HHFW Heating
Power Deposition and Transport

XP-15 Update

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XP-15 Heating Results Overview

- Electron heating observed in He and D.

  Maximum T_e obtained in low recycling D plasma.
- $k_{//} = 14\ m^{-1}$ and $k_{//} = 7\ m^{-1}$ heat electrons.

  Slower spectrum works better.
- $T_e \leq 4$ keV.

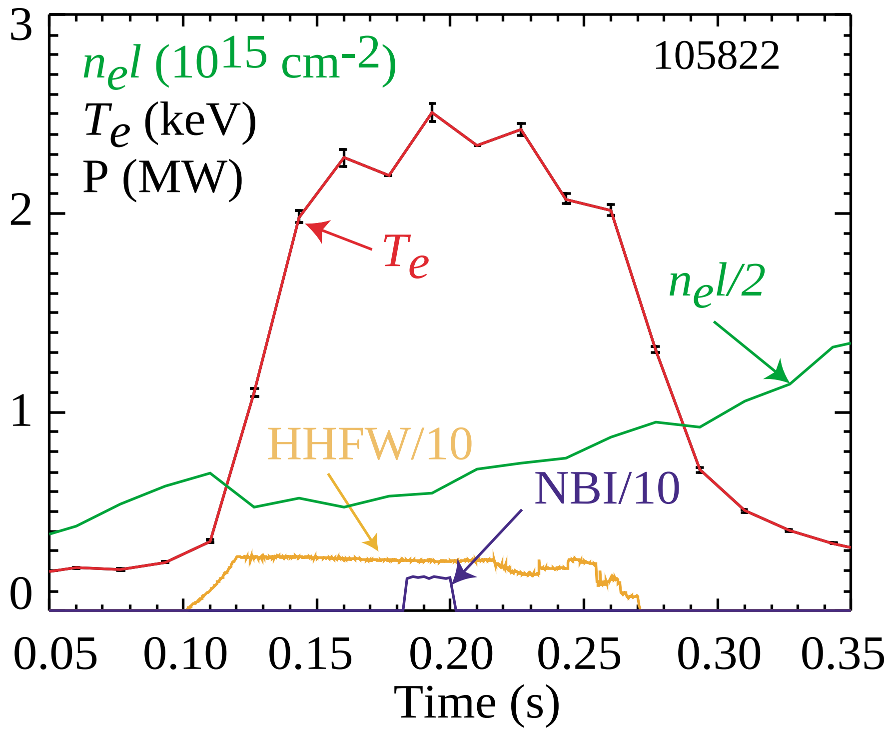
  Obtained 2 keV $\leq T_e \leq$ 3 keV routinely.
- Obtained non-NBI power balance.
- Obtained H-mode plasma -> XP-33
- Obtained long duration discharges -> ISD ET.

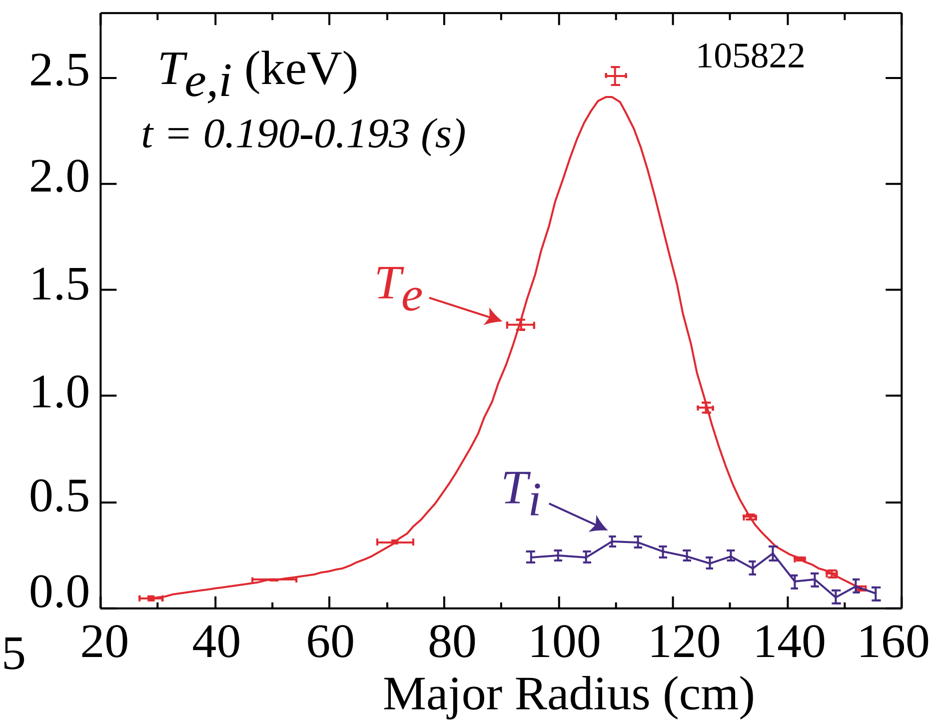
T_i and T_e Decoupled at Low Density: $T_e / T_i = 8$

HHFW Heats Electrons

NSTX

Helium, 400 kA, 4.4 kG



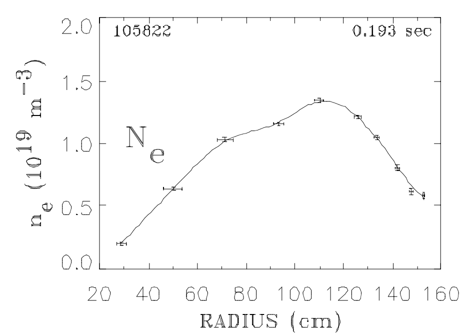


n_{eo} = 1.35x10^{19}/m^3

$\bar{n}_e$=0.86x10^{19}/m^3

T_i from CHERS,

R.E. Bell



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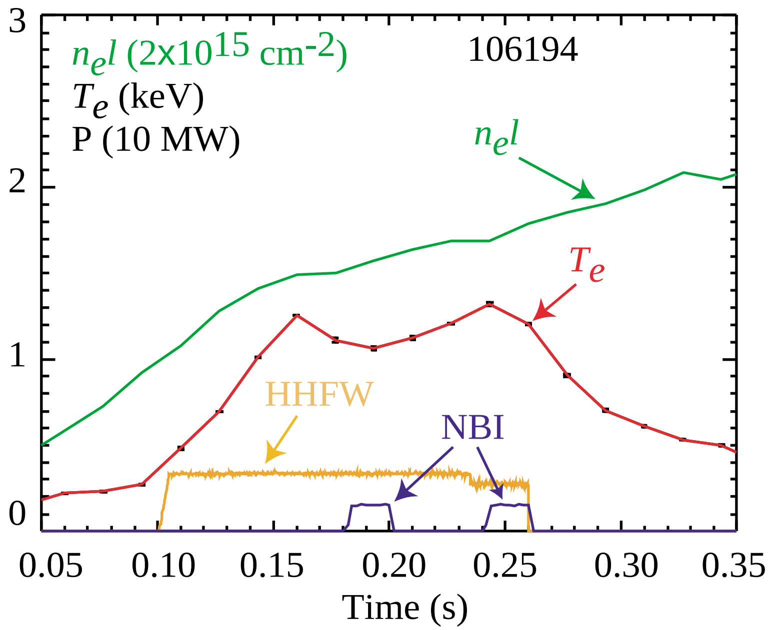
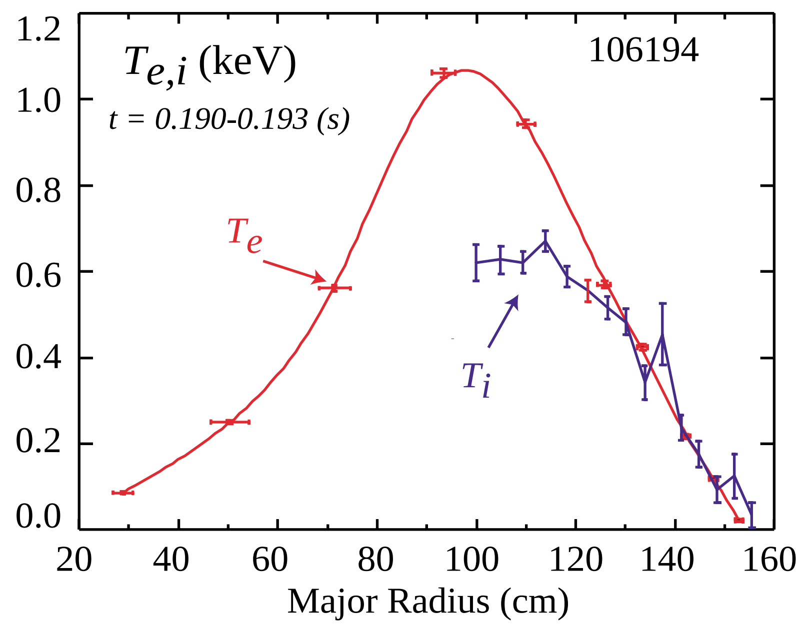
LeBlanc,HHFW-Heating-Rea-For-Nov-01-3

T_i and T_e Closer at Higher Density: $T_e / T_i = 1.6$

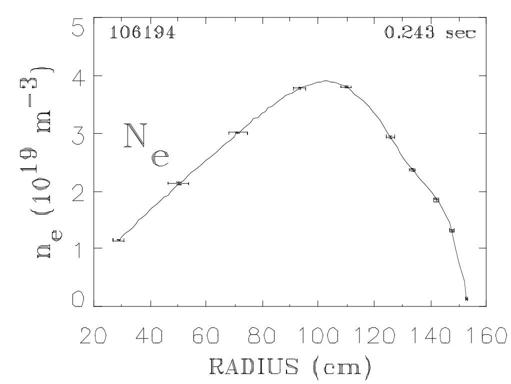
Helium, 800 kA, 4.4 kG





$n_{eo} = 4.0\mathrm{x}10^{19}/\mathrm{m}^3$

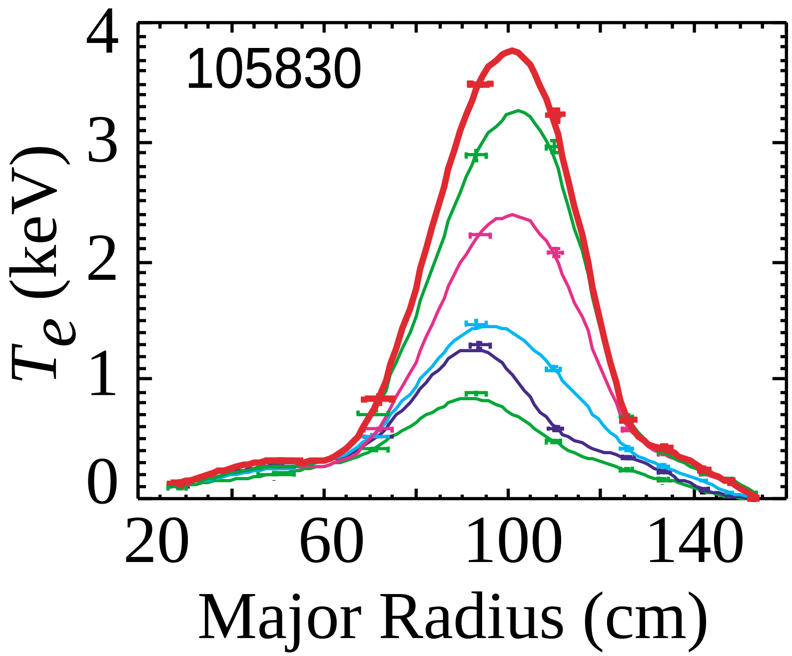
$\bar{n}_e = 2.4\mathrm{x}10^{19}/\mathrm{m}^3$



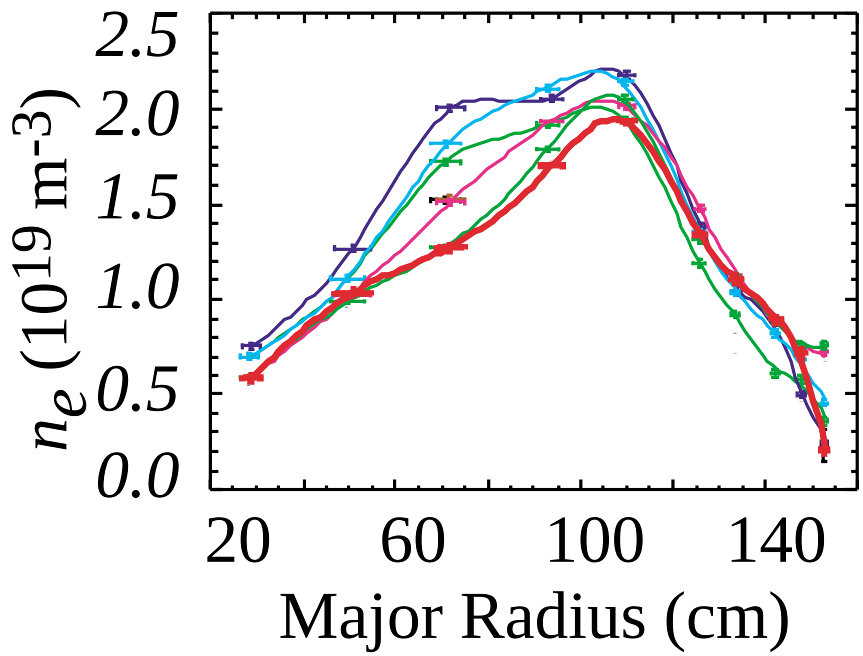
Large T_e Gradient in Core, ITB?

Deuterium, 0.8 MA, 4.5 kG

LARGE T_e INCREASE



SMALL n_e DECREASE



Take Advantage of New Hardware

- Reduced Field error.

  May reduce/eliminate MHD event at $t \approx 0.2$ s, which occurs in large-I_p LSN plasma.

- Center-stack gas puffer.

  Separate plasma fueling from HHFW coupling.

- Twenty spatial channels Thomson scattering diagnostic.

  Get better resolution of $\Delta T_e(R)$ during HHFW heating.

New Challenges

- Have to re-establish good heating.
- Can we couple to center-stack limited discharges more efficiently?
- Can we have long duration HHFW heating for $I_p \geq 800$ kA?
- Can we measure power deposition profile in a simple case (1 keV $\leq T_e \leq$ 2 keV)?
- Should we investigate HHFW coupling in simple NBI target plasma?