Abstract Submitted
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Plasmon anomaly in the dynamical optical conductivity of graphene[1] KOSTYANTYN KECHEDZHI, Condensed Matter Theory Center and Joint Quantum Institute, Physics Department, University of Maryland — We theoretically consider the manifestation of plasmon collective modes in the frequency dependence of the optical conductivity of disordered graphene. We generalize the equation of motion formalism for Dirac electrons in graphene. We show that the presence of the plasmon pole in the dynamical dielectric function of graphene results in the screening effect of graphene electron gas failing at plasmon frequency. As a result of frequency dependent screening the effective strength of charged impurities varies with frequency. This results in the frequency dependent scattering rate. We predict a characteristic broad feature in the frequency dependence of the optical conductivity of graphene appearing at intermediate frequencies, i.e. larger than the disorder broadening of electron states but smaller than the Fermi energy. We predict that this feature could be observable in graphene on hBN/SiO_2/Si substrate with a relatively thick Boron nitride layer of order 10nm.

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