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Density Profile Dynamics in the Levitated Dipole Experiment[1]
A.C. BOXER, J. KESNER, J.L. ELLSWORTH, MIT Plasma Science and Fusion Center, D.T. GARNIER, M.E. MAUEL, Columbia University — Measuring and understanding the evolution of the plasma density is an important goal for the Levitated Dipole Experiment (LDX). Theoretical considerations suggest that the density may naturally develop a highly peaked profile characterized by an equal number of particles per flux-tube: $\delta(nV) \sim 0$, where $V \equiv \oint \delta\ell/B$. Accordingly, in a dipole-confined plasma, the density profile is predicted to vary with radius as $n \sim 1/r^4$. A 4-cord microwave-interferometer density diagnostic with a center frequency of 60 GHz has been built and tested. In experiments where the dipole was not levitating but rather suspended by thin supports, the density profile was observed to respond to (1) ECRH frequency, (2) total ECRH power, and (3) neutral gas fueling. Comparison with data from true levitation experiments (Sept. 2007) will allow us to further characterize the density profile dynamics of dipole-confined plasmas.

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