Abstract Submitted
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Critical Delocalization of Chiral Zero Energy Modes in Graphene[1] AIRES FERREIRA, Department of Physics, University of York, York YO10 5DD, United Kingdom, EDUARDO MUCCIOLO, Department of Physics, University of Central Florida, Orlando, Florida 32816, USA — Graphene subjected to chiral-symmetric disorder is believed to host zero energy modes (ZEMs) resilient to localization, as suggested by the renormalization group analysis of the underlying nonlinear sigma model. We report accurate quantum transport calculations in honeycomb lattices with in excess of 10^9sites and fine meV resolutions. The Kubo dc conductivity of ZEMs induced by vacancy defects (chiral BDI class) is found to match $4e^2/(\pi h)$ within 1% accuracy, over a parametrically wide window of energy level broadenings and vacancy concentrations. Our results disclose an unprecedentedly robust metallic regime in graphene, providing strong evidence that the early field-theoretical picture for the BDI class is valid well beyond its controlled weak-coupling regime.

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