TWISTED BILAYER GRAPHENE AS A WAY TO UNDERSTAND HIGH-TEMPERATURE SUPERCONDUCTIVITY IN GRAPHITE

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Finding a near-room temperature superconductor is one of the ultimate goals in material physics. Lately, hints of this have been experimentally observed in the ordinary material graphite, which consists of multiple stacked graphene sheets. According to the experiments, superconductivity seems to take place at the graphene interfaces [1], and especially at interfaces where the stacking angle changes [2]. This motivates the study of *twisted bilayer graphene*, which exhibits a fascinating Moiré pattern (see Fig. 1). This periodic pattern is responsible for intriguing electronic properties, and it allows tuning the band structure by twisting angle [3].

The study is ongoing work, and in the future we are going to study whether there are topological reasons for the robust zero-band gap emerging in the band structure. Furthermore, we will study whether structural relaxation results in periodic strains in the carbon–carbon bonds, what kind of electronic structure this produces, and whether these phenomena together can explain the observed superconductivity.

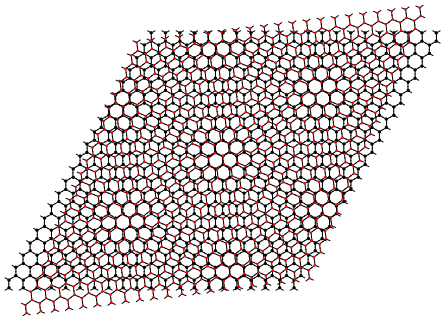

Figure 1: Moiré pattern in twisted bilayer graphene.

[1] T. Scheike *et. al.*, Carbon **59**, 140 (2013).
[2] P. Esquinazi *et. al.*, Pis'ma ZhETF **100**, 374 (2014)
[3] J. M. B. Lopes dos Santos *et. al.*, Phys. Rev. B **86**, 155449 (2012)