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## **Characterizing an electron plasma into a levitated dipole to understand future positron injection and creation of positron-electron plasma**

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The APEX collaboration seeks to create positron-electron plasma by injecting positrons into an electron plasma, a thorough understanding of the electron plasmas. We present design and initial tests of a new diagnostic for the APEX-LD, which enables the measurement of the electric potential of the trapped plasma by injecting electrons along the axis. This information will augment the information garnered from the image charge signal on wall probes to yield a more complete picture of the equilibrium and the dynamics of the trapped plasma.

Further investigation into the behaviour of the stable toroidal mode in the levitated dipole and the transition into the unstable chirping mode are shown through the frequency of the electron plasma measured by image charges at the wall of the chamber.

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