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Limits to universal conductance fluctuations of massless Dirac fermions[1] MARIO BORUNDA, Harvard University, JESSE BEREZOVSKY, Case Western Reserve University and Harvard University, ROBERT WESTERVELT, ERIC HELLER, Harvard University — We study conductance fluctuations (CFs) and the sensitivity of the conductance to the motion of a single scatterer in two-dimensional massless Dirac systems. Our extensive numerical study finds limits to the predicted universal value of CFs. We find that CFs are suppressed for ballistic systems near the Dirac point and approach the universal value at sufficiently strong disorder. The conductance of massless Dirac fermions is sensitive to the motion of a single scatterer. CFs of order e^2/h result from the motion of a single impurity by a distance comparable to the Fermi wavelength. This result applies to graphene systems with a broad range of impurity strength and concentration while the dependence on the Fermi wavelength can be explored via gate voltages. Our prediction can be tested by comparing graphene samples with varying amounts of disorder and can be used to understand interference effects in graphene mesoscopic devices.

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