Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Strain control of the orientation of stripe phases in quantum Hall regime SUNANDA KODUVAYUR, YULI LYANDA-GELLER, GABOR CSATHY, MICHAEL MANFRA, SERGEI KHLEBNIKOV, LEONID ROKHINSON, Purdue University, KEN WEST, LOREN PFEIFFER, Princeton University — Ground state of a two dimensional electron gas in partially occupied Landau levels (LLs) is unstable against the formation of nematic phases. Near half-filled LLs, charge density wave (CDW) is expected to form a unidirectional stripe phase. The existence of striped phase has received experimental support from the observation of large anisotropy of magnetoresistance in high mobility 2D electron and hole gases. The puzzling experimental feature has been the preferential orientation of the stripes along [110] crystallographic direction in a variety of GaAs heterostructures. Here we show that the orientation of stripes can be manipulated by uniaxial strain. We study hole samples fabricated in the Van der Pauw geometry from Carbon-doped GaAs/AlGaAs heterostructure grown on (001) substrate. We apply uniaxial strain along the two orthogonal directions [110] and [$1\bar{1}0$] and study the transport properties in a perpendicular field at 10mK. Strain, apart from switching the hard and easy transport axes, also induces stripe phases at filling fractions of $\nu = 5/2$ and $9/2$, which are isotropic in unstrained samples. From our experimental and theoretical investigation we conclude that piezoelectricity is at the origin of preferential orientation of stripes in two dimensional systems.

Sunanda Koduvayur
Purdue university

Date submitted: 20 Nov 2009 Electronic form version 1.4