Developing Real-Time Particle Tracking Velocimetry for Complex Plasmas[1] BRIAN LYNCH, UWE KONOPKA, EDWARD THOMAS, ROSS FISHER, Auburn University — Complex plasmas contain, in addition to the usual electrons, ions, and neutral atoms, macroscopic electrically charged (nanometer to micrometer) sized "dust" particles. Based on the ratio of the electrostatic potential to kinetic energy, these microparticles can exhibit gaseous, fluid, and even crystal-like behavior. As a result, complex plasmas are a unique testing ground to study multi-particle systems like crystals, fluids, and their transitions and properties. The behavior of complex plasmas is generally studied using digital imaging systems with laser sheet illumination. Following data acquisition, Particle Tracking Velocimetry (PTV) is one of several post-processing techniques used in the determination of dust grain dynamics. The extracted velocity fields provide a spatially resolved particle phase space distribution (PSD) function that can be used to calculate correlation functions and thermal properties of the system. In this presentation, we outline the development of the "Complex Plasma Analysis" (CoPlA) software suite, which is based on spatial and temporal predictor methods to facilitate real-time particle tracking.

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