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Wave Modes of Vertical Dust Chains in Complex Plasma BRANDON HARRIS, AUDREY BURKART, RAYMOND FOWLER, LORIN MATTHEWS, TRUELL HYDE, CASPER - Baylor University — Plasma sheaths are notoriously complicated; however, the recent use of micron size dust particles as in-situ probes of this region is beginning to provide data that can be employed to better understand these phenomena. In this study, longitudinal and transverse waves are explored for vertically aligned dust particle chains consisting of 3 to 5 particles. These spherical particles are levitated in the sheath above the powered lower electrode in a GEC reference cell and are confined in the horizontal direction using a glass box. Under appropriate power and pressure conditions, the horizontal confinement provided by the box is great enough to create the chains, which can then be perturbed by applying time-varying potentials to a vertical probe attached to a Zyvex S100 nanomanipulator. The probe can be positioned over a range of locations, allowing both longitudinal and transverse waves to be driven through the chains. Particles exhibit coupled oscillator motion, individually producing all of the pure three-particle longitudinal normal modes. Dispersion relations previously derived for particles aligned in the horizontal plane exhibit similar relevant forces; these are adapted to the vertical direction and compared to experimental results.

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