

Abstract Submitted
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Imaging 2D Electron Density Variations in High Mobility AlGaAs/GaAs Systems¹ JERRY LEE, KEN WEST, KIRK BALDWIN, LOREN PFEIFFER, Princeton University, LARA FERNANDES LAVELLI, ARON PINCZUK, Columbia University — We demonstrate two different techniques to measure the local 2D electron densities of high mobility AlGaAs/GaAs systems on the micron scale. We used micro-photoluminescence imaging to look for 2D density variations on the 50 micron scale, as well as local magneto-transport measurements to look for 2D density and mobility variations on the scale of several hundred microns. Our results suggest that the 2D electron systems indeed have local 2D densities and mobilities that vary from their corresponding mean values. Spatial maps suggest that the origin of these variations is likely due to variations in the MBE layer thicknesses across the wafer, as well as by fixed charge sites that we believe are located within the GaAs substrate or at the substrate-MBE interface. Our findings suggest that the current limits on the 2D electron mobility could be raised by devising methods to negate the effects of these fixed charges.

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