TRANSP Analysis of NSTX-U L- and H-modes

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NSTX-U Results Review

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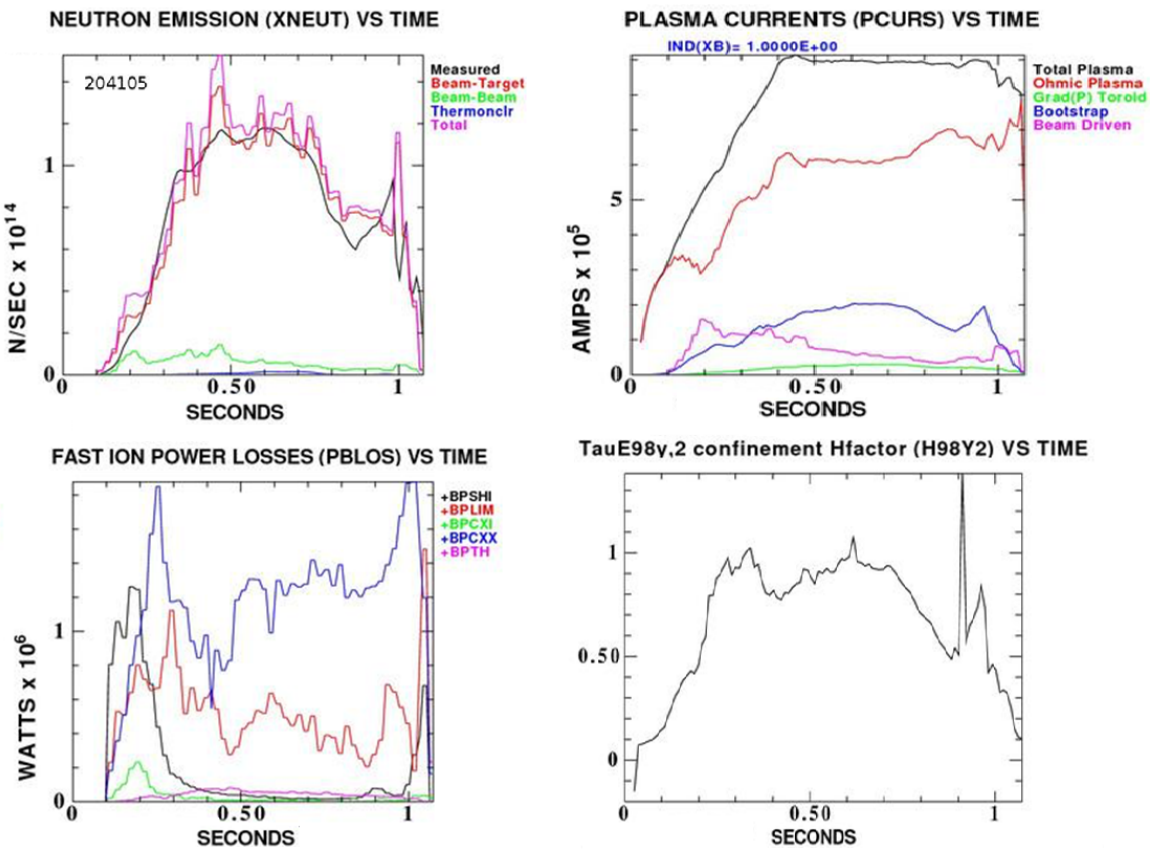
New NSTX-U tool: Between and Among Shot TRANSP (BEAST) will aid experiment execution

- Typical BEAST run completed in 8 mins
  - NSTX-U has 15-20 mins between shots
- In preparation for next shot, session leader can gauge:
  - Non-inductive fraction
  - Beam loss
  - Confinement quality
  - Any TRANSP quantity…

NSTX-U BEAST TRANSP run



NSTX-U

PPPL

TRANSP Runs Performed for Many L- and H-mode Discharges

- Perform global/thermal confinement analysis
- Study local transport (interpretive and predictive)

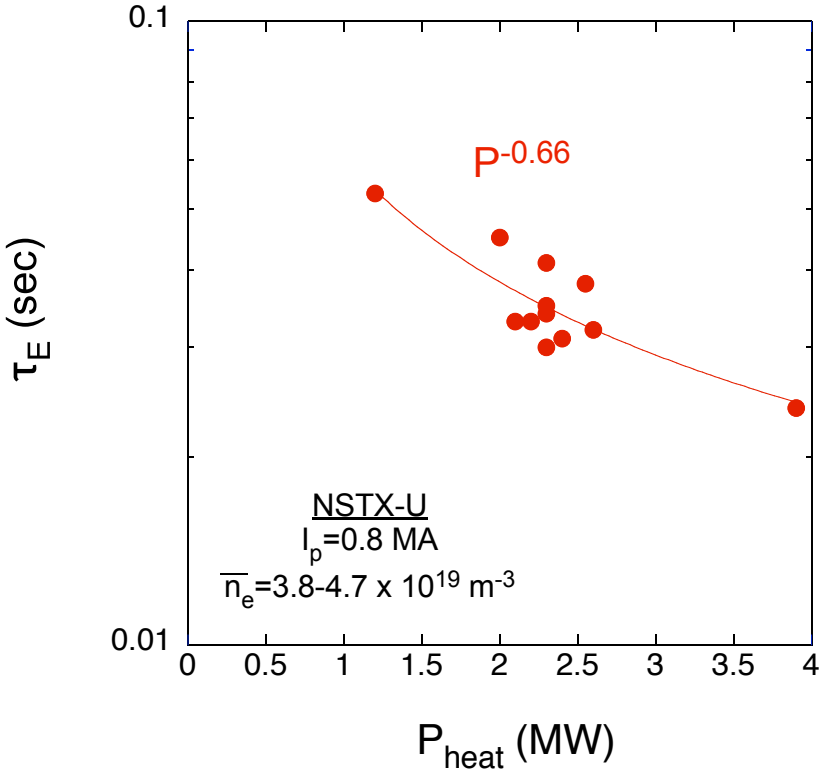
- Hampered by either no CHERS (when second beam on) or poor signal (at low input power)
  - Often use Chang-Hinton neoclassical prediction for T_i
  - Flat Z_{eff}=2 profile
  - Feedback on AFID for neutron match

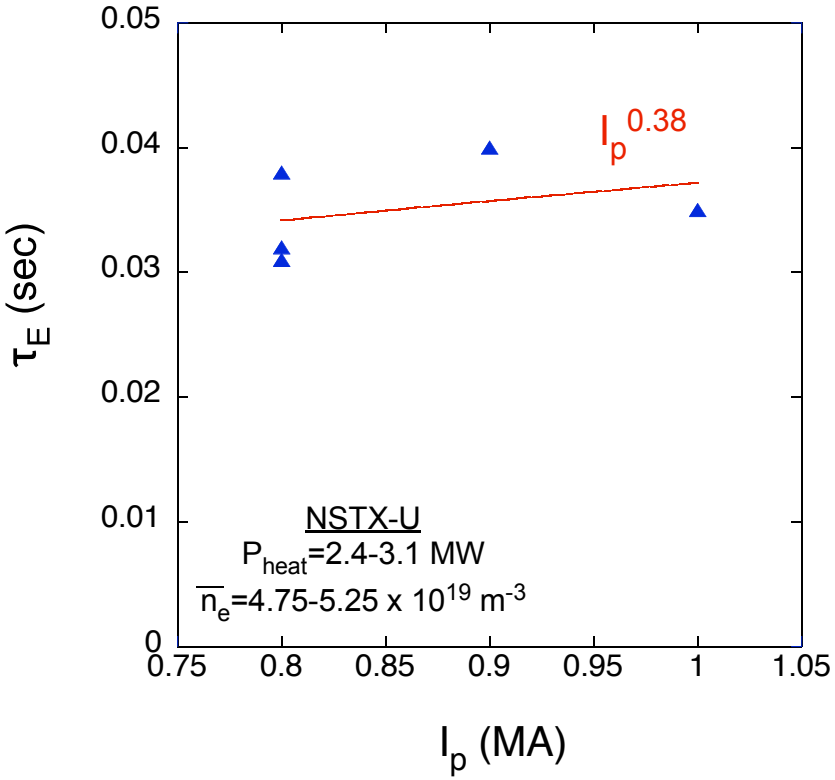
- L-mode data taken from Beam #1 L-mode scan (W. Guttenfelder)
  - I_p = 0.6 to 1.0 MA
  - P_{inj} = 1 to 5 MW
  - $n_{e,bar}$ = 2.8 – 6 x 10^{19} m^{-3}

- Compare to 204118 (H-mode)

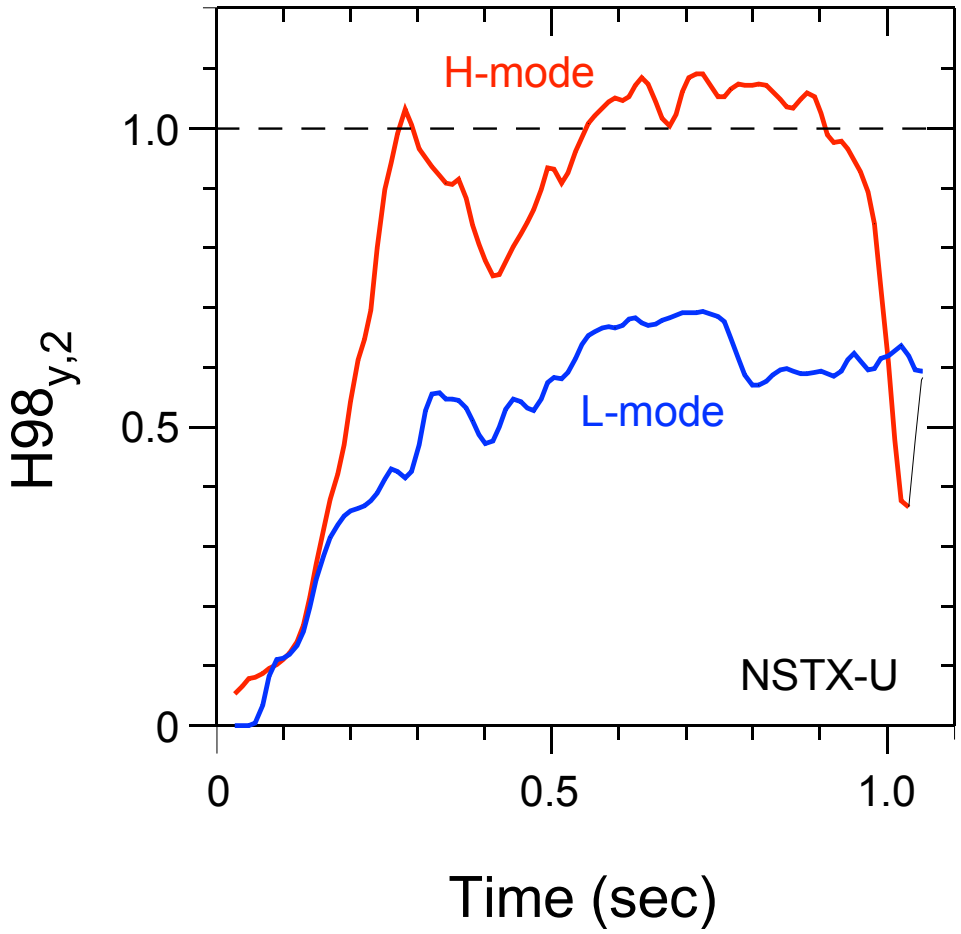
Thermal Confinement Trends Difficult to Extract Due to Poor Coverage Across Parameter Space

L-Mode

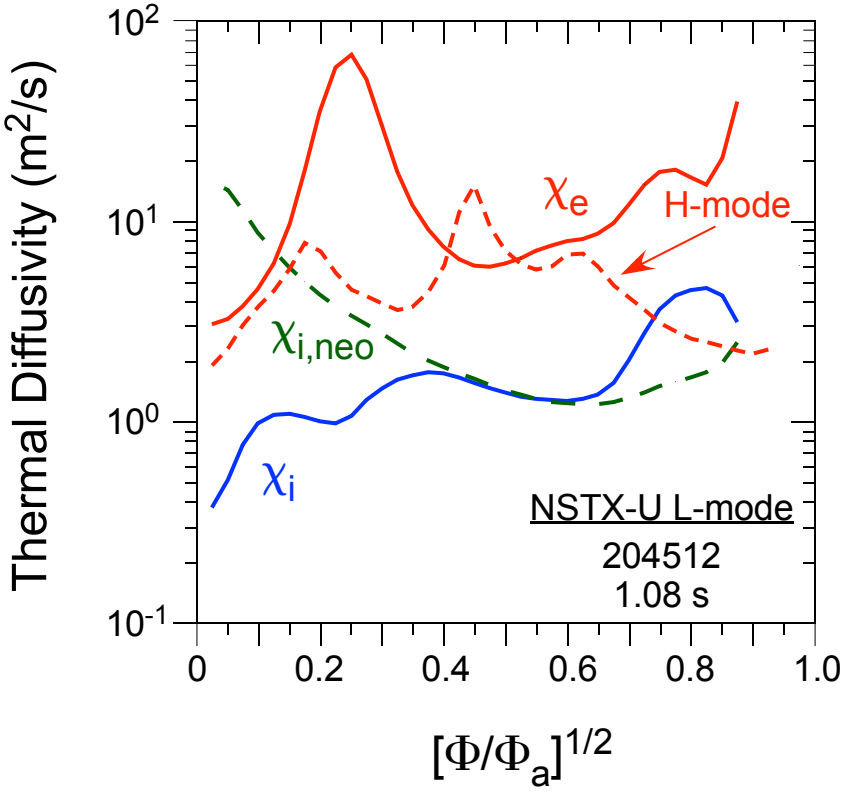


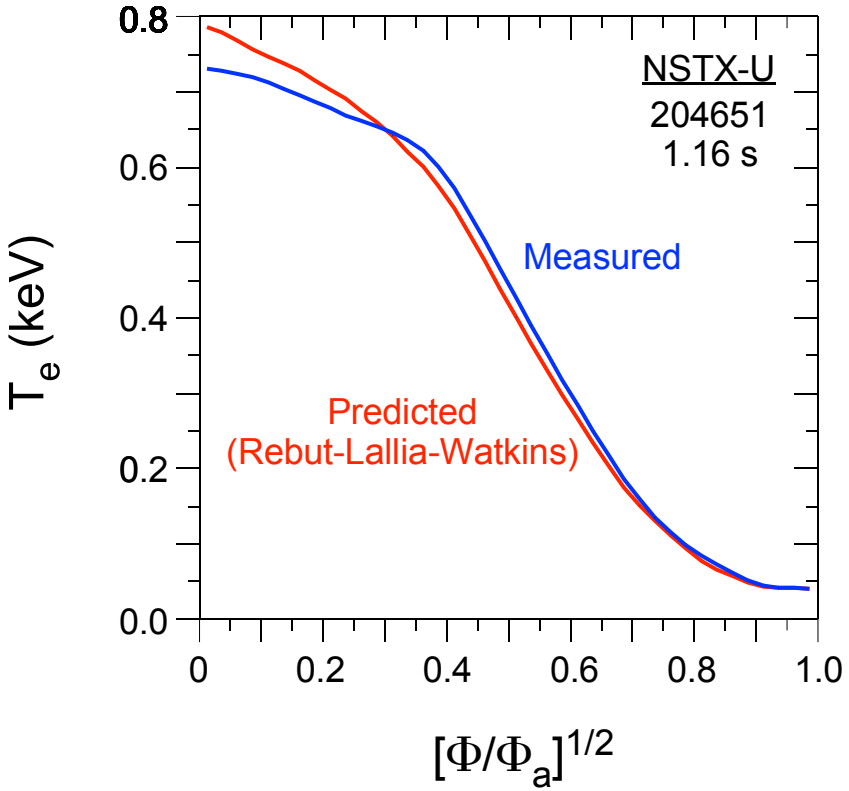


H-mode Confinement Enhancement Well Above that of L-mode (and >=1)



Reduction in χ_e Going From L- to H-; RLW predicts T_e





Caveat: Linear GYRO indicates microtearing is NOT dominant μinstability