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Electronic Transport in Twisted Bilayer Graphene Superlattices JASON LUO, JAVIER SANCHEZ-YAMAGISHI, SANG HYUN CHOI, Massachusetts Institute of Technology, KENJI WATANABE, National Institute of Materials Science, Japan, PABLO JARILLO-HERRERO, Massachusetts Institute of Technology — Twisted bilayer graphene is the ultimate limit of a bilayer 2DEG, where two graphene layers are stacked with an interlayer distance of only 0.34nm. The interlayer tunnel coupling can be continuously tuned by twisting the two layers, leading to different physics in the small and large twist angle limits. At small twist angles, the two layers form a large superlattice unit cell and hybridization of the layers leads to low-energy van Hove singularities in the electronic spectrum. We report transport measurements of high-quality twisted bilayer graphene in the low twist angle regime where interlayer interactions have drastic effects on electronic properties. We demonstrate that in this regime, where the magnetic length scale is comparable to the superlattice constant, we can observe Hofstadter's butterfly physics at low magnetic fields. At zero magnetic field, we also observe a strong departure from the typical monolayer graphene transport properties. We discuss the possible roles that interlayer tunneling and electron-electron interactions play in our observed phenomena as well as the effect of interlayer electric field.

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