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Theoretical study of disorder induced magnetoresistance in graphene SHAFFIQUE ADAM, Yale-NUS College, Singapore and Graphene Research Centre and Department of Physics, National University of Singapore, JINGLEI PING, University of Maryland, INDRA YUDHISTIRA, NAVNEETH RAMAKRISHNAN, National University of Singapore, SUNGJAE CHO, Univeristy of Illinois, MICHAEL S. FUHRER, Monash Univeristy, Australia — In this work we predict theoretically that carrier density inhomogeneity provides a new mechanism for classical magnetoresistance. For concreteness, we study the case of graphene where density inhomogeneity and carrier scattering is dominated by charged impurities, although the mechanism itself is quite general and applies to other systems in which there are large spatial fluctuations of the carrier density. Calculations using an effective medium approximation show that low-field magnetoresistance becomes a universal function of the ratio between the average carrier density and the fluctuations of the carrier density, and scales as a power-law when this ratio is large. Our finding is in excellent agreement with recent experimental results. This work is supported by the Singapore National Research Foundation NRF-NRFF2012-01.

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