Antisymmetric magnetoresistance in graphene /Cr2Ge2Te6 heterostructure

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Graphene with peculiar electronic properties, is a promising material for future application for spintronics and magnetoelectronic. Combining graphene with recently discovered 2d magnetic material can unlock the new functionality of semiconducting devices. Pairing graphene with ferromagnetic substrate can enable the proximity induced magnetism in the graphene. In this work we study electronic and magneto transport properties of the graphene/$Cr_2Ge_2Te_6$ heterostructure. Our experiment revels the unique antisymmetric magnetoresistance (ASMR) observed in graphene/$Cr_2Ge_2Te_6$ heterostructure. Additionally, we explore the unique characteristic of ASMR, its dependence on gate voltage and temperature, arising from the interplay between graphene and ferromagnetic semiconductor ($Cr_2Ge_2Te_6$).

References

[1] Takiguchi, K., Anh, L.D., Chiba, T. *et al.*, *Nat Commun*, **13**, 6538 (2022)
[2] Wang, Y., Lee, P.A., Sile itch, D.M. *et al.*, Nat *Commun* **11**, 216 (2020)
[3] Chun-Chih Tseng, Tiancheng Song, *et al.*, *Nano Letters* **2022** *22* (21), 8495-8501

Figures

Figure 1: Figures describe the magnetoresistance behaviour in the Graphene system. With broken intrinsic Time reversal symmetry longitudinal magnetoresistance shows an extra linear component which is antisymmetric in nature along with quadratic dependence.

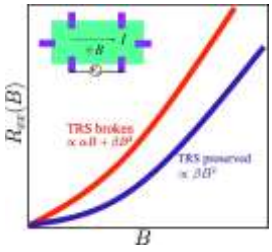

Figure 2: Figure 2(a) is the plot of longitudinal magnetoresistance against magnetic field B, for the heterostructure, shows clear signature of antisymmetric component. In Figure 2(b), both the symmetric and antisymmetric components of longitudinal magnetoresistance are shown, with the antisymmetric component exhibiting a linear finite behaviour.