Spin transport and magnetic behavior of some low dimensional semiconductor nanostructures

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The spin transport is first analyzed in the framework of the R-matrix formalism extended to include the spin orbit (SO) couplings (e.g. Rashba, Dresselhaus). Within the scattering formalism employed, we discuss the possibility of controlling the transfer characteristics in a spin field effect transistor using stray electric fields [1].

The magnetic properties of boron nitride (BN) nanosheets with Mn impurities are discussed from the perspective of low dimensional diluted semiconductors. The ab-initio calculations based on the functional density theory (DFT) indicate different types of magnetic ordering (ferro-, antiferro-magnetic, spin glass) depending on the type of substitution [2].

Spin current switching and spin-filtering effects in Mn-doped boron nitride nanoribbons connected to graphene electrodes were investigated by means of first-principle approach. The analyzed structures indicate a high degree of spin polarization, independent on the spin configuration of the magnetic impurities in the low bias interval [3].

References

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