Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Nonlinearities in Strongly Coupled Lateral Quantum Hall Droplets P. JIANG, C. CHIEN, I. YANG, W. KANG, James Franck Institute and Department of Physics, University of Chicago, L.N. PFEIFFER, K.W. BALDWIN, K.W. WEST, Bell Laboratories, Lucent Technologies — We report on conductance characteristics of a lateral quantum Hall line junction with an aperture in a thin tunnel barrier (width = 8.8 nm). Due to the small opening inside the barrier, the charge distribution in the junction resembles that around a narrow split gate. In the presence of a magnetic field, the edge states of the two- dimensional electron systems across these particular junctions are strongly coupled compared to those with pristine barriers. In the integer quantum Hall effect (IQHE) regime, a strong resonance in conductance is detected at zero bias, while it evolves into an anomalous suppression as the system enters the fractional quantum Hall effect (FQHE) regime. The dramatic suppression of the conductance in the FQHE regime is consistent with the presence of strong repulsive interaction in the lowest Landau levels, while the enhanced conductance in the IQHE regime supports the prediction of softened Coulomb interaction. The contrasting conductance behaviors in the IQHE and the FQHE regimes clearly distinguish the effects of electron-electron interaction in the inter-edge transport in these two regimes.

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Date submitted: 01 Dec 2005 Electronic form version 1.4