MAR14-2013-020225

Abstract for an Invited Paper
for the MAR14 Meeting of
the American Physical Society

Defect Induced Magnetic Moments in Graphene

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We utilize non-local spin transport measurements to detect the presence of defect induced magnetic moments in graphene. As shown in this talk, point defects such as hydrogen adatoms and lattice vacancies generate magnetic moments in graphene that have substantial exchange coupling with the conduction electrons. Therefore, this exchange coupling produces spin relaxation in the conduction electrons. Specifically, a characteristic field dependence of the non-local spin transport signal identifies the presence of the magnetic moments. Furthermore, Hanle spin precession measurements indicate the presence of an exchange field generated by the magnetic moments. The entire experiment including spin transport is performed in an ultrahigh vacuum chamber, and the characteristic signatures of magnetic moment formation appear only after hydrogen adatoms or lattice vacancies are introduced.