Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Observation of Fractional Microwave-Induced Resistance Oscillations using Co-Planar Waveguide on High-Mobility 2DES KRISTJAN STONE, RUI-RUI DU, Rice University, LOREN PFEIFFER, KEN WEST, Bell Laboratories, Alcatel-Lucent — The microwave-induced resistance oscillations (MIRO) are commonly observed in high-mobility GaAs 2D electron systems (2DES) irradiated by microwaves. Usually this is accomplished using an antenna or waveguide, where the electromagnetic components (E_ω and H_ω) coincide with the 2DES plane. We explore MIRO in a co-planar waveguide (CPW) geometry, in which E_ω is the dominant excitation component in the 2DES plane. Our samples are Hall bars of high-mobility, μ= (6 - 12) $\times 10^6$ cm^2/Vs, GaAs/Al_xGa_{1-x}As quantum wells with electron densities ranging from 3 to 5 $\times 10^{11}$cm^{-2}. Microwaves from a tunable source (2 - 40 GHz) were fed in, via a semi-rigid coax cable, to an impedance-matched CPW across the length of the Hall bar, and brought out via a similar semi-rigid coax to a power sensor. Using this CPW geometry, we are able to simultaneously measure the photoconductivity and the microwave transmission across the sample. In a temperature range of 2.0 K - 5.0 K, we observed fractional MIRO associated with ε =1/2, 1/3, 1/4, and 1/5, where $\varepsilon = \omega/\omega_c$, and ω_c is the cyclotron frequency. Experimental data as well as a brief discussion will be presented. The work at Rice was funded by NSF DMR-0706634.

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Date submitted: 19 Nov 2008 Electronic form version 1.4