Abstract Submitted
for the DPP10 Meeting of
The American Physical Society

Equilibrium structure and perturbative dynamics of three-dimensional dust clouds suspended in a glass box VICTOR LAND, SUZANNAH WOOD, JORGE CARMONA REYES, JIMMY SCHMOKE, MICHAEL COOK, LORIN MATTHEWS, TRUELL HYDE, CASPER, Baylor University, Waco, TX, 76798, USA — In a modified GEC cell, dust particles are suspended above the powered lower electrode. The electrode can be cooled or heated in order to produce a vertical temperature gradient in the background gas, resulting in additional thermophoretic forces. Three dimensional dust clouds are formed by using a glass box (placed on the lower electrode) to vertically extend the radial confinement of the dust particles. Information about the horizontal confinement is obtained from single particle trajectories inside the glass box. The three-dimensional equilibrium structure is then reconstructed by combining vertical and horizontal slices through the dust cloud, captured by CCD cameras. By applying perturbations to the discharge power and DC bias, transitions between different equilibrium structures are captured using high speed cameras. The crystal structure in a horizontal and vertical slice is obtained both before and after the perturbation, as well as the particle trajectories during the transition. Finally, the experimental results are compared with numerical results from an N-Body model.

Victor Land
CASPER, Baylor University, Waco, TX, 76798, USA

Date submitted: 12 Jul 2010 Electronic form version 1.4