Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Experimental examination of current instabilities in the irradiated 2DEG R.L. WILLETT, K.W. WEST, L.N. PFEIFFER, Bell Laboratories, Lucent Technologies — RF radiation imposed on a high quality heterostructure can result in a series of oscillations periodic in ω/ω_c with ω the radiation frequency and ω_c the cyclotron frequency, using bare GaAs electron mass [1]. Subsequently it was observed [2,3] that in high mobility samples the minima can form apparent zeroes. These findings are consistent with micro- and macroscopic theoretical pictures of radiation induced transport and current instabilities due to local negative resistivities.[4] Using simple dipole configurations with radiation up to 20GHz frequency we have examined the magneto-resistance oscillations in ultra-high mobility samples, focusing on indications of current instabilities and the fundamental origin of the oscillations. We find that under radiation, voltages are observed from internal to external contacts in the absence of applied driving currents, with a distinction from simple rectification at the principal oscillation minima. Further measurements of magneto-resistance have been carried out using multiple dipoles to apply different radiation frequencies simultaneously. These results are reviewed in consideration of both the origin of the magneto-resistive oscillations and the current instabilities. [1] M.A. Zudov, et al, Phys. Rev. B. 64, 201311 (2001). [2] R.G. Mani, et al; Nature 420, 646 (2002). [3] M.A. Zudov, et al, Phys. Rev. Lett. 90, 046807 (2003). [4] A.V. Andreev, et al, Phys. Rev. Lett. 91, 056803 (2003).

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Date submitted: 01 Dec 2004 Electronic form version 1.4