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NSTX

XP 630
Edge Turbulence In High Density Ohmic Plasmas on NSTX

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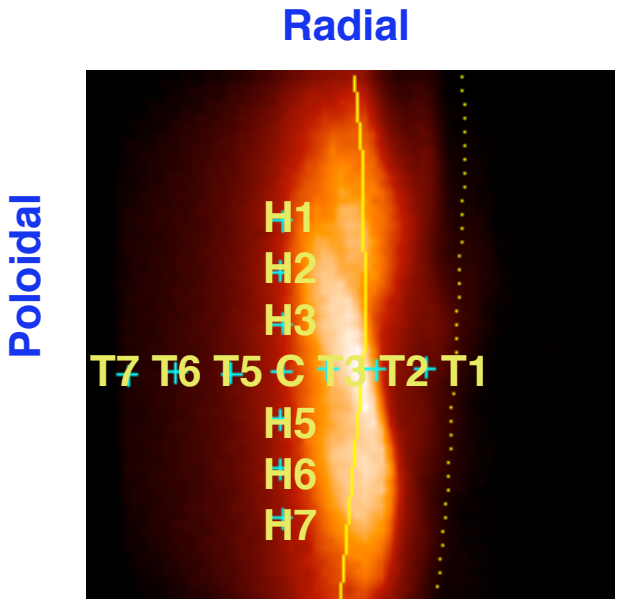
PPPL NSTX Results Review 7/27/06

Motivation

- To examine edge turbulence at or near the density limit in NSTX
- To study edge turbulence in the simplest case: Ohmic, LSN plasmas
- To make consistent turbulence measurements without any of the other changes introduced by NBI, such as, increased rotation and heating.



Shot#117939 @532ms

Example of GPI viewing area in NSTX Plasma

Run Summary from XP630

- XP had 0.5 day of run time (I_p=0.6MA, B=3.5kG), during which 12 good shots were obtained

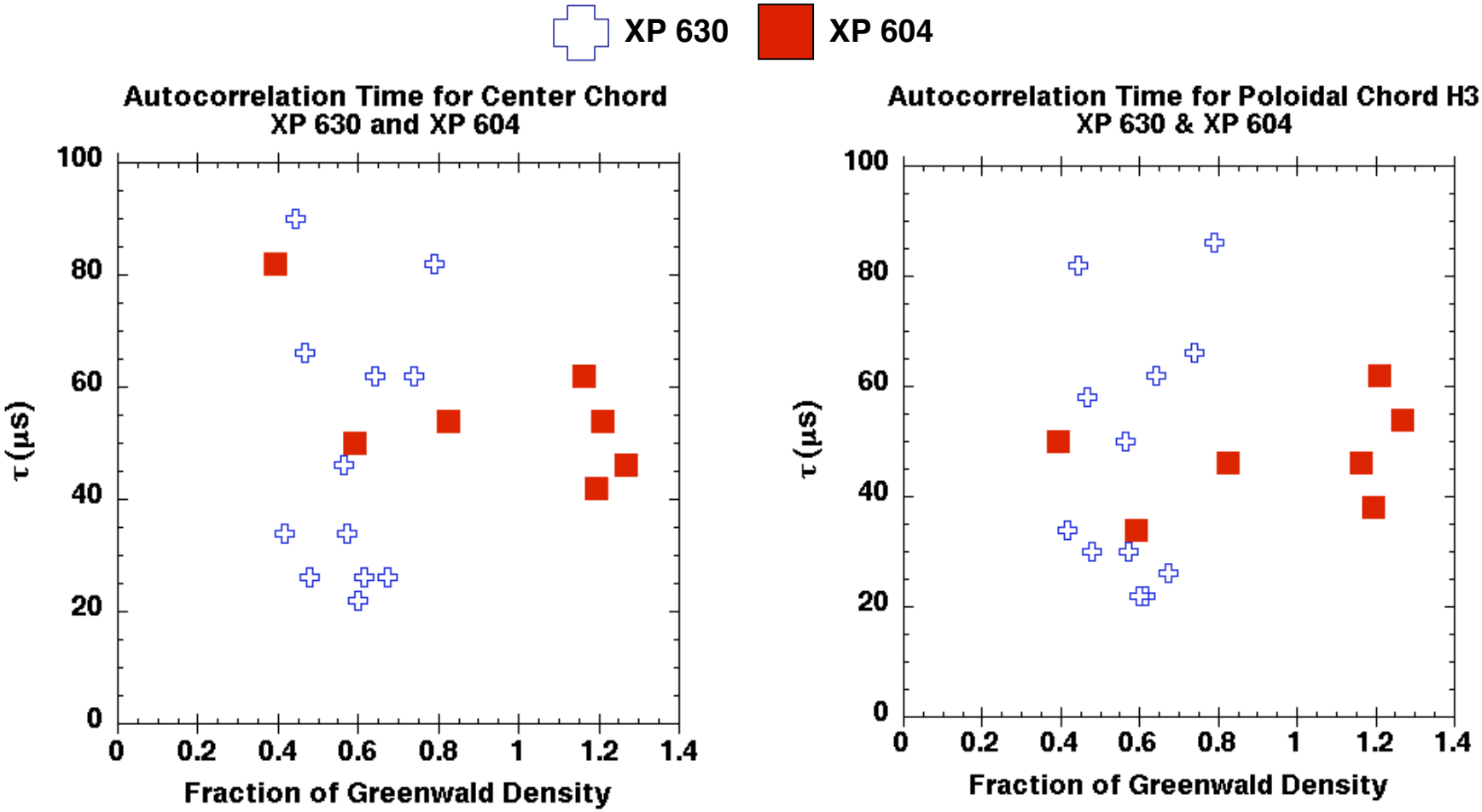
- XP involved use of LFS, HFS, and SGI fueling at varying pressures in combination with short NBI pulse (~250ms duration at beginning of shot) to increase pulse length.

- density range covered was n_e=2.2 - 4.2x10^{15} cm^{-2} corresponding to n_G=0.4 - 0.8

- $n_G \geq 1$ could not be obtained given available pulse length, but a saturated level of density vs. time was observed in some shots (perhaps indicating a density limit)

Autocorrelation Time

Ohmic(XP 630) and Beam Heated (XP 604)Plasmas

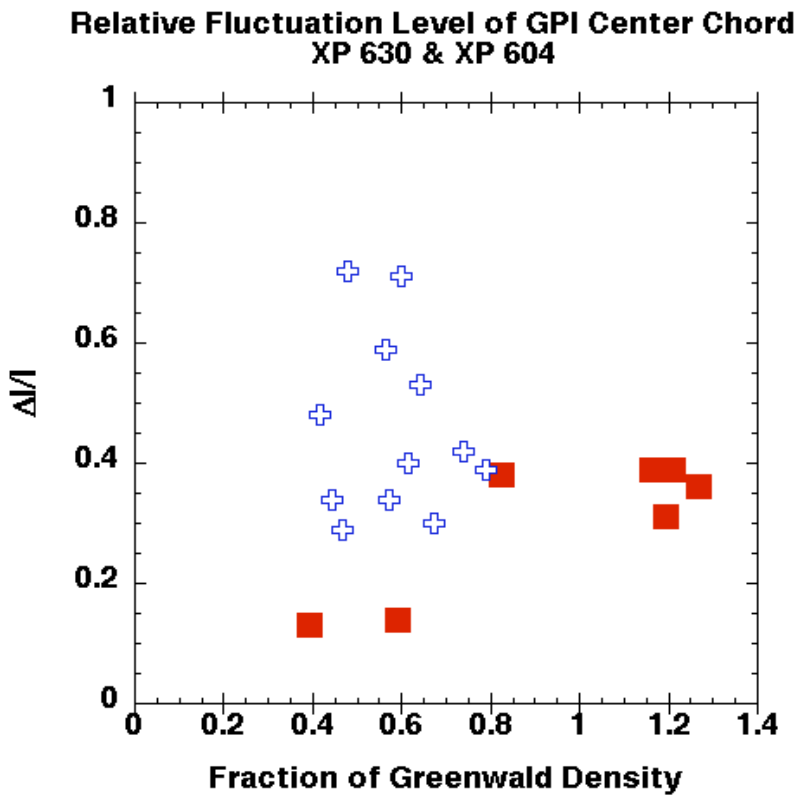


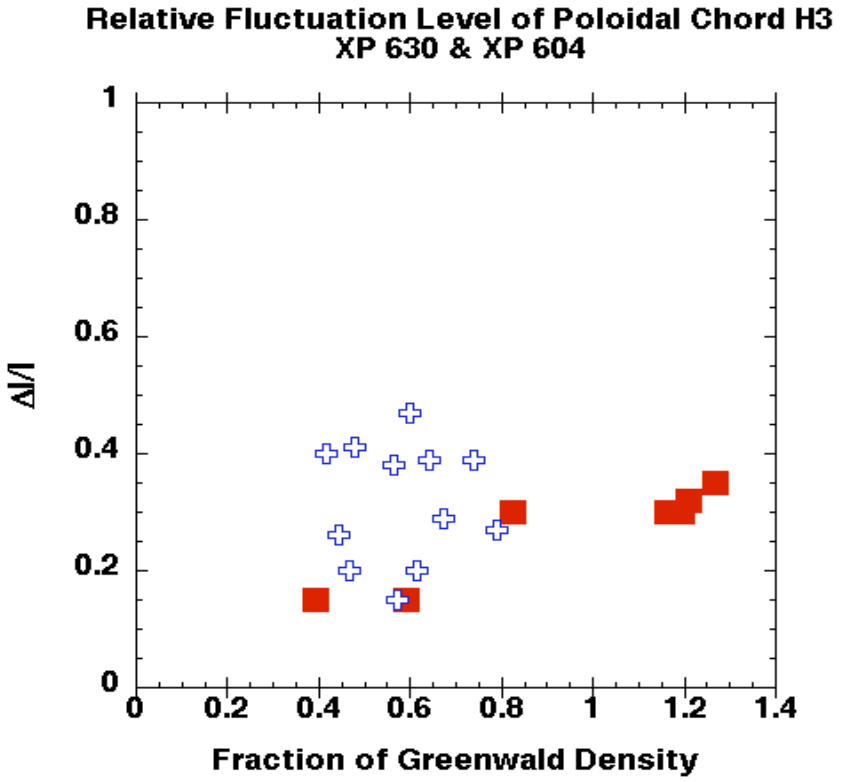
No apparent variation with density in Ohmic case.

Relative Fluctuation Level

Ohmic(XP 630) and Beam Heated (XP 604)Plasmas

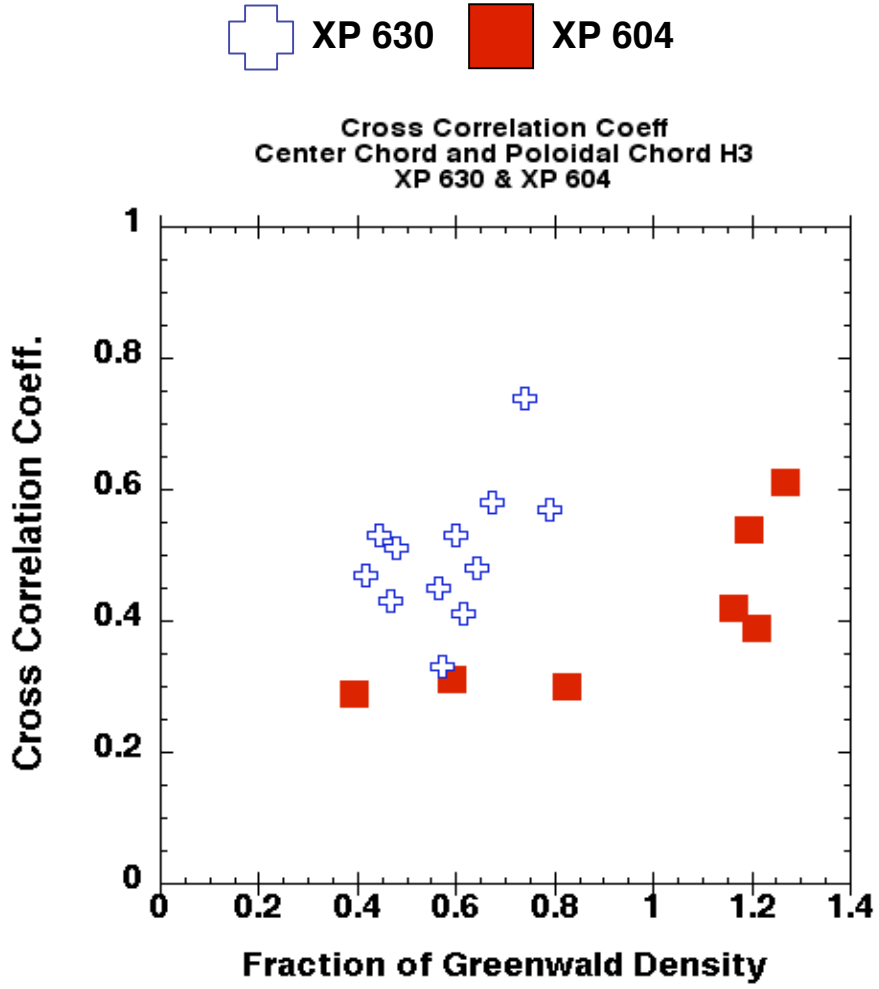
XP 630 XP 604





No significant variation of ΔI/I w/density in Ohmic case

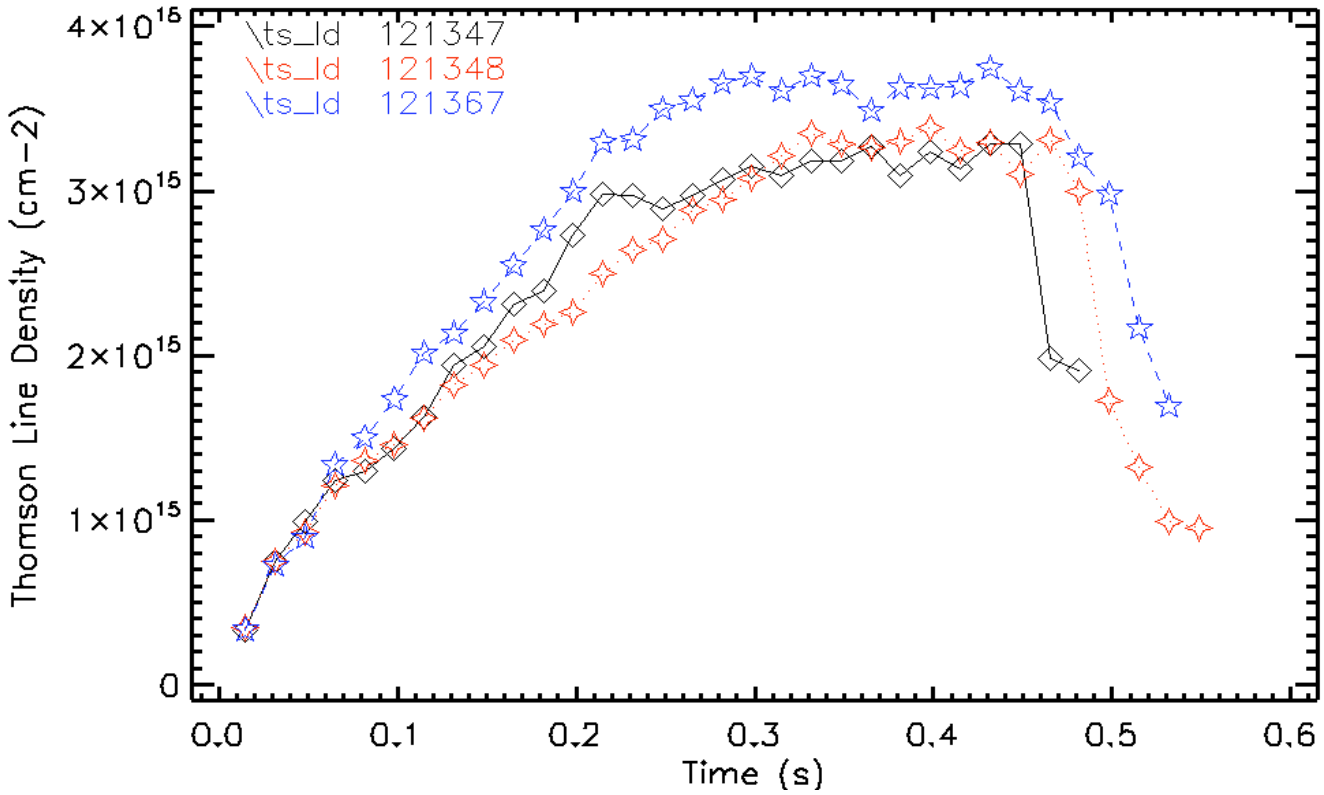
Poloidal Correlation Length
Ohmic and Beam Heated Plasmas



There may be a slight increase in correlation with increasing density.

Was Density Limit Reached ?

- Some shots showed a saturation of density vs. time even though gas puffing continued. This might indicate some form of density limit in NSTX OH plasmas, not necessarily at n_G=1



Summary

- For Ohmic, LSN deuterium plasmas a density of 0.8 times the Greenwald density was achieved.

- From preliminary analysis, relative fluctuation levels and auto correlation time do not seem to directly increase with increasing density in Ohmic case.

- A slight trend of increasing cross correlation coefficient with density is observed for Ohmic case

Further Analysis

- Examine chord data to analyze:
  - pdf's to look for changes in intermittency
  - frequency spectra
  - phase speed
  - radial vs. poloidal correlation lengths
  - compare chord data w/image data (Maqueda)

- Examine more carefully shots where density saturates in time to determine if some density limit was reached, and how this affected edge turbulence.