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Conductance noise in a strongly disordered 2D electron system in Si MOSFETs[1] PING V. LIN, XIAOYAN SHI, JAN JAROSZYŃSKI, DRAGANA POPOVIĆ, National High Magnetic Field Lab., Florida State Univ. — Studies have shown that the metal-insulator transition (MIT) in a 2DES in Si MOSFETs is closely related to the glassy freezing of electrons as temperature $T \to 0$. However, no glassy relaxations were seen after a T quench. Here we first study the effect of cooling in detail: the carrier density n_s is changed at a high $T \approx 20$ K, the system is then cooled to a desired T with a fixed n_s, and fluctuations of conductance G with time are measured. The analysis of the noise power spectra $S_G \propto 1/f^\alpha$ gives evidence for the onset of slow, glassy dynamics near the MIT as $T \to 0$, supporting conclusions obtained with a different protocol. While these noise measurements were done in the Ohmic regime, we have also explored the effect of high excitation voltages, deep into the nonlinear regime, on the noise statistics. The results will be discussed in detail. Finally, we show that sweeping n_s at low enough T results in a reproducible fluctuation pattern of $G(n_s)$. Such a pattern, which reflects a particular realization of disorder, does not change even after warming up to 30 K. This demonstrates that the disorder does not change at low T, and that the observed non-Gaussianity of the noise reflects the intrinsic glassiness of the 2DES.

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