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Mid-gap states and Kondo effect in disordered graphene CAIO LEWENKOPF, VLADIMIR MIRANDA, Universidade Federal Fluminense, LUIS DIAS DA SILVA, Universidade de São Paulo — Recent experiments on graphene flakes with short range scattering defects have stengthen the interest on Kondo physics in graphene systems. The experimental data show a temperature dependence of the resistivity consistent with the low-temperature Kondo screening of local magnetic moments. While the linear dispersion in the density of states in graphene justify a pseudogap Kondo model showing a rich variety of quantum critical behavior as a function of the gate-controlled chemical potential, the presence of disorder can alter this effect in favor of the "standard" Kondo model, with a Fermi-liquid ground state. We study these effects with different numerical methods. Tight-binding calculations for diluted scattering defects show the appearance of quasi-localized midgap states in the local density of states at the vicinity of the charge neutrality point. This leads to the formulation a Anderson-like model of localized states within the graphene matrix, which may lead to a Kondo screening consistent with the experiments. To verify this hypothesis, we perform numerical renormalization group (NRG) calculations to study the gate-dependence of the Kondo temperature and the transport properties of this model.

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