Abstract Submitted
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1/f Noise in Delta Doped GaAs/AlGaAs Heterostructures[1] YUN SUK EO, STEVEN WOLGAST, CAGLIYAN KURDAK, University of Michigan Department of Physics, L. N. PFEIFFER, K. W. WEST, Princeton University Department of Electrical Engineering — We studied $1/f$ noise of a two-dimensional electron gases (2DEG) in δ-doped $GaAs/Al_xGa_{1-x}As$ heterostructures. Three samples that we measured were identical except for the δ-doping concentration: $9.1 \times 10^{18}(cm^{-2})$(high), $1.3 \times 10^{18}(cm^{-2})$(medium), $0.3 \times 10^{18}(cm^{-2})$(low). These δ-doping layers are located in the $Al_xGa_{1-x}As$ region, $800\mathring{A}$ above the $GaAs$ and $Al_xGa_{1-x}As$ interface. We fabricated Corbino and Hall bar structures with different sizes. Carrier density was varied by the persistent photoconductivity effect at low temperature (4.2K). Initially, the samples did not exhibit measurable $1/f$ noise. The high δ-doping concentration samples exhibited parallel conduction. As we increased the carrier concentration in the high and medium-doped samples, $1/f$ noised increased initially, but disappeared as the photo current was saturated. The low-doped samples did not exhibit $1/f$ noise as the carrier concentration was increased. We conclude that $1/f$ noise is caused by the remote ionized impurities in the δ-doped region. Also, changing the DX-center configuration changes the density of the ionized impurities, which then changes the magnitude of $1/f$ noise.

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