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Anisotropic Electronic Transport in a Two-dimensional Hole System under a Tilted Magnetic Field ZHIGANG JIANG, Dept. of Physics, Columbia Univ. and National High Magnetic Field Lab, M.J. MANFRA, Bell Labs, Lucent Technologies, Y.-W. TAN, H.L. STORMER, Dept. of Physics, Columbia Univ., D.C. TSUI, Dept. of Electrical Engineering, Princeton Univ., L.N. PFEIFFER, K.W. WEST, Bell Labs, Lucent Technologies — We study the electrical transport properties of a high mobility two-dimensional hole system (2DHS) confined in a GaAs/AlGaAs quantum well grown on the (100) surface of GaAs. We observed a remarkable magnetotransport anisotropy in the $N = 1$ Landau level, different from the two-dimensional electron gas (2DEG), in which the anisotropy shows exclusively in the higher Landau levels ($N \geq 2$). Under a tilted magnetic field, we find that the anisotropy can be either reduced or enhanced by the in- plane magnetic field, depending on the direction of the field with respect to the lattice orientation of the sample. This behavior is again different from the previous reported results in 2DEG, where we expect the anisotropy will collapse precipitously as applying a much smaller in-plane magnetic field than what we have applied on the 2DHS. Particularly, at high tilting angles, we observed a "spike" like feature developed in the magnetoresistance (R_{xx}) at the filling factor $2 < \nu \leq 5/2$. However, unlike the resistance spike features associated with the first order magnetic transition between quantum Hall ferromagnets, no correlated spike has been observed in the Hall resistance (R_{xy}) of our sample.

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