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Tunable Moiré Bands in Minimally Twisted Bilayer Graphene.[1] KYOUNGHWAN KIM, ASHLEY DASILVA, Univ of Texas, Austin, SHENGQIANG HUANG, University of Arizona, BABAK FALLAHAZAD, STEFANO LARENTIS, Univ of Texas, Austin, TAKASHI TANIGUCHI, KENJI WATANABE, National Institute for Materials Science, BRIAN LEROY, University of Arizona, ALLAN MACDONALD, EMANUEL TUTUC, Univ of Texas, Austin — We present the realization of tunable moiré crystals in minimally twisted (MT) bilayer graphene, and provide a comprehensive study of electron transport in these samples. In twisted bilayer graphene, the relative rotation of the two graphene layers leads to the formation of a new moiré crystal, which is expected to have a dramatically different band structure compared to Bernal-stacked bilayer graphene. The MT bilayer graphene is fabricated using a new transfer method that employs a micromechanical hemispherical handle substrate which allows defining small relative rotation angles (0.6to 1.2) between two graphene flakes that stem from the same domain, with an accuracy of 0.1. We observe the emergence of satellite transport gaps at 8 electrons per moiré unit cell, along with a conductivity minimum at charge neutrality. These features remain robust in the presence of a high transverse electric field, applied using dual gated device structures. In magnetic fields, we observe the emergence of a Hofstadter butterfly in the energy spectrum, with four-fold degenerate Landau levels, and broken symmetry QHS at $\nu = 1, 2, 3$.

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