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Spin transport in polycrystalline graphene and in graphene/TMDC heterostructures ARON W. CUMMINGS, JOSE GARCIA, STEPHAN ROCHE, ICN2 - Catalan Institute of Nanoscience and Nanotechnology — Owing to its small spin-orbit coupling (SOC) and negligible hyperfine interaction, graphene is predicted to be an efficient carrier of spin-based information, and is thus promising for spintronics applications. While measured spin lifetimes are quite satisfactory, in the nanosecond range, there is still room for optimization of spin transport in this material. In addition, some applications, such as those relying on the spin Hall effect or spin orbit torque, require a large SOC. In this talk I will present numerical studies of spin transport in two graphene systems: polycrystalline graphene, and graphene on transition metal dichalcogenides (TMDCs). In polycrystalline graphene, grain boundaries impede charge transport and are generally unfavorable. However, numerical simulations indicate that under the right conditions grain boundaries may actually be beneficial to spin transport. Meanwhile, proximity to a TMDC can significantly enhance the SOC in graphene, making it potentially useful for applications requiring large SOC while also taking advantage of its superior charge transport properties. I will present numerical simulations detailing the impact of this enhanced SOC on the spin lifetime, as well as on phenomena such as weak antilocalization and the spin Hall effect.

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