

MAR10-2009-000157

Abstract for an Invited Paper
for the MAR10 Meeting of
the American Physical Society

Magnetism in Graphene¹

BRUNO UCHOA, University of Illinois at Urbana-Champaign

As a two-dimensional sheet of carbon atoms, graphene seems so far stable against all kinds of electronic instabilities. When adatoms are chemically adsorbed on top of graphene, on the other hand, there is a rich number of possibilities which so far remain little explored both theoretically and experimentally. One promising possibility is about formation, detection and manipulation of local magnetic moments and the subsequent emergence of controllable macroscopic magnetic states in graphene. In this talk I will focus in the problem of formation and detection of local magnetic moments by transport and STM probe measurements. In addition, I will also discuss recent Monte Carlo results for a disordered distribution of magnetic adatoms in graphene and explore the distinctive signatures of magnetism in the transport. Having in mind that the adsorption energy of the adatoms can change substantially according to the local curvature of the graphene sheet, the magnetic adatoms may not be randomly distributed, but might cluster around the top of the ripples. We propose that the interplay between the correlation induced by the ripples and by the RKKY interactions can generate a variety of magnetic states in graphene, with distinctive signatures in the magnetization and magnetoresistance curves.

¹This work was partially supported by Grant DE-FG02-91ER45439 at University of Illinois.