Electronic structure and correlations in twisted multilayer graphene and related layered materials

Efthimios Kaxiras
Harvard University

In the past decade the field of twisted multilayer graphene and other layered materials, like the transition-metal dichalcogenide family, has blossomed to the point of being referred with its own term, ``twistronics" [1]. New arrangements, including twisted n-layers (n=3,4,...), mixed layers, and multilayers of regular few-layer structures, are being studied experimentally and they are revealing ever richer behavior. We review theoretical investigations of some representative systems [2], starting with the iconic twisted bilayer graphene near the magic angle. Our work is based on first-principles tight-biding hamiltonians and includes atomic relaxation though the configuration space approach. A recent focus has been on deriving realistic representations of single-particle states for few-band hamiltonians and how those can be employed in studying many-body physics related to Mott insulator behavior, superconductivity and other manifestations of correlated electronic states [3].

Work supported by Army Research Office under Cooperative Agreement Number W911NF-21-2-0147 and by a grant from the Simons Foundation Award no. 896626.

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