

Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Infrared Magneto-Optical Probe of Landau Levels of Graphite in the Extreme Quantum Limit DIMITRI BASOV, ZHIQIANG LI, WILLIE PADILLA, UCSD, SASA DORDEVIC, University of Akron, KENNETH BURCH, UCSD, YONG-JIE WANG, National High Magnetic Field Laboratory, UCSD COLLABORATION, UNIVERSITY OF AKRON COLLABORATION, NATIONAL HIGH MAGNETIC FIELD LABORATORY COLLABORATION — We present a systematic investigation of the ab plane magneto-reflectance $R(\omega, H)$ of highly oriented pyrolytic graphite (HOPG) in magnetic fields up to 18T, with magnetic field parallel to the c axis of the sample. A linear magnetic field dependence of the Landau level energies is observed in contrast to the square root field dependence predicted by Dirac fermion description of the quasiparticles in HOPG. We show that the conventional graphite band model can quantitatively account for the totality of the magneto-optical data. We also find that the resonance linewidth of the lowest inter-Landau-level transition shows an unconventional linear field dependence. These results provide new insights into the magneto-transport of HOPG.

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Date submitted: 11 Jan 2006

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