Quantum Hall Effect in trilayer graphene

E. Diez[1,*], C. Cobaleda[1], F. Rossella[2], V. Bellani[2], D. K. Maude[3]

[1]Laboratorio de Bajas Temperaturas, Universidad de Salamanca, E-37008, Salamanca, Spain.
[2]Dipartimento di Fisica "A. Volta", Università degli Studi di Pavia, I-27040 Pavia, Italy
[3]Laboratoire National de Champs Magnetiques Intenses, Grenoble, France
[*]enrisa@usal.es

We have carried out magnetotransport experiments in a trilayer graphene sample processed with Hall bar geometry. We have studied the temperature dependence of the Hall and longitudinal resistance in the temperature range 2-190 K and using as a driving parameter the magnetic field up to 22 T. We have observed the presence of the $\nu=6$ quantum hall (QH) plateau in our sample. To our knowledge this is the first report of a QH plateau in non-suspended trilayer graphene. This result is in agreement with the expected series for the QH plateaus in trilayer graphene: $\nu=\pm6,\pm10,...$ (see Refs. [1] and [2] and references therein).

We have also studied the symmetries of the four-terminal resistance configuration in the QH regime. We found an additional symmetry, $R_L^t(B)= R_L^b(-B)$ where the upper index denote the "top" and "bottom" pair of contacts as showed in Fig. 1. This symmetry does not emerge from a straight-forward application of the Büttiker multiprobe formula. It has been previously reported for mesoscopic samples prepared from InGaAs/InAlAs quantum wells [3] and it has been attributed [4] as a result of an interplay between chiral edge currents and the tunneling between the "top" and "bottom" edges of the Hall bar. We think our results could be of some interest to elucidate the role played by edge currents in the high-B regime in trilayer graphene.

References

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Figures

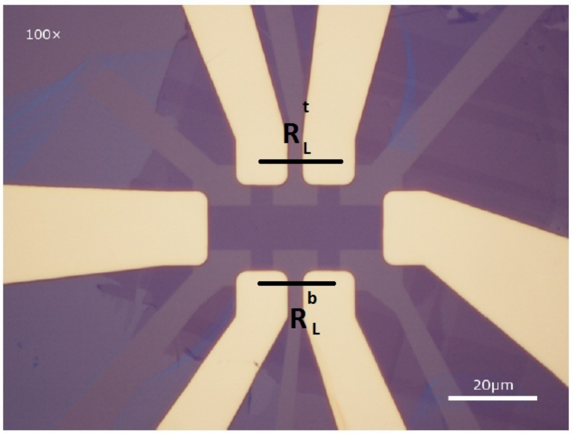

Figure 1: Geometry and contact labels for our trilayer graphene Hall bar.

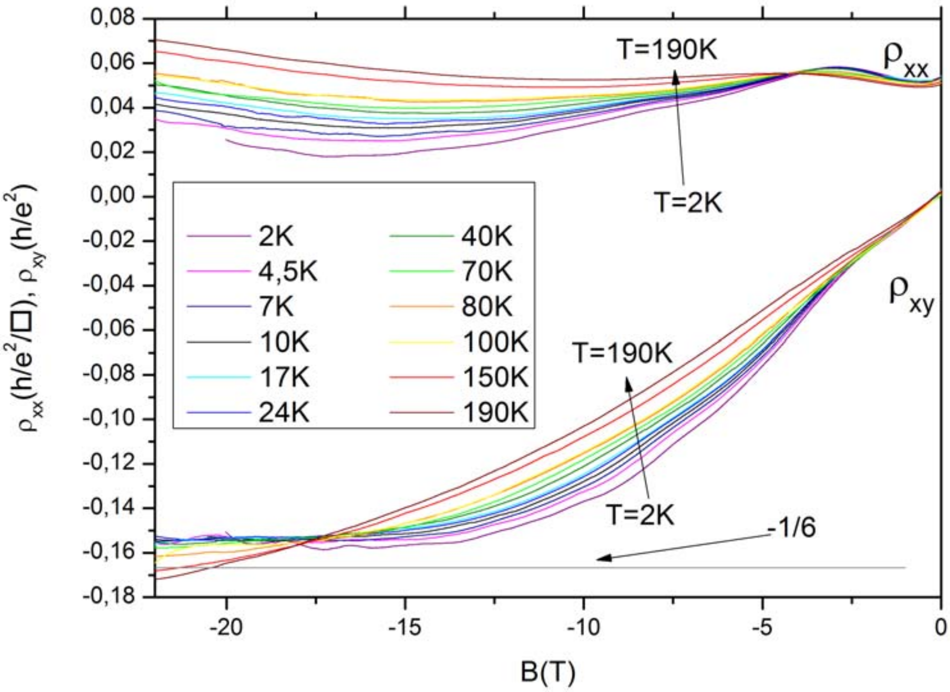

Figure 2: Longitudinal (ρ_{xx}) and Hall (ρ_{xy}) resistivities as a function of the magnetic field at temperatures from 2 K to 190 K.