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Z_2 Topology and Edge States of Twisted Bilayer Graphene[1]
QIYUE WANG, Department of Physics, University of Texas at Dallas, CHAO MA, FENGNIAN XIA, Department of Electrical Engineering, Yale University, FAN ZHANG, Department of Physics, University of Texas at Dallas — Recently twisted bilayer graphene(t-BLG) emerges as a new strongly correlated physical platform near a magic twist angle, which hosts many exciting phenomena such as the Mott-like insulating phases, unconventional superconducting behavior and emergent ferromagnetism. Besides the apparent significance of band flatness, band topology may be another critical element in strongly correlated twistronics yet receives much less attention. While an unusual symmetry of t-BLG trivializes Berry curvature, we elucidate that two high-dimensional Z_2 invariants in the Teo-Kane Altland-Zirnbauer table characterize the topology of the moiré Dirac bands, supported by a systematic nonlocal transport study. The moiré band topology of t-BLG manifests itself as two pronounced nonlocal responses in the electron and hole superlattice gaps. Moreover, the nonlocal responses are robust to the interlayer electric field, twist angle, and edge termination, exhibiting a universal scaling law.

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Qiyue Wang
University of Texas at Dallas

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