

Magnetism and Resonant Impurity band in graphene

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In this talk, I will overview possible mechanisms that induce magnetism in graphene-based structures. In particular, we point out that due to direct couplings of electronic states, point defects on graphene are strongly correlated and can not be treated as independent scatters. For large on-site defect potential and finite quasi-particle lifetime, we show that defects induce an impurity band with density of state characterized by the Wigner semi-circle law. By including long-range Coulomb interaction, we show that depending on, quasi-particle lifetime and defect density, the impurity band may support ferromagnetism. Furthermore, the impurity band can enhance the conductivity of graphene to the order of $4 e^2/h$, in consistent with experimental observations.