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# Imaging Transport Resonances in the Quantum Hall Effect

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We image charge transport in the quantum Hall effect using a charge accumulation microscope. Scanning a charge sensitive tip just above the surface of a very high mobility AlGaAs/GaAs heterostructure, we measure the charging underneath the tip that results from applying an ac voltage to the 2D electron system (2DES). Applying a dc bias voltage to the tip induces a highly resistive ring-shaped incompressible strip (IS) in the 2D electron system (2DES) that moves along with the tip. This IS acts as a barrier that prevents charging of the region under the tip. At certain tip positions, short-range disorder in the 2DES creates a quantum dot island inside the IS that enables breaching of the IS barrier by means of resonant tunneling through the island. The images that result show striking ring shapes that directly reflect the shape of the IS. Within the ring shaped features, we also observe striations that arise from Coulomb Blockade of the quantum dot island. Varying the magnetic field, the tunneling resistance of the IS varies significantly, and takes on drastically different values at different filling factors. Measuring this tunneling resistance provides a unique *microscopic* probe of energy gaps in the quantum Hall system. To better understand the origin of the transport resonances, we have completed a series of simulations that show that the native disorder from remote ionized donors can create islands in the IS. Comparing the simulations with the experimental images provides a direct view of the disorder potential of a very high mobility 2DES. The experiments and simulations reveal the potential importance of single-electron resonant tunneling to bulk transport in the quantum Hall effect.