Abstract Submitted
for the DPP14 Meeting of
The American Physical Society

Dust as In-Situ Probes for Plasma Magnetic Field Interactions in a Dusty Plasma MICHAEL DROPMANN, RENE LAUFER, GEORG HERDRICH, CASPER - Baylor University / IRS - University of Stuttgart, LORIN MATTHEWS, TRUELL HYDE, CASPER - Baylor University — A series of experiments were conducted inside a GEC rf reference cell to map the forces in three dimensions above a magnet placed in a dusty plasma and employing both horizontal and vertical orientations. Micron sized dust particles were used as in-situ probes to investigate the interaction between the low-temperature plasma produced and a magnetic field close to a non-conductive surface. Dust particles were dropped into the plasma where they obtained a negative charge leading to trajectories, which were strongly influenced by both electric and ion drag forces. By recording the trajectories of the particles, which were illuminated by a vertical laser plane, the forces onto the particles were determined. A strong influence of the magnetic field onto the plasma sheath was observed. Given the electrons are strongly magnetized by the magnet while ions remain comparatively unaffected by the magnet a charge separation takes place, which leads to strong electric fields. As a result the sheath thickness varies significantly within the magnetic field, showing strong horizontal force components. Based on these observations, analogies to the interaction of the lunar plasma with known lunar magnetic anomalies will be drawn to contribute to the explanation of the formation of lunar swirls.

Truell Hyde
CASPER - Baylor University

Date submitted: 07 Jul 2014 Electronic form version 1.4