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Exciton Effects on Doped and Gated Twisted Bilayer Graphene
RYAN SOKLASKI, YUFENG LIANG, LI YANG, Washington Univ — Turbostratic graphite and epitaxially grown few-layer graphene (FLG) are known to exhibit significant rotational defects – a departure from familiar Bernal stacked FLG systems. The admixing of states across rotated graphene layers occur far from their respective valleys, giving rise to saddle-point van Hove singularities. We study the effects of doping and voltage gating on twisted bilayer graphene. In particular, we perform first-principle calculations, including e-e and e-h interactions, of the optical absorption spectra of doped and gated twisted bilayer graphene. Increasing the doped carrier density enhances screening in the system, reducing both the self-energy corrections and e-h interaction effects – an effect also seen in doped single layer graphene. On the other hand, gating the system leads to a misalignment of van Hove singularities, diminishing the joint density of states and hence the exciton strength.

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