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Quantum Hall Effect, Screening and Layer-Polarized Insulating States in Twisted Bilayer Graphene¹ JAVIER D. SANCHEZ-YAMAGISHI, Department of Physics, MIT, THITI TAY-CHATANAPAT, Department of Physics, Harvard, KENJI WATAN-ABE, TAKASHI TANIGUCHI, National Institute for Materials Science, Tsukuba, Japan, AMIR YACOBY, Department of Physics, Harvard, PABLO JARILLO-HERRERO, Department of Physics, MIT — We present a study of electronic transport in dual-gated twisted bilayer graphene. Despite the sub-nanometer proximity between the layers, we identify independent contributions to the magnetoresistance from the graphene Landau level spectrum of each layer. We demonstrate that the filling factor of each layer can be independently controlled via the dual gates, which we use to induce Landau level crossings between the layers. By analyzing the gate dependence of the Landau level crossings, we characterize the finite inter-layer screening and extract the capacitance between the atomically-spaced layers. At zero filling factor, we observe magnetic and displacement field dependent insulating states, which indicate the presence of counter-propagating edge states with inter-layer coupling.

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