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**Pinning and Melting of a Quantum Wigner Crystal**[1] TALBOT KNIGHTON, Wayne State Univ, ALESSANDRO SERAFIN, National High Field Magnetic Laboratory and University of Florida, Gainesville, FL, USA, ZHE WU, VINICIO TARQUINI, Wayne State Univ, JIAN-SHENG XIA, NEIL SULLIVAN, National High Field Magnetic Laboratory and University of Florida, Gainesville, FL, USA, JIAN HUANG, Wayne State Univ, LOREN PFEIFFER, KEN WEST, Princeton University — Quantum Wigner crystals (WC) are a remarkable interaction-driven phase that is expected to display manybody pinning in arbitrarily low disorder. For two-dimensional (2D) systems, application of a perpendicular magnetic field quenches the kinetic energy and so that the reentrant and high field insulating phases are considered strong candidates for WC. However, there are large discrepancies in the pinning threshold and lacking evidence of melting since only activated transport has been found. Here we demonstrate strongly non-linear transport for high mobility ($\mu = 3.0 \times 10^6$ cm$^2$/Vs) dilute 2D holes ($p = 4.5 \times 10^{10}$ cm$^{-2}$) at the reentrant phase near filling factor $\nu = 1/3$ in a 20nm GaAs/AlGaAs/GaAs square well. A striking threshold appears below 30 mK at the center of this peak where the holes are pinned within a narrow range of 5pA with equivalent resistance greater than 1 G$\Omega$. This breaks down at larger currents where the differential resistance plummets by more than 3 orders of magnitude. Heating also destroys the threshold while resistance drops in a non-activated fashion. This demonstrates the existence of a pinned WC that appears to undergo a second-order transition upon heating, in agreement with previous theoretical studies.

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Talbot Knighton
Wayne State Univ

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