Abstract Submitted
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Estimation of the Polytropic Index of the Thermal Electron Population in the Levitated Dipole Experiment (LDX)[1] M.S. DAVIS, D.T. GARNIER, M.E. MAUEL, Columbia University, J.L. ELLSWORTH, J. KESNER, P.C. MICHAEL, P. WOSKOV, PSFC MIT — LDX studies plasma confined by the field of a magnetic dipole. The plasma profiles are distinctly different when the superconducting dipole is mechanically supported and when it is magnetically levitated. When supported, profiles are determined by particle losses to the supports, leading to flat density profiles. By contrast, when the dipole is levitated, parallel losses are eliminated, a thermal electron population is formed and turbulent radial ExB driven transport creates "stationary" profiles. Interferometry shows that the density profile is centrally peaked during levitation. Equilibrium calculations with the measured density profile and edge temperature imply a centrally peaked temperature profile. The condition for marginal MHD stability, $\delta(pV^\gamma) = 0$, relates the polytropic index of the turbulent transport, γ, to the peakedness of the pressure profile. We estimate the value of γ by developing the magnetic reconstructions and examining both soft X-ray and visible spectra.

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