abanin, *et al.*, Science, 332, 6027, 328-330 (2011) [3] D. A. Bandurin, arXiv:1509.04165 (2015)

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