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Critical Point Transitions between Dust Particle "Phases" in a Complex Plasma[1] TRUELL HYDE, LORIN MATTHEWS, JIE KONG, KE QIAO, MUDI CHEN, BO ZHANG, ZHIYUE DING, CASPER - Baylor University — In 1934 Wigner predicted theoretically that a gas of electrons, in which the kinetic energy (temperature) was comparable to the average potential energy, would form a symmetric lattice (i.e., a crystalline phase) at some critical value of the ratio of these energies. Since this time, various Wigner structures have been observed experimentally, for example, the electron structures (Wigner "islands") observed floating on the surface of superfluid helium. To date, most experimentally observed Wigner clusters have been observed in the presence of external system confinement, making the fundamental physics behind these correlation driven effects surprisingly difficult to determine. Recently, complex plasmas have proven a versatile analog for the study of such systems. In this talk it will be argued, using experimental data collected for two- and three–particle strings, that there is a basis set of fundamental parameters which determine the critical "phase" transition point for a given set of operating conditions.

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