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Non-crystalline states in a 2D dusty plasma JUAN-JOSE LIETOR-SANTOS, CAO CONG, JUSTIN BURTON, Emory University — When suspended in a plasma, colloidal particles become negatively charged due to a preponderance of collisions with free electrons. If the plasma is weakly-ionized, the resulting repulsive electrostatic forces cause the particles to self-organize into a single 2D layer in the plasma sheath near a surface. At high concentrations and particle charging, a hexagonal crystalline lattice is formed which supports the propagation of underdamped, phonon-like waves. This "dusty plasma" is an ideal model system to study low-temperature dynamics in solids, where the individual particle motions can be visualized and tracked [1]. Here we report the creation of non-crystalline states in a dusty plasma by combining two particle species of different size and material density. By finely-tuning these variables, we show that both particle populations lie in the same plane, leading to a 2D amorphous structure which can be used to study the dynamics of glassy and jammed systems at low temperatures and frequencies.

[1] Chaudhuri et al., Soft Matter 7, 1287-1298, (2011).

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