Abstract Submitted
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Transport properties and quantum criticality of magnetic vacancies and adatoms in graphene.[1] DAVID RUIZ-TIJERINA, Instituto de Fisica, Universidade de Sao Paulo and National Graphene Institute, University of Manchester, LUIS DIAS DA SILVA, Instituto de Fisica, Universidade de Sao Paulo — We study the effects of a low concentration of magnetic adatoms or single vacancies in the linear–response transport properties of graphene. For adatoms, we considered top– and hollow–site adsorbates (TOP and HS). For vacancies, we studied bond–reconstructed (REC) and unreconstructed symmetric vacancies (VAC). These impurity problems map onto different power–law pseudo gap Anderson models, with distinct critical behaviors for TOP/REC and HS/VAC impurities in charge–neutral graphene. Away from charge neutrality, Kondo correlations are quintessential to all impurity types considered. We predict Kondo temperatures of up to 10K for realistic parameters, including the cases of VAC and HS impurities, contrary to what was previously believed. Our results indicate that electronic transport is determined by usual impurity scattering with TOP and REC impurities, which do not possess the graphene C_{3v} symmetry. In contrast, the presence of C_{3v} and inversion symmetries for VAC and HS impurities, respectively, leads to a decoupling from electronic states at symmetry points and/or branches throughout the Brillouin zone. As a consequence, the highly–symmetric VAC and HS impurities do not contribute to the resistivity in charge neutrality. Ref: PRB 94 085425 (2016).

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