

PSF12-2012-000026

Abstract for an Invited Paper
for the PSF12 Meeting of
the American Physical Society

Many-body effects in doped graphene sheets¹

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The peculiar band structure of graphene is responsible for a variety of unusual many-body effects, e.g. a logarithmic divergence of the group velocity of electron quasiparticles near the Dirac point. Interesting many-body effects have also been predicted for doped graphene sheets. Due to the lack of Galilean invariance in this system, both the plasmon frequency and the Drude weight in the optical conductivity are enhanced relative to the standard RPA values. The orbital magnetic susceptibility, which vanishes in the free-electron approximation, is found to be positive, i.e. paramagnetic, and its value is completely controlled by the electron-electron interaction. I review these theoretical predictions vis-a-vis the current state of the experiment.

¹Work supported by NSF Grant DMR-1104788.