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Preferential orientation of stripes in high Landau levels Y. LYANDA-GELLER, S.P. KODUVAYUR, G.A. SCATHY, M.J. MANFRA, S. KHLEBNIKOV, Purdue University, K.W. WEST, L.N. PFEIFFER, Princeton University, L.P. ROKHINSON, Purdue University — Near half-filled Landau Levels at $n > 2$, two-dimensional systems are unstable with respect to the formation of a stripe phase, with charge carrier guiding centers forming a one-dimensional periodic pattern. The stripe phase is consistent with experimentally observed anisotropic magnetoresistance. The puzzling experimental feature has been the preferential orientation of the stripes along [110] crystallographic direction in GaAs heterostructures with spatial confinement along [001]. Here we present the Hartree-Fock analysis demonstrating that shear strain ϵ_{xy} defines a preferential direction of instability with respect to the formation of the stripe phase. The analysis is valid for both hole and electron gases, but the effect is stronger in hole systems. In the absence of external strain, the preferential orientation originates from the built-in electric fields in heterostructures that induce internal strain due piezoelectric effect in GaAs. The internal strain leads to the orientation of stripes along [110]. Application of external strain can compensate the internal strains, and change the preferential orientaton to $[1\bar{1}0]$, as observed experimentally. Our analysis also accounts for the experimentally observed effects of the in-plane magnetic field on the orientation of stripes in electronic samples.

Yuli Lyanda-Geller
Purdue University

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