Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Sorting Category: 12.8 (T)

Universal conductance fluctuations in Dirac materials in the presence of long-range disorder[1] E. ROSSI, Department of Physics, College of William and Mary, Williamsburg, VA 23187, USA, J.H. BARDARSON, Department of Physics, University of California, Berkeley, CA 94720, USA; Materials Sciences Division, LBNL, Berkeley, M.S. FUHRER, CNAM, Department of Physics, University of Maryland, College Park, MD 20742-4111, USA, S. DAS SARMA, CMTC, Department of Physics, University of Maryland, College Park, MD 20742-4111, USA — We study quantum transport in Dirac materials with a single fermionic Dirac cone (strong topological insulators and graphene in the absence of intervalley coupling) in the presence of long-range disorder [1]. We show, by calculating the conductance fluctuations, that in the limit of very large system size and disorder strength, quantum transport becomes universal. However, a systematic deviation away from universality is obtained for realistic system parameters. By comparing our results to existing experimental data on $1/f$ noise, we suggest that many of the graphene samples studied to date are in a non-universal crossover regime of conductance fluctuations, and provide an explanation for the origin of the 1/f noise in Dirac materials and in graphene in particular.

[1] E. Rossi, J. H. Bardarson, M. S. Fuhrer, S. Das Sarma, *Universal conductance fluctuations in Dirac materials in the presence of long-range disorder.* arXiv:1110.5652v1 (2011)

[1]Work supported by the Jeffress Memorial Trust, Grant No. J-1033 (ER), DOE DE-AC02-05CH11231 (JHB), ONR-MURI (SDS, MSF), and NRI-SWAN (SDS).

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[X] Prefer Oral Session
[ ] Prefer Poster Session

Date submitted: 12 Dec 2011 Electronic form version 1.4