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APPEL Linear Device: A Test-bed for Tokamak plasma studies

The APPEL (Applied Plasma Physics Experiments in Linear) device is a versatile linear plasma facility that can support a wide range of experiments, such as plasma-wall interaction studies, pre-ionization start-up experiments, and ion heating investigations, making it an ideal test bed for both fundamental and applied plasma research. The device operates over a wide gas pressure range, from 10^{-4} mbar to 10^{-2} mbar, and can sustain steady-state axial magnetic fields of up to 0.41 T with high radial uniformity. Recent experiments have demonstrated particle fluxes on the order of $10^{22} \text{ m}^{-2} \text{ s}^{-1}$ – $10^{23} \text{ m}^{-2} \text{ s}^{-1}$, enabling effective studies of plasma material interactions. The linear configuration provides a controlled environment for examining plasma generation, RF power coupling, and plasma uniformity under conditions relevant to tokamak plasma. Pre-ionization studies conducted in the APPEL device using a spiral antenna achieved a density of the order of 10^{16} m^{-3} .

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