Spin transport in mesoscopic graphene

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In this talk, I would present some of our recent work on spin transport in graphene.

The first part of the talk will focus on spin-orbit coupling in graphene : We find that local curvature of the graphene sheet induces an extra spin-orbit "Rashba-like" coupling term, which is the dominant contribution to spin-orbit for the values of doping and curvature reported in actual samples of graphene. The effect of spin-orbit coupling on the quasiparticles' zitterbewegung will be discussed. Also some implications of spin-orbit coupling on transport through nanotubes will be mentioned.

The second part of the talk will focus on the ferromagnetic proximity effect in graphene : Magnetic gates in close proximity to graphene can induce ferromagnetic correlations. We study the effect of such induced magnetization dependent Zeeman splittings on the graphene transport properties. We estimate that induced spin splittings of the order of 5 meV could be achieved with the use of magnetic insulator gates, e.g. EuO-gates, deposited on top of graphene. These splittings could be determined by magnetoresistance measurements in a spin-valve geometry.