Recent results from single and double layer quantum Hall systems

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This talk will review some of our most recent experiments [1-4] on high mobility 2D electron systems in the fractional quantized Hall effect (FQHE) regime. For the case of single layer 2D systems the focus will be on transport phenomena in the N=1, or first-excited Landau level. In particular, I will describe experiments which demonstrate that the fate of the $\nu = 5/2$ FQHE state in tilted magnetic fields depends sensitively on the width of the quantum well confining the electrons and on the relative alignment of the Landau levels emanating from the various electric subbands of the quantum well. I will also present evidence for a FQHE state at $\nu = 7/3$ which simultaneously exhibits both a robust quantized Hall plateau and a strongly anisotropic longitudinal resistance.

In double layer 2D systems I will describe recent experiments on the excitonic QHE state at total Landau level filling $\nu_T = 1$. These experiments, done in Corbino geometries, have convincingly demonstrated that while the bulk of the 2D system is opaque to charged quasiparticle transport, it is essentially transparent to neutral exciton transport. This distinction is manifested by the very large electrical resistance encountered when *parallel* currents in the two layers attempt to cross the bulk in contrast to the very small resistance encountered by *antiparallel* currents. Among other things, the ready transport of excitons across the bulk leads to the curious phenomenon of "perfect Coulomb drag" in which a bulk current in one layer spontaneously generates an equal, but oppositely directed, bulk current in the other layer even though the layers are electrically isolated.

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