Magnetoresistance of large-area epitaxial graphene : interactions and dislocations

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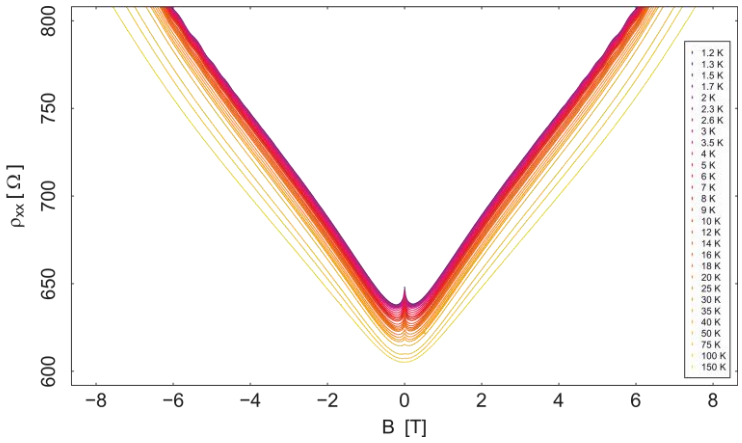
We report on charge transport measurements on large-area epitaxial graphene Hall bars, both monolayer and bilayer in magnetic fields below Landau quantization. In contrast to small (µm sized) samples, our mm sized samples do not show any universal conductance fluctuations, or edge effects. Consequently, in monolayers the weak localization and the electron-electron interaction correction can be accurately and consistently resolved by a careful analysis of the magnetoresistance, including interesting crossover phenomena [1]. When impurities are added, a logarithmic $R(T)$ occurs, which should not be confused with Kondo effect [2], but rather is rather a consequence of EEI and inhomogeneities [3, 4].

Unexpectedly, the picture changes completely when bilayer graphene is investigated: a strong linear magnetoresistance occurs. We associate this effect, which is displayed in Fig. 1, as a result of the dislocation patterns we recently discovered in bilayer graphene [5]. We present careful experimental analyses and a theory that describes the linear magnetoresistance. The consideration of dislocations may further shed new light on interesting problems that have been recently discussed for bilayer graphene.

Figures



Linear magnetoresistance measured in large area devices of bilayer epitaxial graphene on SiC(0001).

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