CU Physics Department Colloquium

Monday, March 19, 2007
4:10 PM - 428 Pupin Hall

Graphene – What's in There?

Presented By Prof. Amir Yacoby

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The electronic density of states of graphene is equivalent to that of relativistic electrons. In the absence of disorder or external doping the Fermi energy lies at the Dirac point where the density of states vanishes. Although transport measurements at high carrier densities indicate rather high mobilities, many questions pertaining to disorder remain unanswered. In particular, it has been argued theoretically, that when the average carrier density is zero, the inescapable presence of disorder will lead to electron and hole puddles with equal probability. In this talk, we shall present measurements of the microscopic properties of graphene. We use a scanning single electron transistor to image the carrier density landscape of graphene in the vicinity of the neutrality point. Our results clearly show the electron-hole puddles expected theoretically. In addition, our measurement technique enables us to determine locally the density of states in graphene. In contrast to previously studied massive two dimensional electron systems, we show that the kinetic contribution to the density of states accounts quantitatively for the measured signal. Our results suggests that exchange and correlations effects are either weak or have canceling contributions.

Hosted by: Prof. Boris Altshuler