

GRAPHENE SPINTRONICS

Over the past few years graphene has become one of the most studied systems in the field of nanoelectronics. The fact that nanostructured graphene (graphene ribbons, graphene dots, voids in graphene, etc.) can present magnetic order also makes it of interest for spintronics applications. I will discuss how the associated imbalance in the number of atoms belonging to the two graphene sublattices, the existence of zero-energy states, and the total and local magnetic moments are intimately related. We consider electron-electron interactions both in a mean-field approximation to the one-orbital Hubbard model and within density functional theory. The magnetic properties of nanometer-sized graphene structures (also known as polycyclic aromatic hydrocarbons) strongly depend on their shape and type of edges (zigzag or armchair) [1]. The magnetism associated to zigzag edges, vacancies, and various defects and the magnetic interactions developed in graphene ribbons open interesting possibilities in spintronics for these systems [2]. As an example I will present a proposal for a device entirely based on graphene featuring 100% magnetoresistance [3].

[1] J. Fernández-Rossier and J. J. Palacios, *Phys. Rev. Lett.* 99, 177204 (2007).

[2] J. J. Palacios, J. Fernández-Rossier, and L. Brey, *Phys. Rev B* 77, 195428 (2008).

[3] F. Muñoz-Rojas, J. Fernández-Rossier, and J. J. Palacios, (in preparation).