Weak localization in epitaxial graphene layers grown on (0001) SiC

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We performed magnetotransport studies of the epitaxial graphene layers grown on semi-insulating (0001) SiC by CVD method [1]. The samples were processed by means of optical lithography into large hall bars (263μm x 526μm) with Ti/Au metallization for ohmic contacts. Resistivity tensor was measured in Oxford Instruments VTI system in temperatures ranging from room temperature down to 1.5 K and magnetic fields up to 12T.

Diagonal component of the resistivity tensor ρ_{xx} had a pronounced peak at B=0, attributed to a weak localisation, and oscillations at higher fields, superimposed on a rising background (see fig.1). In order to extract credible information about the parameters governing weak localisation, it is important to take this background into account. The rising background can successfully be simulated in terms of mobility spectrum [2]. Here, we applied two channel conductivity model combined with a weak localization correction to the conductivity proposed in [3] to simulate the full conductivity tensor. The parameters obtained will be discussed and compared to other approaches used in the literature.

References:
[1] W. Strupiński, K. Grodecki, A. Wysmołek, R. Stepniewski, T. Szkopek, P. E. Gaskell, A. Grüneis, D. Haberer, R. Bozek, J. Krupka, and J. M. Baranowski, Nano Lett., **11** (4),1786 (2011)
[2] M. Gryglas-Borysiewicz, B. Jouault, J. Tworzydło, S. Lewinska, W. Strupinski and J.M. Baranowski, Acta Phys. Pol. A **116,** 838 (2009)
[3] K. Kechedzhi, E. McCann, V.I. Fal'ko, H. Suzuura, T. Ando, and B.L. Altshuler, Eur. Phys. J. Special Topics **148**, 39–54 (2007).

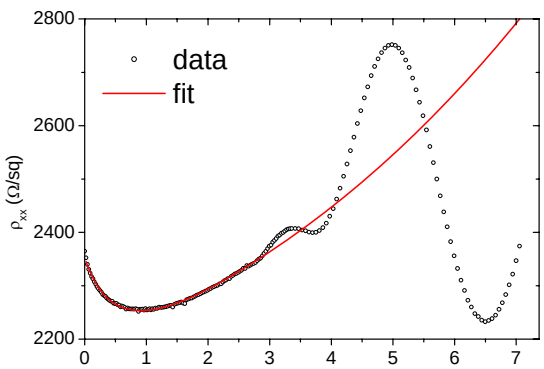

Fig.1. ρ_{xx} component of the resistivity tensor