Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Parallel Magnetic Field Effect in the Insulating Phase of 2D Metal-Insulator Transition in p-GaAs with High r_s RICHARD L.J. QIU, XUAN P.A. GAO, Department of Physics, Case Western Reserve University, LOREN N. PFEIFFER, KEN W. WEST, Department of Electrical Engineering, Princeton University — We present magnetotransport measurements on the insulating side of the 2D metal-insulator transition in p-type GaAs quantum wells with 10 nm width (critical density $p_c \sim 0.8*10^{10}/cm^2$, $r_s \sim 36$). Before entering the disorder dominated regime ($p^* < p < p_c$) ($p^* \sim 0.5*10^{10}/cm^2$), the conductance of the insulating phase follows a power-law like temperature dependence that is different from the well known thermally activated or variable range hopping behavior for insulators. In this unconventional insulating regime, a strong in-plane magnetic field ($B_{||} > B_c \sim$ 1-2 Tesla) drives the insulating phase into a "normal" insulating state which shows the variable range hopping behavior with Coulomb gap. Moreover, with the presence of a strong in-plane magnetic field in the hopping transport regime, large negative magnetoresistance (ρ can decrease by a factor of 5) is observed when increasing the $B_\perp$ component. The authors thank the NSF (DMR-0906415, DMR-0819860) and the Gordon and Betty Moore Foundation for funding support.

Lei Qiu
Department of Physics, Case Western Reserve University

Date submitted: 14 Nov 2012 Electronic form version 1.4