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Design of new dusty plasma apparatus to view 3D particle dynamics of fluorescent dust clouds KATHREEN THOME, MIT, SULI, PPPL, ALEXANDRA FONTANETTA, RPI, ANDREW ZWICKER, PPPL — Particles suspended in dusty plasmas represent both contamination in industrial plasmas and a primary interstellar medium component. Typically, dusty plasma behavior is studied by laser scattering techniques that provide 2D dust cloud images. However, the 3D structure of the dust cloud is essential to understand the waves, group dynamics, and stabilities of the cloud. Techniques used to study this structure include stereoscopic particle image velocimetry and rapid laser scanning. Our UV illumination technique reveals translational and rotational velocities of fluorescent dust particles as a function of UV intensity. The new argon DC glow discharge experiment designed to study the 3D aspects of fluorescent dust consists of a 13.25" diameter chamber, two 8" window ports for CCD cameras, one along the plasma and another transverse to it, two additional 8" window ports transverse to the plasma for laser or UV light illumination of the dust cloud, and a diagnostic probe port. Results from different electrodes–including mesh and ring–observations and imaging will be presented.

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