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Using Falling Dust Particles as In-Situ Probes to Measure the Vertical Electric Force Distribution in a Complex Plasma JIE KONG, KE QIAO, JORGE CARMONA-REYES, ANGELA DOUGLASS, ZHUANHAO ZHANG, LORIN MATTHEWS, TRUELL HYDE, CASPER - Baylor University
— A free-falling dust particle within a complex plasma acts as an in-situ probe, providing a minimally perturbative diagnostic for the measurement of the electric force distribution. This technique is particularly important for particles confined within a glass box placed on the lower electrode, as the electric potential within this structure is not yet well-understood. In this experiment, falling particle trajectories within and without a glass box placed on the lower electrode in a GEC reference cell were recorded and analyzed and the electric forces exerted on the dust particles derived and compared. It will be shown that without a glass box, only a single force balance point (i.e., the position where the gravitational force is balanced by the electric force) exists in the vertical direction, while within a glass box this force balance spans an extended vertical range.

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