Title: Electronic properties of twisted bilayer graphene

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Abstract

Twisted-bilayer graphene (TBG), in which the lattice mismatch between neighboring layers gives rise to an additional potential modulation, creates novel electronic features distinct from monolayer graphene. We present the effect of quasiparticle interference (QPI) on the spatial variations of the local density of states in TBG in the neighborhood of an isolated impurity. We present the density and temperature dependent resistivity of twisted bilayer graphene by considering the effect of moire superlattice structure. We theoretically show that twisted bilayer graphene should have an enhanced and strongly twist-angle dependent linear-in-temperature resistivity in the metallic regime with the resistivity magnitude increasing as the twist angle approaches the magic angle. The slope of the resistivity versus temperature could approach one hundred ohms per kelvin with a strong angle dependence, but with a rather weak dependence on the carrier density. This angle-tuned resistivity enhancement arises from the huge increase in the effective electron-acoustic phonon coupling in the system due to the suppression of graphene Fermi velocity induced by the flatband condition in the moire superlattice system. The calculated linear-in-T resistivity is arising from the ordinary electron-phonon coupling in a rather unusual parameter space due to the generic moire flatband structure of twisted bilayer graphene.