Twisted Bilayer Graphene Electronic Structure Revisited

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We study the low-energy bands of twisted bilayer graphene (TBG), summarizing the configuration space approach that allows for the construction of an *ab initio* tight binding hamiltonian. We find that the bands are never perfectly flat and the Fermi velocity never vanishes, but rather a "magic range" of twist angles exists where the lower band becomes extremely flat and the Fermi velocity attains a nonzero minimum value. Motivated by features related to the atomic relaxation in the moiré pattern, namely, circular regions of AA stacking, triangular regions of AB/BA stacking, and linear domain walls separating the latter, we endeavor to build effective tight binding models on the moiré scale that can capture the changes in the low energy bands as a function of twist angle.