Electron spin relaxation and decoherence by magnetic defects in graphene.

Mark B. Lundeberg*, Rui Yang, Julien Renard, Joshua A. Folk
Department of Physics, University of British Columbia, Vancouver, British Columbia, V6T1Z4, Canada
*now at ICFO - The Institute of Photonic Sciences, Castelldefels (Barcelona) 08860 Spain
mark.lundeberg@icfo.es

Abstract

Evidence for electron spin relaxation in graphene by paramagnetic defects is presented, based on transport measurements of electron coherence lifetimes in an in-plane magnetic field. This mechanism provides an explanation for past observations of significant spin relaxation rates despite the theoretical expectations of negligible spin-orbit and hyperfine interactions.

References

[1] M. B. Lundeberg, R. Yang, J. Renard, and J. A. Folk, Phys. Rev. Lett. (accepted) / arxiv:1211.1417

Figure

Measured electron decoherence rate in low temperature graphene. The reduced decoherence in the presence of a high in-plane magnetic field (six tesla: filled circles) compared to zero magnetic field (open circles) indicates the quenching of magnetic defects.