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Local compressibility of bilayer graphene in the quantum hall regime ANDREI LEVIN, ANGELA KOU, BENJAMIN FELDMAN, BERTRAND HALPERIN, Harvard Univ, KENJI WATANABE, TAKASHI TANIGUCHI, AML, NIMS, Tsukuba, Japan, AMIR YACOBY, Harvard Univ — In the presence of a strong magnetic field, the charge carriers in bilayer graphene (BLG) condense into a set of flat energy bands called Landau levels (LLs). Electronic compressibility measurements have historically been a powerful tool in studying the physics of partially filled LLs in two-dimensional electronic systems. In particular, electron-electron correlations arising from Coulomb interactions can introduce a negative component to the compressibility. Here we present measurements of electronic compressibility in BLG, performed locally using a scanning single electron transistor. We find that while the inverse compressibility is close to zero for $4 < |\nu| < 8$, it is markedly more negative in the lowest LL, $|\nu| < 4$. Moreover, within the lowest LL, the background inverse compressibility between integer filling also exhibits a stark even-odd asymmetry. It is more negative when starting to fill from an even filling factor than when starting to fill from an odd filling factor, exhibiting a $\nu \rightarrow \nu + 2$ symmetry and indicating the important role of the orbital degeneracy uniquely present in bilayer graphene.

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