

Abstract Submitted
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Gyroradius-Scale Ion Gradients in NSTX¹ R.E. BELL, B.P. LEBLANC, PPPL, R. MAINGI, ORNL, S.A. SABBAGH, Columbia U. — The spherical torus geometry is well suited to compare experimental profiles on a fundamental transport scale. The low-field region in the low-aspect ratio NSTX along with a high spatial resolution charge exchange spectroscopy system make gyroradius-scale ion measurements possible. Ion temperature and density gradients with gyroradius-scale widths have been measured in some NSTX plasmas. Measured ion temperature changes of $\Delta T_i = 250 - 500$ eV are observed over $\Delta r \sim 1$ cm with total Larmor radius ~ 1 cm. Minimum gradient widths comparable to the larger banana orbit width would normally be expected from “random walk” arguments of neoclassical theory. Since radial electric field (E_r) gradients also vary on a gyro-radius scale, distortion of the gyro orbit is expected to cause orbit shrinking or orbit expansion [1], depending on the sign of E_r . Orbit shrinking removes the apparent discrepancy in the gradient width.

[1] K. C. Shaing, A. Y. Aydemir, R. D. Hazeltine, Phys. Plasmas 5, 3680 (1998).

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