Abstract Submitted
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The disappearance of weak localization in a strongly correlated 2D hole system[1] RICHARD L.J. QIU, XUAN P.A. GAO[2], Dept of Physics, Case Western Reserve University, LOREN N. PFEIFFER, KEN W. WEST, Dept of Electrical Engineering, Princeton University — The origin of Metal-Insulator Transition (MIT) in strongly correlated two-dimensional (2D) electrons or holes in semiconductors has long been of great interest. We will present the low temperature (down to 0.05K) transport properties of 10nm GaAs quantum wells with metallic hole densities near the critical point of the 2D MIT (critical density $p_c \approx 0.8 \times 10^{10}\mathrm{cm}^{-2}$). We found that 2D holes exhibit a negative magneto-resistance in small perpendicular magnetic fields, which has been attributed to weak localization in the literature. On the other hand, the magnitude of this negative magneto-resistance is much smaller than conventional 2D weak localization. What is more surprising is that the weak localization induced negative magneto-resistance peak around B=0 becomes weaker at lower temperature, suggesting there is a mechanism causing quasiparticles to lose coherence as temperature decreases.

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