Cory R. Dean
Columbia University, New York, USA

cd2478@columbia.edu

Tunable degrees of Freedom in van der Waals heterostructures

Graphene , a single layer of carbon atoms arranged in a hexagonal lattice, is probably the best known, and most extensively characterized two-dimensional material. However, this represents just one of a larger class of van der Waals materials, in which atomic monolayers can be mechanically isolated from the bulk. By integrating these materials with one another, an exciting new opportunity has emerged in which layered heterostuctures can be fabricated with properties beyond those of the constituent materials. In this talk I will present some of our recent efforts where we explore new degrees of freedom available in these strucutures that allow us to realize yet a new level of control over their electronic properties.

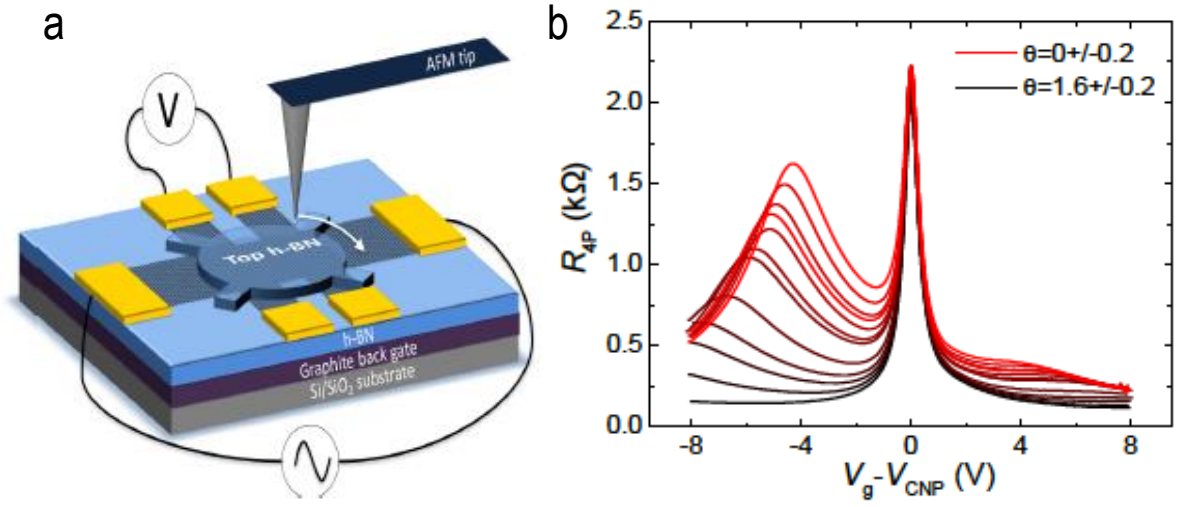

Figure 1: (a) Cartoon schematic of an example device where the crystallographic orientation between a graphene Hall bar and encapsulating BN layer can be varied resulting in a dynamically tunable moire-pattern. (b) Transport measurement acquired from a device similar to that illustrated in (a). Rotating the BN layer allows in-situ modification of the density at which the moire pattern- induced satellite Dirac point appears. Control of the angular orientation to better than 0.2 degree precision is demonstrated.