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Local defects and ferromagnetic interactions in 2D graphite[1] M.P. LÓPEZ-SANCHO, Ins. Ciencia de Materiales de Madrid (CSIC) Cantoblanco 28049-Madrid, M.A.H. VOZMEDIANO, Unidad ASociada CSIC-UC3M E28911 Leganés Madrid, F. GUINEA, Inst de Ciencia de Materiales de Madrid (CSIC) Cantoblanco 28049 MADRID — Recent experiments have shown unexpected properties in carbon-based materials. Ferromagnetic behavior enhanced by proton bombardment has been reported in graphite and, more recently, quantum Hall effect has been experimentally observed in graphene sheets. These results suggest that electronic correlations play an important role in these materials. The anomalous electronic and transport properties reported by the experiments agree with theoretical predictions of 2D models considering only π-electrons. The vanishing of the density of states at the Fermi energy and the absence of a true Fermi surface have important consequences in the electronic behavior of 2D graphite. Although at present there is not a microscopic explanation of the graphite ferromagnetic properties, they seem to be related to topological defects, as pointed out by AFM measurements. In this work we show that lattice defects and vacancies in the graphene structure give rise to localized states at the Fermi energy. Repulsive electron-electron interactions lead to the formation of local moments by polarization of local states. Due to the lack of a Fermi surface the RKKY-like interaction does not have oscillations instead it decays as r^{-3}, where r is the distance between defects. The interaction is then ferromagnetic.

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