Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

The low-temperature 2D mobility for metallic p-type GaAs Quantum Well THEODORE CASTNER[1], University of Rochester — At T < 1.2K the mobility μ(T) is determined by charged trap ionized impurity scattering (iis) and T-dependent screening [1]. μ(T) is calculated with $<\tau(E)>$ given by an empirical expression $\tau = \tau_o$x/[x + C tanh(η/2)] [x = E/kT, $\eta = T_F/T$ and a 2D DOS that features a pseudogap. μ(T) exhibits a minimum at $T_m = T_F/2.25$ and increases slowly for $T > T_m$. The physical reason for this unusual increase in μ(T) is explained. The coefficient C is directly related to $\mu(0)/\mu(T_m$ [4.0 > ratio > 3.6 for p-type GaAs data [2]]. The T-dependent screening κ_2(T) = s(T) $\kappa_2(0)$ and s(T) is given by [μ(T)-μ_m]/ [μ(0)-μ_m]. This s(T) allows the determination of T* [dσ/dT = 0] where T* is slightly less than T_m. The data [2] is an example of ideal 2D behavior. The role of interactions for $T < T_m$ and $T > T_m$ will be discussed. [1] F. Stern, PRL 44, 1469 (1980); [2] X.P.A. Gao et al., PRL 93, 256402 (2004).

[1]emeritus

Theodore Castner
University of Rochester

Date submitted: 29 Nov 2007 Electronic form version 1.4