TRANSPORT IN GRAPHENE WITH SUPERLATTICES

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Graphene's unique band structure is responsible for the observation of remarkable transport phenomena such as anomalously quantized Hall effects [1], strong suppression of weak localization [2] , existence of a minimum conductivity [3], etc.
An important parameter that defines the range of electronic phenomena accessible in graphene experiments is its carrier mobility (μ). There are three main candidates which limit μ: charged impurities [4], random strain [5] and resonant (strong) scatterers (RS) [6]. RS have been observed recently in graphene with hydrogen adsorbates [7] and vacancies [8]. In addition, RS may also be conveniently induced by metallic islands deposited on the graphene surface [9]. In this case, the strength of the impurity scattering can be controlled by a local external gate. Moreover, these impurities can be arranged on graphene in a periodic pattern, i.e. forming a superlattice (SL). The conductivity in these type of structures is predicted to change depending on the superlattice structural parameters [10]. Furthermore, if SLs are fabricated with magnetic impurities, an enhancement of spin polarization and magnetoresistance are expected [11]. However, no experimental effort has been undertaken towards this end, in particular employing a magnetic SL.
In our study (ferromagnetic) dot-patterns are grown on graphene. Transport measurements under external magnetic field are undertaken to detect variations in the conductance and magneto-resistance depending on the superlattice parameters.

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