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Resistivity of a high mobility two-dimensional hole gas on (100) GaAs in the vicinity of the metal-to-insulator transition MICHAEL MANFRA, L. PFEIFFER, K. WEST, A.M. SERGENT, Bell Laboratories — We report on the density and temperature dependence of the resistivity of an extremely high mobility, carbon-doped, two-dimensional hole system (2DHS) in the vicinity of the putative metal-to-insulator (MIT) transition. The high mobility of our structures allows us to probe the conduction properties at very low 2D densities, $\sim 10^9 \mathrm{cm}^{-2}$, a regime in which interactions are expected to play an important role. Using a back-gated structure, a mobility of $2.2 \times 10^6 \mathrm{cm}^2/\mathrm{Vs}$ is achieved at a density of $2.9 \times 10^{10} \mathrm{cm}^{-2}$ at T=50mK. Backgating allows us to monitor the evolution of the resistivity as the density is continuously tuned from $2.9 \times 10^{10} \mathrm{cm}^{-2}$ to $2.9 \times 10^9 \mathrm{cm}^{-2}$. From analysis of the temperature dependence of the resistivity, the sample becomes insulating at $3.5 \times 10^9 \mathrm{cm}^{-2}$. We compare our data to existing models of the MIT in high mobility, low density, structures.

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