Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Electron Self-Energy Corrections to Quasiparticle Excitations in Graphene and Large Diameter Single-Walled Carbon Nanotubes JACK DESLIPPE, DAVID PRENDERGAST, STEVEN LOUIE, University of California at Berkeley and Lawrence Berkeley National Lab — Recent experimental measurements of the band structure and band velocity at the Dirac point in graphene highlight many novel effects due to the existence of Dirac fermions in this system. The low energy electronic states are measured to have Fermi velocity of approximately 1.1×10^6 m/s, with energy dispersion obeying the 2D massless Dirac equation. Motivated by this work, we explore in detail the importance of an accurate description of the electron self-energy in determining the quasiparticle band structures of graphene, graphite, and armchair single-walled carbon nanotubes near the Fermi energy, using the GW approximation to the electron self energy.

This work was supported by National Science Foundation Grant No. DMR04-39768 and by the US DOE under Contract No. DE-AC02-05CH11231. Computational resources were provided by SDSC and NERSC. Jack Deslippe acknowledges funding from the DOE Computational Science Graduate Fellowship (CSGF).

Jack Deslippe
University of California at Berkeley and Lawrence Berkeley National Lab

Date submitted: 17 Nov 2006 Electronic form version 1.4