Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Evidence of fully spin polarized $\nu = 3$ in single valley (110)-AlAs quantum wells S. PRABHU-GAUNKAR, M. GRAYSON, EECS Dept., Northwestern University, S. DASGUPTA, M. BICHLER, A. FONTCUBERTA I MORRAL, G. ABSTREITER, Walter Schottky Institut, Tech. Univ. Munich — We observe a spike in the longitudinal resistance of a single valley (110)-AlAs quantum well between $\nu = 3$ and 4 which is interpreted as evidence of a quantum Hall ferromagnetic transition. This feature occurs at a magnetic field $B = 2.85$ T in a sample with densities $n = 1.5 - 2.17 \times 10^{11}$ cm^{-2} in a perpendicular field with no external strain. The spike disappears on further lowering the density of the sample or on raising its temperature above 600 mK. The spike also shows magnetic hysteresis. Since AlAs is a heavy mass system, the exchange enhanced Zeeman energies become comparable to the cyclotron energies and can lead to Landau level crossings even in a purely perpendicular magnetic field. Being a single valley system, there are fewer quantum numbers for the Landau levels than in standard (001) double-valley AlAs wells, and exchange interactions can reorder the levels differently. The spike feature may suggest that up to three completely spin polarized levels exist before the occupation of minority spin levels lowers the exchange interaction energy causing the ground state transition. The (110)-AlAs quantum wells may thus be particularly suited to study exchange enhancement effects.

Sunanda Prabhu-Gaunkar
Northwestern University

Date submitted: 20 Nov 2009 Electronic form version 1.4