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Local Compressibility Measurements of Broken-Symmetry States in Suspended Bilayer Graphene JENS MARTIN, BEN FELDMAN, THOMAS WEITZ, MONICA ALLEN, AMIR YACOBY, Physics Department, Harvard University — We have performed local compressibility measurements of a suspended bilayer graphene flake using a scanning single electron transistor. In addition to the expected energy gaps at filling factors $\nu = \pm 4$ and ± 8, we observe Landau levels corresponding to broken-symmetry states at $\nu = 0$ and ± 2. The width of the incompressible region at each filling factor is independent of magnetic field B, and is on the order of 10^{10} cm^{-2}, indicative of the low disorder in suspended devices. Remarkably, the $\nu = \pm 4$ gaps even persist below 50 mT. The measured energy gap between each Landau levels scales linearly with B, with a magnitude of approximately 4 meV/T for $\nu = \pm 4$ and approximately 1 meV/T for the broken-symmetry states. In addition, the flakes exhibit decreased compressibility near the charge neutrality point at $B = 0$. Scanning the tip position reveals density variations consistent with estimates from transport and from the width of the incompressible regions around each Landau level.

Jens Martin
Physics Department, Harvard University

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