Contribution (Invited)

Van der Waals heterostructures in high magnetic fields

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High magnetic field sources represent a fundamental tool of characterization for condensed-matter systems, often leading to the realization of new phenomena and exotic states of matter [1]. In recent years, the assembly of two-dimensional (2D) crystals into artificial heterostructures held together by van der Waals forces is opening up unique opportunities for the realization of novel electronic properties [2]. In our talk we will discuss several results we obtained by studying gate-tunable electrical transport devices based on high-quality 2D heterostructures in the presence of strong magnetic fields and cryogenic temperatures.

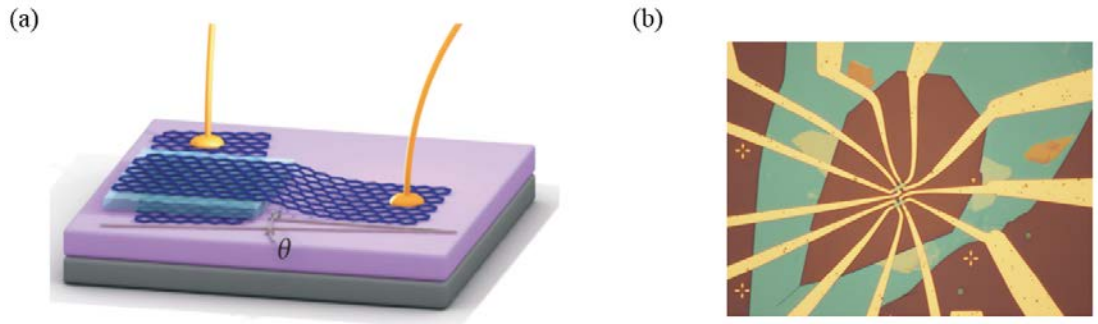

Figure 1: (a) Schematic diagram of a Gr/hBN/Gr tunneling device as the one studied in Ref.[3]. (b) Optical microscopy image of two Hall bar devices fabricated on an aligned graphene/hBN stack.

This work has been done in collaboration with S. Wiedmann and U. Zeitler at the HFML in Nijmegen, and A. Mishchenko and collaborators from the University of Manchester.

References

[1] D. C. Tsui, Rev. Mod. Phys. 71, 891 (1999).
[2] K. S. Novoselov, A. Mishchenko, A. Carvalho, A. H. Castro Neto, Science 353, aac9439 (2016).
[3] J. R. Wallbank, et al., Science 353, 575-579 (2016).