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Interaction-driven versus disorder-driven transport in ultra-dilute GaAs two-dimensional hole systems[1] JIAN HUANG, Wayne State University, L.N. PFEIFFER, K.W. WEST, Princeton University — It is well-known that the insulating behavior in the two-dimensional metal-to-insulator transition demonstrates a finite temperature conduction via hopping. Recently, however, some very strongly interacting higher purity two-dimensional electron systems at temperatures $T \to 0$ demonstrate certain nonactivated insulating behaviors that are absent in more disordered systems. Through measuring in dark the T-dependence of the conductivity of ultra-high quality 2D holes with charge densities down to 7×10^8 cm^{-2}, an approximate power-law behavior is identified. Moreover, for the lowest charge densities, the exponent exhibits a linearly decreasing density-dependence which suggests an interaction-driven nature. Such an electron state is fragile to even a slight increase of disorder which causes a crossover from nonactivated to activated conduction. The non-activated conduction may well be an universal interaction-driven signature of an electron state of strongly correlated (semiquantum) liquid.

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