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Observation of even denominator fractional quantum hall states in dual gated bilayer graphene heterostructures ALEXANDER ZIBROV, CARLOS KOMETTER,, Department of Physics, University of California, Santa Barbara CA 93106, TAKASHI TANIGUCHI,, KENJI WATANABE,, Advanced materials laboratory, National institute for Materials Science, Tsukuba, Ibaraki, 305-0044, Japan, MICHAEL ZALATEL, Station Q, Microsoft Research, Santa Barbara, California, 93106-6105, USA, ANDREA YOUNG, Department of Physics, University of California, Santa Barbara CA 93106 — We report multi-terminal magneto-capacitance measurements of bilayer graphene (BLG) devices in which the BLG is successively enapsulated in both hBN and few-layer graphite gates. Due to the resulting dramatic increase in sample quality, we observe a rich sequence of FQH states with denominators as large as 11. In addition, we observe robust even denominator states at $\nu = -5/2$, -1/2, 3/2 and, 7/2). We find the thermodynamic gap of the $\nu = 3/2$ state to be $\Delta\mu_{3/2} = 4$ K at $B = 14$ T, considerably larger than has been observed for even-denominator states in other experimental systems. Measuring the full capacitance matrix, we determine the layer polarization and identify both single- and multi-component regions within the quasi-degenerate space of spin, valley, and orbital quantum number. We find that the even denominator states occur in fully single component regimes, supporting their interpretation as nonabelian, Pfaffian ground states. The ease of tuning valley degeneracy in our dual gated geometry further allows us to explore level crossings between states of differing valley polarization.

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