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Scanning Probe Study of Edge States in a Two-Dimensional Electron System CEMIL KAYIS, STUART TESSMER, Michigan State University, LOREN PFEIFFER, KEN WEST, Bell Laboratories, Lucent Technologies — The edge-state picture in two-dimensional electron systems (2DESs) in an applied perpendicular magnetic field successfully explains several properties observed in transport measurements in the quantum Hall regime. Although a handful of scanning probe experiments have resolved these states, a detailed understanding of the apparent edge-state width and resistance has yet to emerge. We apply Scanning Charge Accumulation Imaging, a cryogenic capacitance technique, to study the behavior of a 2DES in a GaAs/AlGaAs heterostructure sample. The sample contains a pattern of narrow metallic gates fabricated on the exposed surface, a 2DES 80 nm below the surface, and an underlying metallic electrode. By allowing charge to tunnel vertically from the underlying electrode our technique is especially sensitive to compressibility variations of the system. Here we report progress on resolving the edge state properties with this method.

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