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NSTX

# Results Review - XP610: Study of Transport with Reversed Shear in NSTX

**F. M. Levinton, H. Yuh, .....**

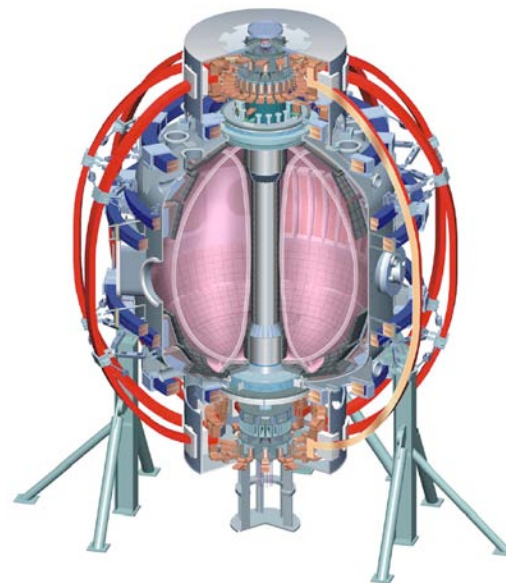
**NSTX Results review 2006**

**July 26-27, 2006**

**Princeton Plasma Physics Laboratory**

**Princeton, NJ**

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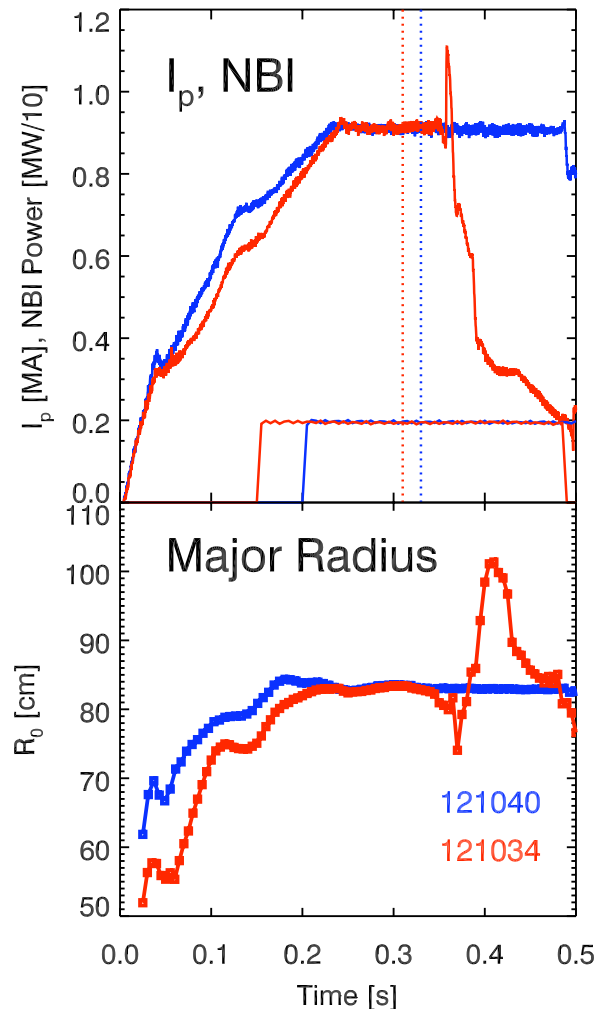
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# XP-610: Goals



- Vary q-profile from reversed shear to monotonic to study effects on transport.
- Three parts of experiment.
  - \* L-mode phase @4.5 kG (3/27-28, 5/30).
  - \* L-mode phase @5.5 kG.
  - \* H-mode phase @4.5 kG.

# q-profile Development

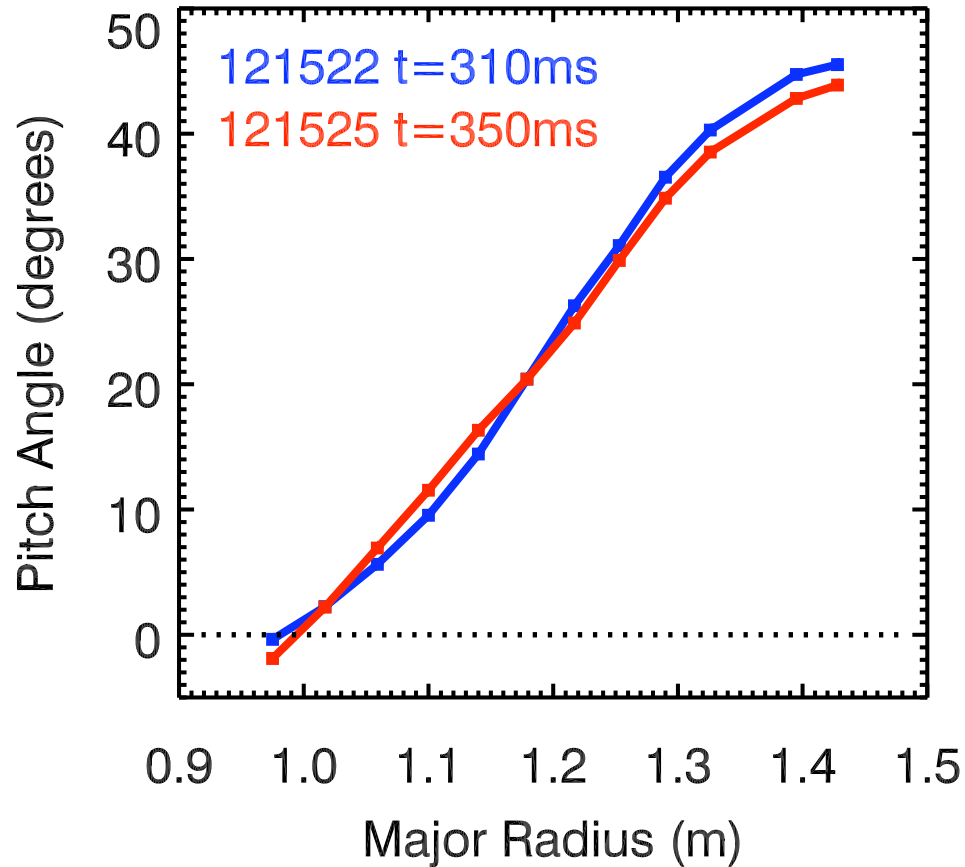


- Produced monotonic and reversed shear (RS) q-profile at .9 MA and 1 MA.
- Control of major radius evolution, NBI timing, and current ramp up is used to vary the current profile. A range of q-profiles from monotonic, with  $q(0) \sim 0.95-1.5$ , to RS with  $q(0) \sim 1.5-2$  have been produced.

# MSE-CIF Results

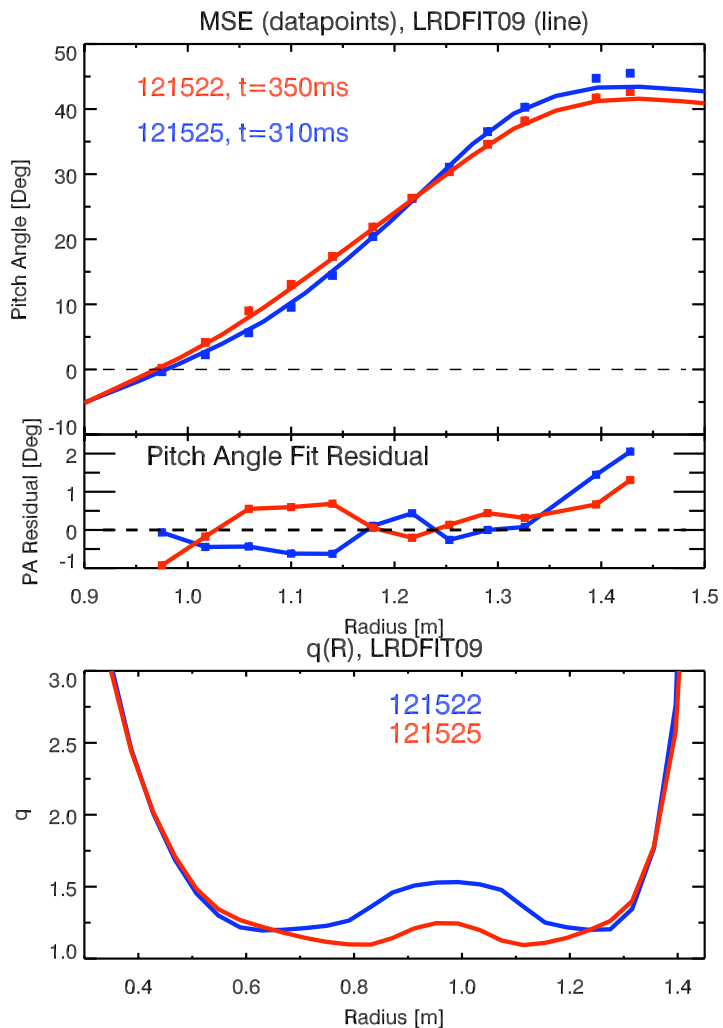


Pitch Angle (MSE)



- MSE-CIF data for RS and monotonic q-profiles at 0.9 MA.

# Results from LRDFIT09

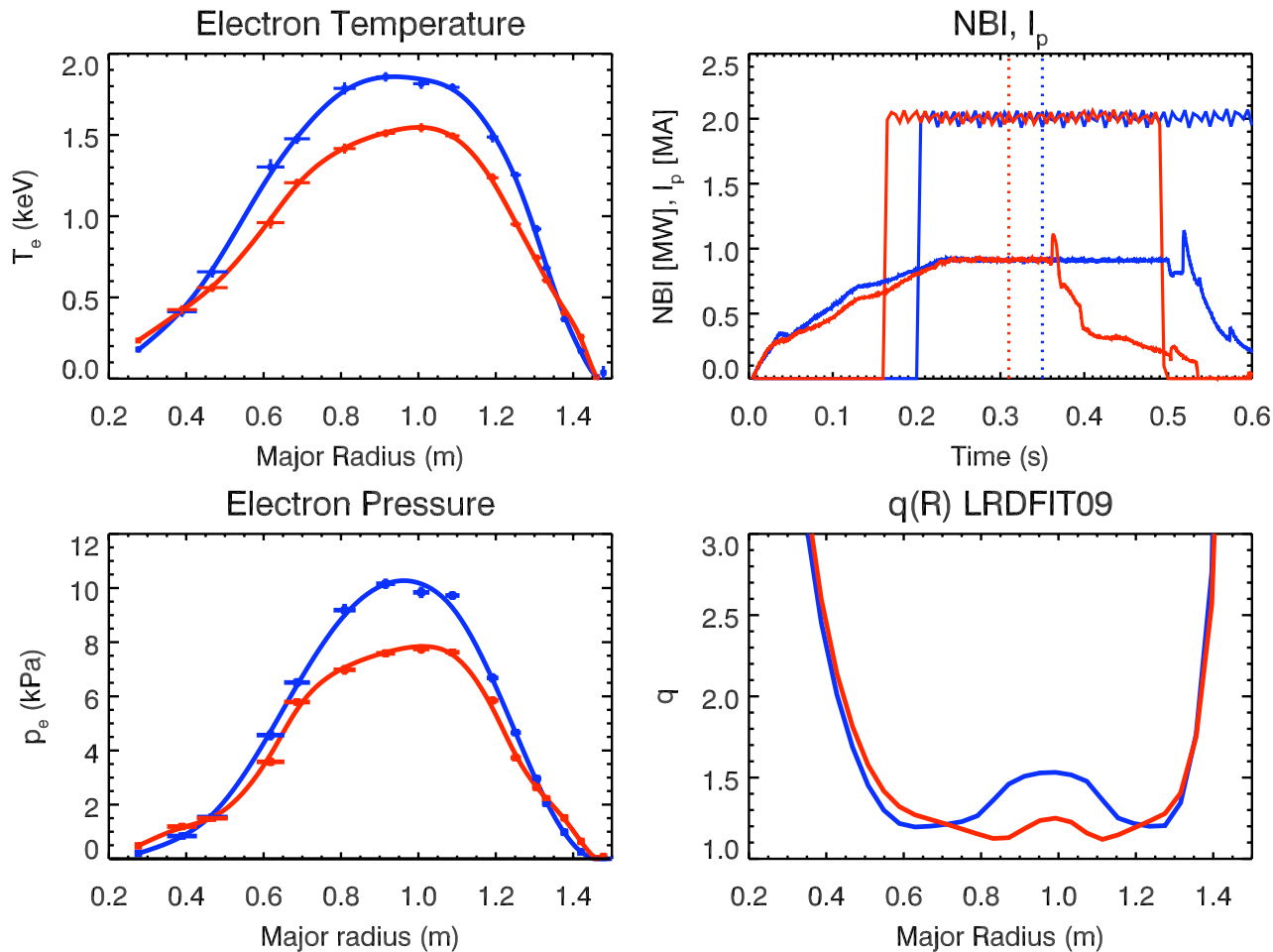


- LRDFIT reconstruction of equilibrium with 12 channel MSE-CIF has improved this year due to much effort by Jon Menard and Howard Yuh.
- Important to choose good basis functions and well placed knots for pressure and current.
- Includes isotherm surface mapping of  $T_e$  data and rotation effects.
- RMS error of fitted data has been reduced from 1 degree to  $\sim 0.3$  degree.

# Comparison of RS and monotonic profiles



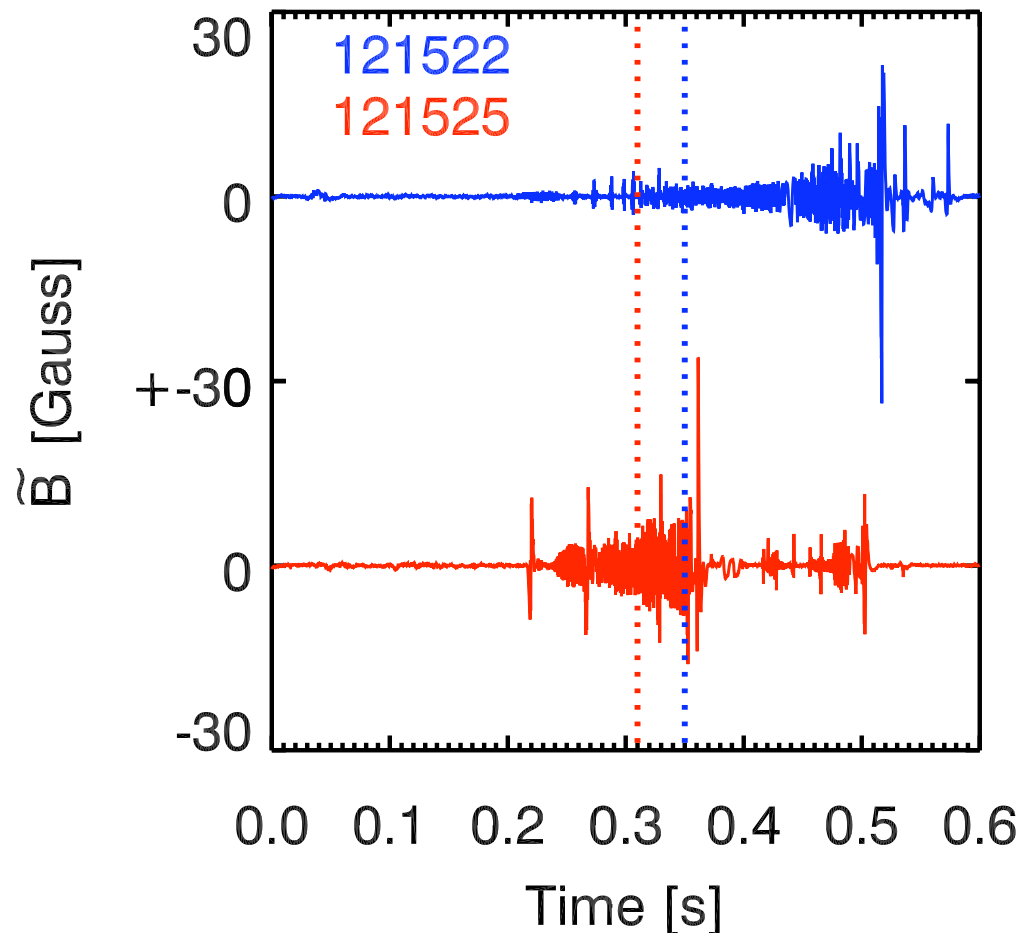
121522@350ms (Blue), 121525@310ms (Red)



# MHD behavior is different



## MHD (Mid+Low F)



- q-profiles have increasing amount of low frequency MHD as shear is reduced toward zero.
- The effect of the MHD on core temperature is being investigated.

# Plans for Data Analysis

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- Several comparison cases being looked at from this year and last.
- Results from high-k scattering have been obtained that show some difference between the monotonic and RS cases.
- Analysis of microstability underway.



# Future Diagnostic Plans

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- Improved optical transmission of filter will result in 3x more light throughput. This will improve the temporal resolution and sensitivity to measure density and magnetic fluctuations.
- Increase number of sightlines from 12 to 16.

