

Abstract Submitted  
for the MAR17 Meeting of  
The American Physical Society

**Resistance Spike Enhancement at a Landau Level Crossing in a Two-subband 2D Electron System with a 1D Density Modulation**<sup>1</sup> MENG K. MA, MD. SHAFAYAT HOSSAIN, M. A. MUEED, L. N. PFEIFFER, K. W. WEST, K. W. BALDWIN, M. SHAYEGAN, Princeton University — When two Landau levels with different indices, subband, orbital, or spin, cross at the Fermi level, a resistance spike is often seen at low temperatures, signaling a ferromagnetic quantum Hall effect transition. The spike is believed to be a manifestation of extra dissipation at the boundary between the domains of quantum Hall states with different pseudo-spin. Here we report magneto-transport measurements in a two-subband 2D electron system (40 nm-wide GaAs quantum well with  $n = 2.7 \times 10^{11} \text{ cm}^{-2}$ ) where a resistance spike is seen near  $\nu = 6$  at a crossing of Landau levels with different subband indices at temperatures ranging from 600 mK to 1 K. In our experiments, we impose a strain-induced, 1D periodic density modulation through the piezoelectric effect of stripes of negative e-beam resist placed on the sample surface. The data reveal a significant amplification of the resistance spike at  $\nu = 6$ . We also observe that the level of enhancement depends the period of the stripes; the stripes with a 225 nm period give the strongest enhancement and lower the temperature onset to below-300 mK. We discuss possible implications of the observations.

<sup>1</sup>Work supported by the NSF (Grants DMR-1305691, ECCS-1508925, and MRSEC DMR-1420541), the DOE Basic Energy Sciences (Grant DE-FG02-00-ER45841), the Gordon and Betty Moore Foundation (Grant GBMF4420), and the Keck Foundation.

Md. Shafayat Hossain  
Princeton Univ

Date submitted: 09 Nov 2016

Electronic form version 1.4