

Abstract Submitted
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Drude weight and optical conductivity in doped graphene: effects of electron-electron interaction¹ SAEED H. ABEDINPOUR, Department of Physics and Astronomy, University of Missouri, Columbia, Missouri 65211, USA, MARCO POLINI, NEST-CNR-INFM and Scuola Normale Superiore, I-56126 Pisa, Italy, ALLAN H. MACDONALD, Department of Physics, The University of Texas at Austin, Austin, Texas 78712, USA, GIOVANNI VIGNALE, Department of Physics and Astronomy, University of Missouri, Columbia, Missouri 65211, USA — The long wavelength behavior of collective modes in ordinary electron liquids with parabolic dispersion is protected from many-body renormalizations by Galilean invariance. In this talk, we will show how the absence of Galilean invariance in the massless Dirac Hamiltonian for a single layer doped graphene implies strong renormalization of Drude weight, optical conductivity and collective modes, even in the long wavelength limit. The physical origin of these renormalizations lies in the coupling between orbital and pseudospin degrees of freedom. Our predictions can be tested by using inelastic light scattering and infrared spectroscopy.

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