Spin Physics in two dimensional materials: from graphene to MoS_2

J. Fernández-Rossier[1,2]

[1]*International Iberian Nanotechnology Laboratory, Av. Mestre José Veiga, 4715-330 Braga, Portugal*

[2]*Depto. de Física Aplicada, Universidad de Alicante, 03690 Alicante, España*

E-mail: joaquin.fernandez-rossier@inl.int

The study of truly two dimensional systems made of a single atomic plane extracted from a layered material has opened a new chapter in the field of material science. Whereas the paradigmatic case of graphene is being very widely studied, the fabrication of devices based on single atomic planes of transition metal dichalcogenides such as MoS2 is following suit.

In this talk I will discuss, from the theory standpoint, spin-related physical phenomena that are unique to this new class of two dimensional materials. In the case of graphene, I will discuss an intrinic spin relaxation originated by the interplay of atomic spin-orbit interaction and the local curvature induced by flexural distortions of the atomic lattice, typical from membrane like materials [1]. The proposed mechanism dominates the spin relaxation in high mobility graphene samples and should also apply to other planar aromatic compounds.

In the case of MoS2, and after a brief introduction to the properties of this semiconducting material, I will discuss the unique electronic properties of spin properties related to the lack of inversion symmetry specific of the single atomic plane. The electronic and spin properties of heterostructures of MoS2 and the related compound WS2 will also be discussed.

Referencias

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