Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Long-range interactions and Pseudo-relativistic Phenomena in Disordered Graphene: The Zero-bias Anomaly WILLIAM SHIVELY, DMITRI KHVESHCHENKO, University of North Carolina at Chapel Hill — Two-dimensional graphene creates a window into new and unusual transport phenomena, which can be described in terms of the propagation of non-interacting Dirac quasi-particles (DQP). In such a system, Coulomb interactions also remain unscreened, and it is of interest how such long-ranged correlations might significantly affect DQP excitations. Using single-particle tunneling measurements, the DQP densities of states are computed analytically, in the presence of mild impurities and for energies ranging between the diffusive and the ballistic limits. Interesting interplay between the Coulomb interactions and the DQP is best revealed in the ballistic regime, whereas in the diffusive limit we recover what is essentially the conventional 2DEG. The evolution of the anomalous exponent characterizing the "zero-bias" anomaly in the ballistic regime is discussed.

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Date submitted: 05 Dec 2006 Electronic form version 1.4