

Abstract Submitted
for the DPP09 Meeting of
The American Physical Society

Effect of a floating circular aperture on a dc glow discharge dusty plasma¹ JONATHON R. HEINRICH, SU-HYUN KIM, ROBERT L. MERLINO, University of Iowa — We have investigated novel effects observed when a floating aperture, either 6 mm or 8 mm in diameter, is placed 1-2 cm in front of an anode disk (4 cm diameter) that is used to form a dc glow discharge dusty plasma. Dust is incorporated into the anode glow plasma from a tray located below the anode which contained kaolin powder. The glow discharge traps particles with an average size of 1 micron. When the aperture is placed in front of the disk, well-defined pear-shaped or spherical dust clouds are formed, depending on the diameter of the aperture and its distance from the anode. The dust interacts with the aperture through the potential structure associated with the floating (negative) plate in which the aperture is located. The dust cloud is imaged using a CCD camera and a thin sheet of 532 nm laser light. Some of the effects observed include: outwardly expanding spherical dust acoustic waves and shocks, dust rotation around a void formed at the aperture, and a dust/discharge instability in which the discharge is periodically quenched and reignited while the dust cloud expands and contracts, with the dust retaining a residual charge.

¹Work supported by DOE

Robert L. Merlino
University of Iowa

Date submitted: 17 Jul 2009

Electronic form version 1.4