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Scanning Probe Study of Donor Layer Charging in a Gallium Arsenide Heterostructure IRMA KULJANISHVILI, STUART TESSMER, Institute for Quantum Sciences, Michigan State University, LOREN PFEIFFER, K.W. WEST, Bell Laboratories, Lucent Technologies — We use a cryogenic scanning probe technique to study the charging behavior of silicon dopants in a GaAs/AlGaAs heterostructure sample. The sample contains a delta doped layer which is 60 nm below the exposed surface and 20 nm above an underlying two-dimensional electron system. We locally induce charge to enter the donor layer by applying an ac excitation voltage to a sharp metal tip situated a few nanometers above the surface. The resulting image charge appearing on the tip provides a local measure of magnitude of charge entering the donor layer. Here we report measurements as a function of dc voltage and magnetic field.

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