Electron tunneling in moire graphene

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Periodic potentials lay the foundation for solid state systems and their electronic band structures. When a secondary periodic potential is introduced in the form of a moiré superlattice with a long wavelength, the electronic band structure is heavily modified by the formation of minibands. In recent years, graphene and related layered materials have garnered considerable attention since they provide easy access to the moiré physics via tunability of the interlayer twist angles. The formation of extremely flat bands at certain 'magic' angles in twisted bilayers of graphene (tBLG), has led to the observation of correlated insulating states and superconductivity and other exotic states such as Chern insulators, orbital ferromagnets, and nematic phases. In this talk I shall discuss our recent works where we have employed planar tunneling to explore various facets of correlations in moire graphene. In this talk I shall discuss planar tunneling spectroscopy measurements on metal-WSe_2-tBLG heterostructures across a broad range of gate and bias voltages. A notable finding is the enhanced phonon-assisted tunneling in tBLG compared to Bernal BLG, which arises from a more relaxed in-plane momentum matching criterion. Our results establish planar tunneling as a versatile tool to further understand electron-phonon coupling in twisted van der Waals materials.