Abstract Submitted
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Hofstadter's Fractal Energy Spectrum in Twisted Bilayer Graphene[1] ZHENGFEI WANG, School of Physics, Georgia Institute of Technology. Department of Materials Science and Engineering, University of Utah, FENG LIU, Department of Materials Science and Engineering, University of Utah, M.Y. CHOU, School of Physics, Georgia Institute of Technology — Hofstadter butterfly, the fractal spectrum of 2D lattice electrons in a magnetic field, has been studied theoretically for a few prototypical systems. However, due to the small unit cell in traditional materials, it is difficult to directly observe such a structure in the experiment. In this work we demonstrate that the Hofstadter butterfly structure can be detected in twisted bilayer graphene with a reasonable strength of the magnetic field. Based on the recursive tight-binding method, we have systematically studied the landau level dependence on the magnetic field as a function of the twist angle, with the underlying electronic structure ranging from the parabolic dispersion of Bernal bilayer graphene to the linear dispersion of decoupled graphene layers. The signature of transition is characterized by some low-lying landau levels in slightly twisted bilayer graphene, which are related to the flat bands induced in the layer decoupling process.

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