Spin-orbit-mediated spin relaxation in ballistic graphene materials

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Most of the work on understanding spin relaxation in graphene for spintronic applications relies on the assumption that spin polarization is lost due to scattering and dephasing processes. Here, we present results of a recent theoretical study of spin dynamics of supported graphene in the ballistic regime [1]. This can be relevant in high-quality devices where electron scattering no longer dominates the spin relaxation. In this case, spin-orbit coupling induced by a substrate is sufficient to dephase the spin precession and limit the spin lifetime to a few ns. In addition, the conditions to observe spin transport anisotropy is discussed in this clean limit. Finally, the case of bilayer graphene, strongly debated in the literature [2], will be considered in order to clarify experimental results [3].

References

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