Twisted graphene devices for on-demand Hamiltonians

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Abstract: We discuss our approach to 2D quantum state engineering, based on high-mobility field-effect devices built from CVD-grown twisted graphene crystals.

2D materials offer an immense toolbox for controlling emergent electronic behaviours. On-demand Hamiltonian design can be achieved by acting on the twist angle between consecutive layers, which can induce states with non-trivial topology and strong electronic correlations. We have developed techniques to extend this paradigm to CVD graphene crystals, including both monolithically grown and artificially assembled multilayers. These structures allow to control the interlayer hopping [1], introduce superlattices [2], break relevant symmetries [3]. We will especially focus on recent results on structurally asymmetric twisted trilayer graphene, featuring a spontaneous gap opening [3].

References

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