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NEBRASKA CENTER FOR MATERIALS AND NANOSCIENCE
2011 SEMINAR SERIES PRESENTS

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Dr. Xia Hong

Department of Physics and Astronomy
University of Nebraska-Lincoln

Large Magnetoresistance and Anomalous Phase Breaking in Dilute Fluorinated Graphene

Graphene, a single atomic layer of carbon, exhibits Dirac-like dispersion, unconventional Quantum Hall effect, and supreme electronic properties. Pristine graphene does not have local magnetic moments; however, local moments can be introduced into graphene via atomic defects, such as vacancies or sp^3 bonded adatoms. In this talk, I will discuss our recent magnetotransport studies on dilute fluorinated graphene (DFG). Fluorine adatoms serve as atomically sharp defects and modify drastically the transport properties of pristine graphene. The temperature-dependent conductivity of the DFG sample follows weak localization at high carrier density and variable-range hopping at low carrier density. In the variable-range hopping regime, DFG samples exhibit very large, negative magnetoresistance, which shows unusual staircase-like field dependence at low temperature. In the weak localization regime, we observe anomalous phase breaking behavior, which can be attributed to spin-flip scattering. Our observations point to the presence of local magnetic moments in dilute fluorinated graphene. Functionalizing graphene with fluorine may offer a model system for studying two-dimensional magnetism and lead to electric field controllable spintronic devices.

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Wednesday, November 9, 2011
3:30 pm - Room 151, Jorgensen Hall
Refreshments served

Host:
Dr. David Sellmyer
Department of
Physics & Astronomy

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