Abstract Submitted
for the DPP09 Meeting of
The American Physical Society

Measurement of Plasma Parameters in an Argon DC Glow Discharge Dusty Plasma ARTHUR SAFIRA, ANDREW ZWICKER, PPPL, Princeton University, TAYLOR CALIGARIS, PPPL, DPX TEAM — Dust particles in plasmas can gain a charge due to the free ions and electrons. The particles can then be suspended in space by opposing gravitational and electrical forces. These dusty plasmas appear as impurities in plasma processes and fusion reactors, but are also observed in astrophysics in planetary rings and nebulae. In an argon DC glow discharge plasma, dust cloud formation was studied by varying the dust tray location, the dust tray bias, the electrode bias, and the neutral gas pressure. In this set up, two 4 inch ring electrodes were set concentrically, and two 30 fps CCD cameras were used for data collection. Silica, a fluorescent dust mixture, glass beads, and quantum dots were tested as dust cloud substances. Plasma parameters near these dust clouds were measured using a Languimir probe. Dust clouds were readily produced with a pressure of 85± 5mTorr, cathode voltage of 253±30V, anode voltage of 110±20V, and the dust tray 4 inches from the anode. Dust tray biases proved useful in cloud positioning with -30CV$<V_{dt}<$+80V, but at other voltages clouds would not form due to plasma spots or dust tray proximity. Probe measurements indicated an electron density and temperature of 10^{14}m^3 and 2eV, respectively. In addition, at P<60mTorr spontaneous dust acoustical waves were observed and studied with a 500,000 fps 28 frame PSI-4 CCD camera.

Arthur Safira
PPPL

Date submitted: 17 Jul 2009 Electronic form version 1.4