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Effect of strain on nematic phases of two-dimensional hole gases SUNANDA KODUVAYUR, LEONID ROKHINSON, Purdue University, MICHAEL MANFRA, Bell laboratories, Lucent Technologies — We study the effect of uniaxial strain on high Landau levels(LL), $N \geq 2$ (N is the LL index), in two dimensional hole gases(2DHG). The presence of anisotropic magnetotransport at certain half-integer filling factors in these systems has been understood as a signature of stripe or nematic phases. Recent studies on 2DHG in a perpendicular field have shown anisotropic transport at filling factors $\nu = 7/2$ and $11/2$ accompanied by an isotropic $9/2$ state. These results differ from those of 2D electrons where anisotropy is only observed for LLs with $N \geq 3$. While this difference has been attributed to stronger spin-orbit interactions in holes, the origin and conditions necessary for the stabilization of these states are still open questions. We study samples fabricated in the Van der Pauw geometry from C-doped GaAs/AlGaAs 2DHG grown on (001) substrate. We apply uniaxial strain along [110] and study the transport properties in a perpendicular field at 10mK. We introduce nematic states earlier on for $2 \leq N \leq 7$ with large enough strain. Furthermore, we demonstrate reversal in direction of anisotropy at filling factors $\nu = 7/2$ and $5/2$ with strain modulation. We also see a difference in strain response of the resistances along [110] and $[1\bar{1}0]$. We try to understand the observed effects using an electrostatic model which incorporates the anisotropy of the elastic moduli of GaAs.

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