Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Measurement of the THz Hall conductivity in a GaAs high mobility two dimensional electron gas A. V. STIER, C. T. ELLIS, J. CERNE, B. D. MCCOMBE, Dept. of Physics, University at Buffalo, SUNY — We investigate the THz Hall conductivity in a high mobility two dimensional electron gas. Motivated by predictions of novel step-like features in the optical Hall conductivity (σ_{xy}) by Morimoto et.al. (Phys. Rev. Lett. 2009), we measure the THz σ_{xy} as a function of top gate voltage and magnetic field (up to 10T) at 2K using polarization modulation techniques (Grayson, Phys. Rev. Lett. 2002). Morimoto et.al. found that localization effects open energy gaps between extended states, producing plateaus in the IR σ_{xy} and that should be observable in Faraday effect measurements. We sensitively measure the Faraday rotation using a rotating linear polarizer and the Faraday ellipticity/ circular dichroism using a rotating wave plate in combination with strong THz radiation in the 3-10 meV range from a far-infrared molecular gas laser. Unlike the infrared longitudinal conductivity (σ_{xx}), which probes the sum of the optical responses for left and right circularly polarized light, the infrared Hall conductivity is proportional to the difference and therefore is sensitive to small changes in symmetry.

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Date submitted: 20 Nov 2009 Electronic form version 1.4