NSTX

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Dependence of P_{LH} on X-point Radius

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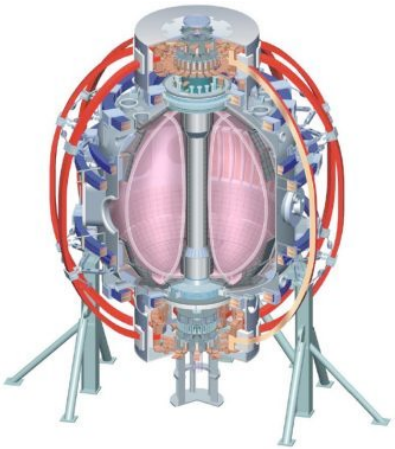
R. Maingi[1], S. Gerhardt[2]

1) Oak Ridge National Lab

2) Princeton Plasma Physics Lab

** Contributions from C.S. Chang

NSTX Transport and Turbulence TSG meeting
Princeton, NJ
Jan. 27, 2009



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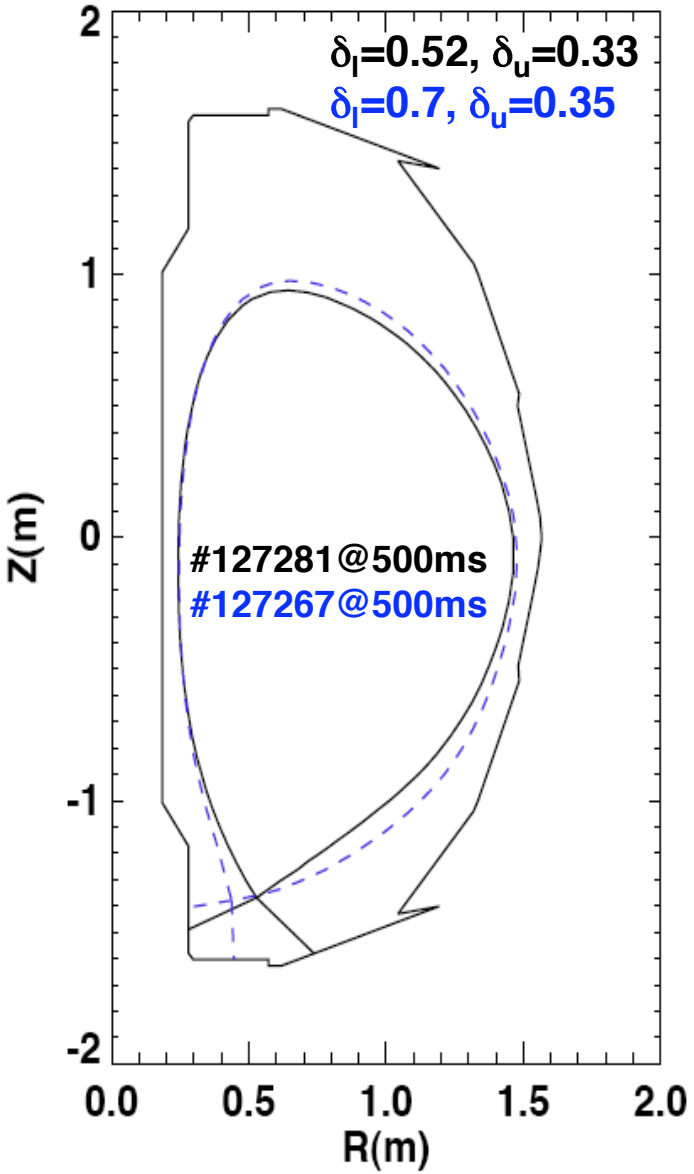
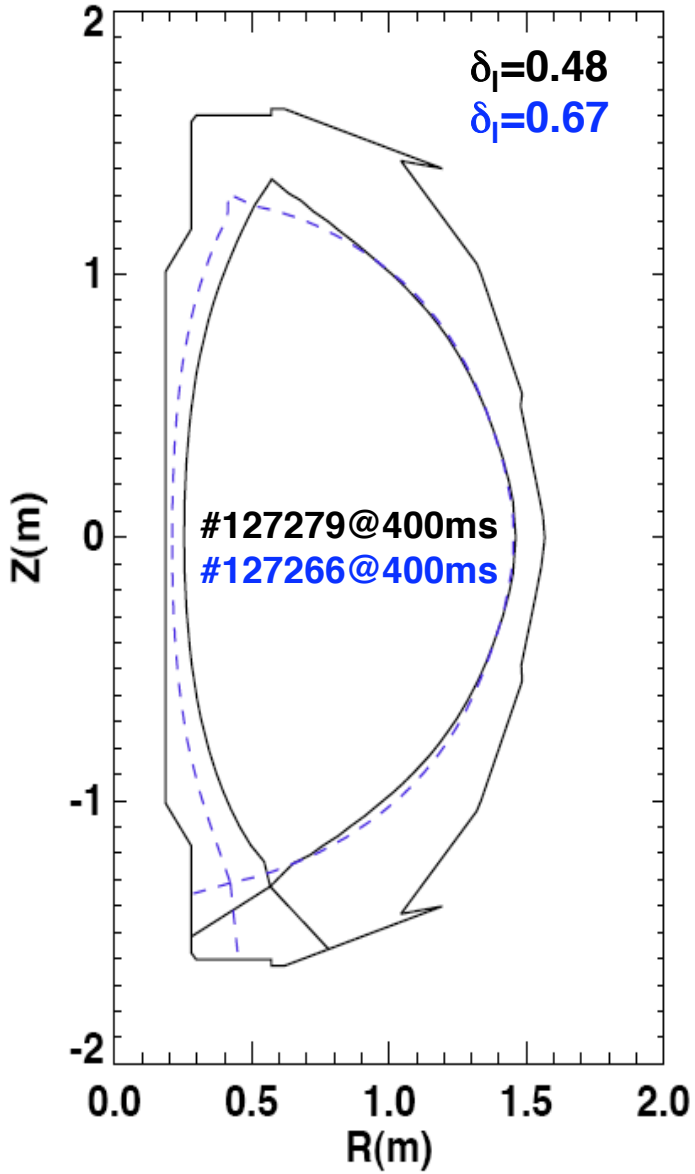
Dependence of the L-H power threshold on X-point radius

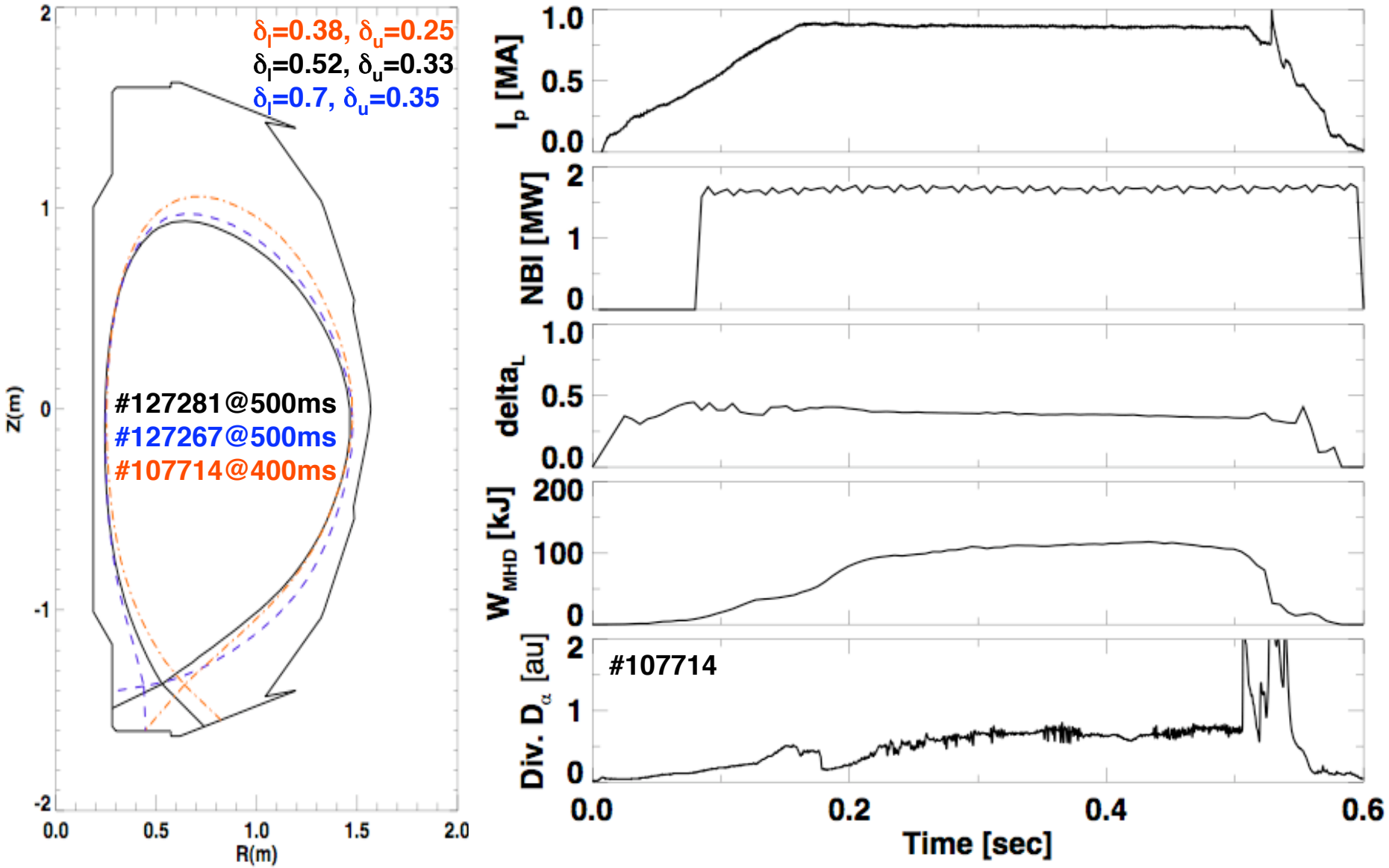
- In NSTX, DIII-D, JET (and probably other machines), an observation that P_{LH} decreases with triangularity (radius of X-point) has been noted but not documented
  - Could have an impact on future operational scenarios, using low δ to get H-mode and higher δ for improved stability, confinement
- CS Chang proposed in a ~ 2003 seminar that the ion loss near the X-point increased with increasing R
  - This would set-up a pre-transition E_r more easily and could translate to a lower P_{LH}
- *Goal: document the dependence of P_{LH} on triangularity (X-point radius) at fixed κ, δ_r^{sep}*
  - Target δ=0.4, 0.6, 0.8 (in DN configuration?)
  - Need XGC modeling/analysis to document results

Good δ_L and δ_r^{sep} scans achieved at comparable κ (XP 609, 2008)





Existence proof - we used to make lower δ shots a long time ago (2002)



XP development Plan

- Document role of X-point loss vs. X-point radius (Chang)
- Calculations on ability to make three different δ (Gerhardt)
- Decide on using LSN vs DN
- Decide on kappa value desired
- Decide on whether to us pre-heating during I_p ramp: save V-s
- What to do about δ_U?