

Nonequilibrium spin phenomena in 2D materials

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2D materials such as graphene and transition-metal dichalcogenides offer excellent prospects for investigating spin dynamics and spin relaxation. A great variety of spin interactions is offered: spin-orbit coupling with the lattice ions and with impurities, exchange coupling with magnetic impurities, as well as spin-dependent coupling with phonons. In addition, there are proximity effects with other materials, changing the spin dynamics due to emergence of novel interactions, such as coupled Zeeman and valley spin-pseudospin dynamics. I will review the status of the field, introduce the basic mechanisms of spin dynamics and spin relaxation in 2d materials, and present recent examples of theoretical and experimental accomplishments. In particular, I will focus on the significant spin relaxation anisotropy and the effects of resonant scattering on spin relaxation.