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Complex Plasma with Two Distinct Particle Sizes BERNARD SMITH, LORIN MATTHEWS, TRUELL HYDE, CASPER - Baylor University — Dust particle clouds can be found in almost all plasma processing environments including both plasma etching devices and in plasma deposition processes. Dust particles suspended within such plasmas acquire an electric charge from collisions with free electrons in the plasma. If the ratio of inter-particle potential energy to the average kinetic energy is sufficient, the particles will form either a "liquid" structure with short range ordering or a crystalline structure with long range ordering. Otherwise, the dust particle system will remain in a gaseous state. The preponderance of prior experiments used monodisperse spheres to form complex plasma systems. In order to determine the effects of a size distribution, multiple monodisperse particle sizes need to be examined to determine the manner in which phase transitions and other thermodynamic properties depend upon the overall dust grain size distribution. In this experiment, two-dimensional plasma crystals were formed from mixtures of 11.9 μm and 6.50 μm monodisperse particles in Argon plasma. With the use of various optical techniques, the pair correlation function was determined at different pressures and powers and then compared to measurements obtained for experiments employing a single size distribution of monodisperse spheres. Additionally, vibrational data was examined to determine other dust and plasma parameters.

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