Contribution ID: **11** Type: **Poster**

Plasmarons and phonons in finite momentun optical conductivity of graphene

Monday, 23 July 2012 20:00 (2 hours)

J.P. Carbotte, McMaster University
J.P.F. LeBlanc, University of Guelph
E.J. Nicol, University of Guelph

Mid infrared nanoscopy has recently been successfully applied to graphene. In principle, this technique could be used to obtain some information on the finite momentum q optical conductivity sigma(q,omega) as a function of energy omega. Consequently, this novel experimental probe could allow one to examine regions of momentum space (k) of the Dirac fermions in graphene which were not previously accessible to q=0 optics. With this in mind, we calculate sigma(q,omega) for graphene in the presence of many-body renormalizations. We also demonstrate how sigma(q,omega) could be used to image parts of the renormalized charge carrier dispersion curves. In particular, we discuss how electron-electron interactions as well as electron-phonon interactions present themselves in sigma(q,omega). For instance, if the region near the Dirac point at k=0 is probed with a q of order the Fermi momentum kF, structure is revealed which is due to plasmarons. These are collective modes of an electron plus a plasmon which have recently been seen in ARPES experiments on graphene. Here, we calculate that plasmarons will provide a visible signature in sigma(q,omega) even for probing q < kF/2.

Primary author: CARBOTTE, Jules (McMaster University)

Presenter: CARBOTTE, Jules (McMaster University)

Session Classification: Poster Session 1

Track Classification: Graphene