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Effect of Electron-electron Scattering on Linear Conductivity for Graphene-like Band Structure BEN YU-KUANG HU, Dept. of Physics, The University of Akron, Akron, OH 44325, FERESHTEH MEMARIAN, Department of Physics, University of California, Merced, CA 95343 — We study theoretically the effect of electron-electron scattering on the electrical conductivity of two-dimensional materials with linear bands such as graphene, both with and without a perpendicular magnetic field. The Boltzmann transport equation was utilized, where phonon and impurity scattering are modeled using the relaxation-time approximation. In graphene-like materials with linear bands, for a constant relaxation time, the conductivity decreases as the temperature increases from absolute zero. Furthermore, in linear band materials, the electron-electron scattering also decreases the conductivity. This is in contrast to parabolic band materials, where the conductivity for a constant relaxation time does not depend on temperature or the electron-electron scattering rate. We also investigate the magneto-conductance for linear band materials in the absence and presence of electron-electron scattering.

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