Scanning gate imaging of transport in graphene heterostructure - towards rotatable devices

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Scanning gate microscopy (SGM) has recently been used to evidence the coexistence of upstream and downstream quantum Hall edge channels (QHECs) along the same edge in graphene under a high magnetic field [1-3]. In particular, we have shown that antidots, located between these QHECs, cause the topological breakdown of the quantum Hall (QH) state. First, we present SGM results showing that these antidots act as nano-size quantum Hall interferometers in the Aharonov-Bohm regime [4]. Secondly, we illustrate how SGM could be used to pinpoint where the topological breakdown occurs in other topological phases observed in graphene, such as the anomalous quantum Hall effect [5]. We also demonstrate how the SGM probe could be used to change *in situ* the hBN crystalline orientation compared to graphene (Fig. 1), to switch on and off the topological phase [6].

References

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Figures

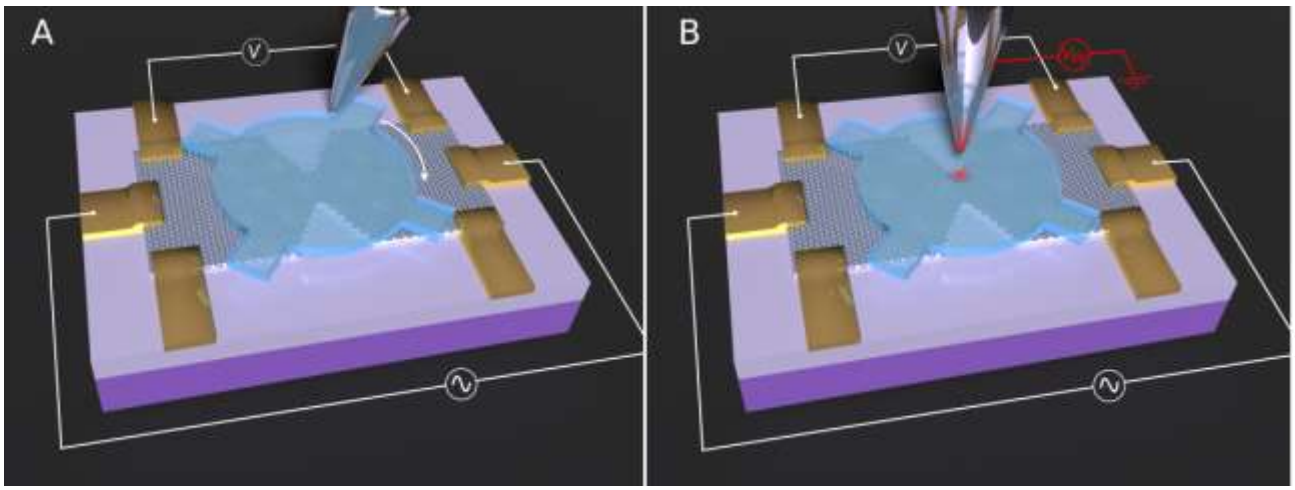

Figure 1: A, Schematic illustration of the tip-induced tuning of the twist angle between a hBN "wheel" and an electrically-contacted graphene flake. **B,** Schematic illustration of the SGM experiment, with a bias Vtip applied to the metallic tip, inducing a local electrostatic perturbation (represented in red) for conduction electrons or holes in graphene.