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Tilted Field Studies of Competing Phases in the N=1 Landau Level[1] JING XIA, VACLAV CVICEK, J.P. EISENSTEIN, California Institute of Technology, L.N. PFEIFFER, K.W. WEST, Princeton University — The N=1 Landau level (LL) exhibits collective electronic phenomena characteristic of both fractional quantum Hall (FQHE) states seen in the lowest LL and pinned, anisotropic states in the higher LLs. Moreover, it has been shown that in tilted magnetic fields, FQHE states at $\nu = 5/2$ and $\nu = 7/2$ give way to anisotropic states, revealing the close competition between the two phases. To study the energetics of various quantum phases in the N=1 LL, we perform measurements of the activation energy gap and temperature dependence of the resistivity anisotropy in a high mobility and relatively low density 2DES in a GaAs quantum well at $\nu = 5/2$, $\nu = 7/2$, $\nu = 8/3$ and $\nu = 7/3$ in tilted magnetic fields. At zero tilt, we observe several re-entrant integer quantum Hall (RIQH) states along with FQHE states in the N=1 LL. As the in-plane magnetic field increases, FQHE activation gaps are reduced at half fillings while strengthened at third fillings. In the meanwhile, transport anisotropy is enhanced at all four fillings with increasing tilt. At high tilt, we observe strong anisotropic states at half fillings in coexistence with FQHE states with accurately quantized Hall plateaus at third fillings.

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