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Spin transport over long distance in epitaxial graphene grown on C-face SiC

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Spintronics is a paradigm focusing on spin as the information vector and ranging from quantum information to zero-power non-volatile magnetism. Several spintronics evices (logic gates, spin FET, etc) are based on spin transport in a lateral channel between spin polarized contacts. However while spin is acclaimed for information storage, a paradox is that efficient spin transport as remained elusive. We will present magneto-transport experiments on epitaxial graphene multilayers on SiC showing very large spin signals and spin diffusion length in graphene in the 100μm range (as high as 285μm). In the best case, the spin transport efficiency of epitaxial graphene is found to be of 75% of the ideal channel. Graphene, could turn out as a material of choice for large scale logic circuits and the transport/processing of spin information. Understanding the mechanism of the spin relaxation, improving the spin diffusion length and also testing various concepts of spin gates are the next challenges.

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