

Abstract Submitted  
for the DPP15 Meeting of  
The American Physical Society

**Externally and self-excited nonlinear waves in a dusty plasma.**<sup>1</sup>

BO ZHANG, KE QIAO, JIE KONG, LORIN MATTHEWS, TRUPELL HYDE, CASPER - Baylor University — Recently it has been shown that strongly coupled three-dimensional dust clouds can be easily levitated in the plasma sheath region of a glass box coated with a transparent yet conductive layer of indium tin oxide (ITO). Gradually reducing the neutral gas pressure below a critical value of  $\sim 350$  mTorr establishes self-excited waves within this system. In this paper, it will be shown that decreasing the ITO bias to  $-20$  V allows waves to be externally induced within the lower region of the dust cloud. The underlying physics and synergistic effect of changing the pressure and/or ITO bias on these waves will be examined as will the onset of instabilities and the evolution of the dust density waves for ITO biases ranging from 0 to  $-40$  V. Finally, the dust charge will be estimated by assuming the waves oscillate at the dust plasma frequency.

<sup>1</sup>Support from the NSF and the DOE (award numbers PHY-1262031 and PHY-1414523) is gratefully acknowledged.

Truell Hyde  
CASPER - Baylor University

Date submitted: 21 Jul 2015

Electronic form version 1.4