Abstract Submitted
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Fractional Quantum Hall Effect in the Second Landau Level of bilayer graphene GEORGI DIANKOV, FRANCOIS AMET, MENYOUNG LEE, ANDREW BESTWICK, KEVIN THARRATT, CHI-TE LIANG, DAVID GOLDHABER-GORDON, Stanford University — Bilayer graphene exhibits rich Quantum Hall physics due to valley, spin and orbital degrees of freedom that lead to a variety of polarization states. We study the Fractional Quantum Hall Effect (FQHE) in ultra-clean multiterminal bilayer graphene devices on boron nitride with a local graphite gate at magnetic fields of up to 45 T. We measure mobility of up to 1 million $cm^2/V.s$ and very low disorder. In addition to the broken-symmetry integer states, we unambiguously resolve a variety of fractions and focus on a series of fractions in the Second Landau Level, which do not follow particle-hole asymmetry. From the magnetic field dependence of the fractions, we find that some of these fractions have spin-polarized ground states while others are unpolarized, and we present a possible explanation for this difference. This work provides insights into how the symmetry-breaking electron-electron interactions and Zeeman splitting interact to produce a rich landscape of composite fermions in the Second Landau Level of bilayer graphene.

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