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Orientation of quantum Hall stripes under in-plane magnetic fields[1]

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One longstanding mystery about quantum Hall stripes is the origin their native orientation, which is found to be along the $\langle 110 \rangle$ crystal axis of GaAs in most cases. An in-plane magnetic field $B_{\|}$ can modify the orientation, and a "standard picture" was established that stripes perpendicular to $B_{\|}$ are favored in a single-subband quantum well. This talk will discuss recent experiments showing that this "standard picture" is incomplete. First, a regime for stripes parallel to $B_{\|}$ being the ground state has been established. Second, the orientation of stripes with respect to $B_{\|}$ is shown to depend on the carrier density and the filling factor. Qualitative examination of these findings suggests that screening plays an important role in determining the orientation of stripes. In addition, we find that the reorientations by $B_{\|}$ are sensitive to the partial filling of a given Landau level. The implications on the native orienting mechanism will also be discussed. This work was done in collaboration with M. Zudov, J. Watson, G. Gardner, Q. Qian and M. Manfra.

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