

Abstract Submitted
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RF attenuation as a dusty plasma diagnostic¹ BRANDON DOYLE,
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— When a dusty plasma is formed by adding dust to a plasma environment, the electron density of the background plasma is depleted as the dust particles acquire their negative charge. The magnitude of the electron depletion depends on the dust particle charge, and thus its properties, as well as the dust number density. A direct measurement of the electron density in a dusty plasma therefore contains information about the charging state of the dust particles. This measurement is difficult to obtain without influencing the system. For example, Langmuir probes influence the system by creating voids, or they become unreliable due to their potential contamination with dust. A less invasive diagnostic tool might be realized using plasma chamber electrodes for a plasma impedance measurement as it depends on the excitation frequency: the spatially averaged electron density is derived from the electron plasma frequency, which is related to the radio frequency attenuation characteristic. We present preliminary experiments using two impedance probe designs: probes immersed in a plasma and electrodes located at the edge of the plasma. We evaluate the potential application of this method for ground-based laboratory experiments and future microgravity experiment facilities aboard the ISS.

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