Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Transport Spectroscopy of Symmetry-Broken Insulating States in Bilayer Graphene JAIRO VELASCO JR., LEI JING, WENZHONG BAO, YONGJIN LEE, University of California Riverside, PHILIP KRATZ, Stanford University , VIVEK AJI, MARC BOCKRATH, JEANIE LAU, CHANDRA VARMA, University of California Riverside, RYAN STILLWELL, DMITRY SMIRNOV, Florida State University, FAN ZHANG, JEIL JUNG, ALLAN MACDONALD, University of Texas Austin — The flat bands in bilayer graphene (BLG) are sensitive to electric fields Edirected between the layers, and magnify the electron-electron interaction effects, thus making BLG an attractive platform for new two-dimensional (2D) electron physics. Theories have suggested the possibility of a variety of interesting broken symmetry states, some characterized by spontaneous mass gaps, when the electron-density is at the carrier neutrality point (CNP). The theoretically proposed gaps in bilayer graphene are analogous to the masses generated by broken symmetries in particle physics and give rise to large momentum-space Berry curvatures accompanied by spontaneous quantum Hall effects. Though recent experiments have provided convincing evidence of strong electronic correlations near the CNP in BLG, the presence of gaps is controversial. Here we present transport measurements in ultra-clean double-gated BLG, using source-drain bias as a spectroscopic tool to resolve a gap of $\sim$2 meV at the CNP. The gap can be closed by an electric field $E \sim 15$ mV/nm but increases monotonically with a magnetic field B, with an apparent particle-hole asymmetry above the gap, thus providing a spectroscopic mapping of the ground states in BLG.

Jairo Velasco Jr.
University of California Riverside

Date submitted: 09 Nov 2011 Electronic form version 1.4