

2008 HHFW Research Plan

(from 5 year plan)



- Extend previous helium plasma coupling physics studies to deuterium plasma; improve operation with NBI, and optimize heating efficiency
- Begin heating & CD studies in deuterium H-mode plasmas

XP1: L mode in D_2
(extension of XP712)

- Can density be held below onset value in deuterium?
- How does efficiency depend on wavelength in deuterium?
- Need to establish behavior in deuterium L mode to optimize current drive for startup and in preparation for H mode studies

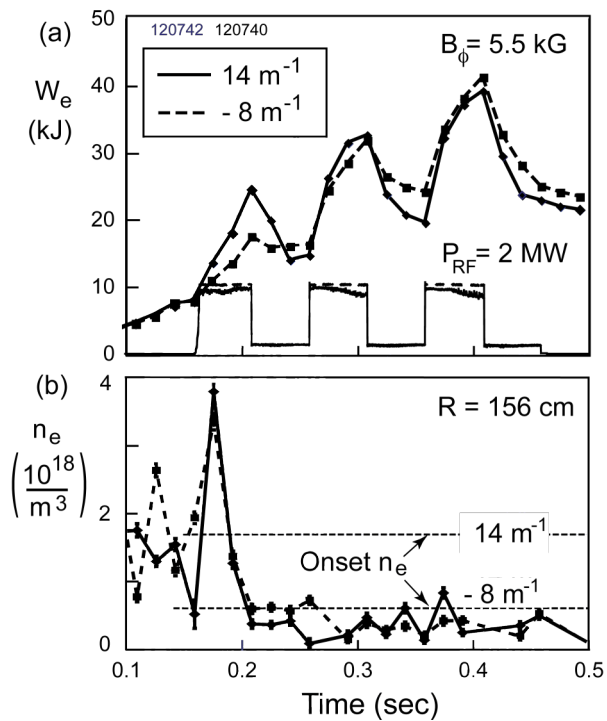
Edge density appears to affect the heating when it is above the onset density close to the antenna



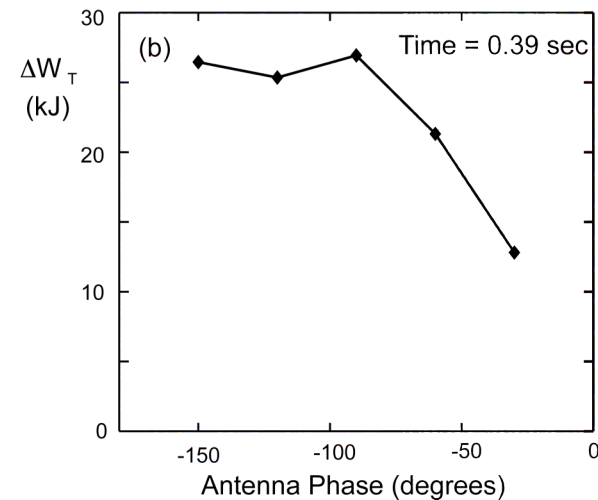
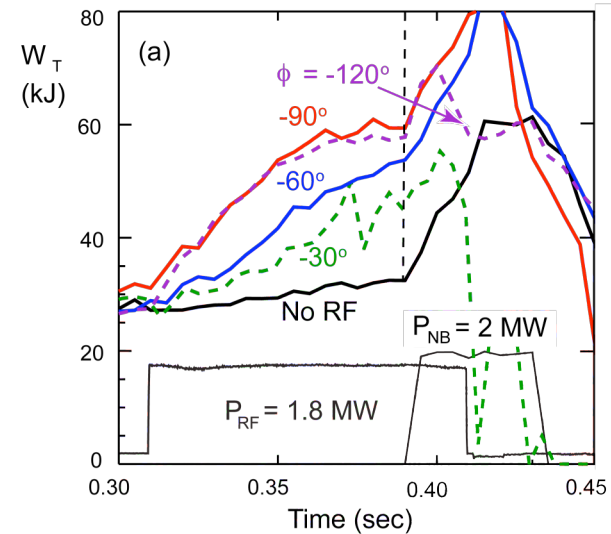
- Can density be held below onset value in deuterium?

- How does efficiency depend on wavelength in deuterium? (XP712 rev)

Helium plasma results



Helium plasma results



HHFW XP: Heating of L mode deuterium plasma

- dependence on edge density and wavenumber



- Plasma conditions
 - Deuterium, $B_T = 5.5$ kG, $I_p = 900$ kA to better confine beam (during diagnostic pulses), gap ~ 6 cm to reduce NB interaction with antenna
- RF properties for phase scan
 - Long pulse ≥ 200 ms
 - Phase scan 150° , 90° , 30° and fill phases as needed to determine knee location for drop-off of efficiency
- Diagnostics for phase scan
 - Thomson scattering for edge density, etc.
 - 90 kV NB pulse at end of RF for MSE
 - 70 kV NB pulse blip during RF for CHERS
- RF properties for efficiency scan
 - Repeat conditions for 150° and 90° phases but with the RF modulated to check efficiencies
- Results
 - Determine knee in heating efficiency and compare with helium
 - Run a few shots in helium to establish that 90° efficiency is good
 - Adjust conditions to obtain good efficiency at 90° for deuterium - density, gap etc