Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

DC Transport in Pseudogapped Superconductors: The Role of the Fermi Arcs HAO GUO, BENJAMIN M. FREGOSO, DAN WULIN, James Franck Institute and Department of Physics, University of Chicago, CHIH-CHUN CHIEN, Los Alamos National Laboratory, KATHRYN LEVIN, James Franck Institute and Department of Physics, University of Chicago — We examine the dc conductivity σ in a d-wave pseudogapped high T_c superconductor for a range of different hole doping concentrations and temperatures T. Our approach is based on treating the cuprates as mid-way between BCS and Bose Einstein condensation and our correlation functions are demonstrably consistent with gauge invariance and the transverse f-sum rule. Studies of the $\omega \to 0$ dc conductivity below T_c lead to a peak structure (observed experimentally) while above T_c we show that pseudogap effects manifest themselves in the resistivity primarily through a depression in the effective carrier number with decreasing T. We discuss related implications for resistivity vs $T > T_c$ experiments and demonstrate that the trends with hole doping are compatible with the data, while the role of the Fermi arcs appears overall to be secondary.

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Date submitted: 30 Dec 2010 Electronic form version 1.4