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Wigner-Mott scaling of transport near the two-dimensional metal-insulator transition MILOS RADONJIC, DARKO TANASKOVIC, Scientific Computing Laboratory, Institute of Physics Belgrade, University of Belgrade, Pregrevica 118, 11080 Belgrade, Serbia, VLADIMIR DOBROSAVLJEVIC, Department of Physics and National High Magnetic Field Laboratory, Florida State University, Tallahassee, Florida 32306, GABRIEL KOTLIAR, Department of Physics and Astronomy, Rutgers University, Piscataway, New Jersey 08854 — Thermal destructions of heavy quasiparticles often dominates the transport behavior of many strongly correlated materials. It typically leads to pronounced resistivity maxima in the incoherent regime around the coherence temperature T^*, reflecting the tendency of carriers to undergo Mott localization following the demise of the Fermi liquid. This behavior is best pronounced in the vicinity of interaction-driven (Mott-like) metal-insulator transitions, where the T^* decreases, while the resistivity maximum ρ_{max} increases. Here we show that, in this regime, the entire family of resistivity curves display a characteristic scaling behavior $\rho(T)/\rho_{max} \approx F(T/T_{max})$, while the ρ_{max} and $T_{max} \sim T^*$ assume a powerlaw dependence on the quasi-particle effective mass m^*. Remarkably, precisely such trends are found from an appropriate scaling analysis of experimental data obtained from diluted two-dimensional electron gases in zero magnetic fields. Our analysis provides strong evidence that inelastic electron-electron scattering – and not disorder effects – dominates finite temperature transport in these systems, validating the Wigner-Mott picture of the two-dimensional metal-insulator transition.

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