Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Tunable magnetoresistance behavior in suspended graphitic multilayers through ion implantation CARLOS DIAZ-PINTO, XUEMEI WANG, SUNGBAE LEE, Department of Physics, Texas Center for Superconductivity, University of Houston, VIKTOR HADJIEV, Texas Center for Superconductivity, University of Houston, DEBTANU DE, WEI-KAN CHU, HAIBING PENG, Department of Physics, Texas Center for Superconductivity, University of Houston — A linear positive magnetoresistance (MR) is often observed in graphitic multilayers, yet its origin remains inconclusive. Recently, a non-Markovian transport theory predicts a strong positive MR in two dimensional systems under the influence of both short- and long-range disorders, while a negative MR is expected with only one type of disorder. Here, we address the role of disorders on the MR behavior of suspended graphitic multilayers through ion implantation. Boron implantation is found to drastically change the MR behavior: the linear positive MR transforms into a negative MR after the introduction of short-range disorders (boron), in consistence with the non-Markovian theory. This suggests that the origin of the unexplained linear positive MR in graphitic structures is the non-Markovian transport under the interplay between long-range disorders (charged surface adsorbents) and short-range disorders (defects inside the lattice). After ion implantation, short-range disorders dominate, leading to a distinct negative MR behavior.

Carlos Diaz-Pinto
Department of Physics, Texas Center for Superconductivity,
University of Houston

Date submitted: 21 Nov 2010 Electronic form version 1.4