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Linear unsaturating magnetoresistance in disordered systems[1]
YING TONG LAI, SILVIA LARA, CAMERON LOVE, Yale-NUS College, NAVNEETH RAMAKRISHNAN, Centre for Advanced 2D Materials, SHAFFIQUE ADAM, Yale-NUS College — Theoretical works [1, 2] have shown that disordered systems exhibit classical magnetoresistance (MR). In this talk, we examine a variety of experimental systems that observe linear MR at high magnetic fields, including silver chalcogenides, graphene, graphite and Weyl semimetals. We show that a careful analysis of the magnitude of the MR, as well as the field strength at which the MR changes from quadratic to linear, reveal important properties of the system, such as the ratio of the root-mean-square fluctuations in the carrier density and the average carrier density. By looking at other properties such as the zero-field mobility, we show that this carrier density inhomogeneity is consistent with what is known about the microscopic impurities in these experiments. The application of this disorder-induced MR to a variety of different experimental scenarios underline the universality of these theoretical models.

J. Ping, I. Yudhistira, N. Ramakrishnan, S. Cho, S. Adam, and M. S. Fuhrer, Phys. Rev. Lett. 113, 047206 (2014).

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