Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Hofstatder Physics and Many-body Interactions in Twisted Bilayer Graphene YUAN CAO, JASON LUO, VALLA FATEMI, Massachusetts Institute of Technology, SHIANG FANG, JAVIER SANCHEZ-YAMAGISHI, Harvard University, KENJI WATANABE, TAKASHI TANIGUCHI, National Institute of Materials Science, Japan, EFTHIMIOS KAXIRAS, Harvard University, PABLO JARILLO-HERRERO, Massachusetts Institute of Technology — Twisted bilayer graphene (TwBLG) consists of two twistingly stacked sheets of graphene spaced only 0.34 nm apart. The interlayer interactions in TwBLG are strongly dependent on the twist angle and can vastly affect the electronic properties of the system. Recently, we have experimentally observed the existence of novel insulating states in TwBLG with small twist angles, which result from the interplay between interlayer hybridization and the periodicity of the underlying moiré pattern[1]. However, the transport gaps of the insulating states are much larger than existing theory predictions, suggesting possible effects of many-body interactions and/or mechanical effects. Additionally, we also observe for the first time the Hofstadter butterfly in TwBLG with a sub-degree twist angle in a high magnetic field, where the quantum Hall effect in this regime shows major differences compared with previously measured samples. [1] Y. Cao, J. Y. Luo, V. Fatemi, S. Fang, J. D. Sanchez-Yamagishi, K. Watanabe, T. Taniguchi, E. Kaxiras, and P. Jarillo-Herrero, Phys. Rev. Lett. 117, 116804 (2016).

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Date submitted: 21 Feb 2017 Electronic form version 1.4