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Theory of interaction-induced renormalization of Drude weight and plasmon frequency in chiral multilayer graphene[1] WANG-KONG TSE, The University of Alabama, XIAO LI, University of Maryland — We develop a theory for the optical conductivity of doped multilayer graphene including the effects of electron-electron interactions. Applying the quantum kinetic formalism, we formulate a set of pseudospin Bloch equations that governs the dynamics of the nonequilibrium density matrix driven by an external *a.c.* electric field under the influence of Coulomb interactions. These equations reveal a dynamical mechanism that couples the Drude and interband responses arising from the chirality of pseudospin textures in multilayer graphene systems. We demonstrate that this results in an interaction-induced enhancement of the Drude weight and plasmon frequency strongly dependent on the pseudospin winding number. Using bilayer graphene as an example, we also study the influence of higher-energy bands and find that they contribute considerable renormalization effects not captured by a low-energy two-band description. We argue that this enhancement of Drude weight and plasmon frequency occurs generally in materials characterized by electronic chirality.

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Wang-Kong Tse
Univ of Alabama - Tuscaloosa

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