

# HHFW in Helium Discharges (M. Ono)



NSTX

Recently, helium ohmic discharges were obtained reliably in NSTX with very promising characteristics. (See results from XP-13 by R. Maingi, XP-1 by J. Menard, and XP-5 by S. Kaye).

- MHD behavior looks quiescent. (over 200 msec period)
- Minimize chemical plasma-wall interactions.
- Jan 00 HHFW electron heating experiment was severely affected by the MHD event.

So, HHFW in helium might be a good way to clarify electron heating physics in the short term.

But how does HHFW physics affected in helium?

From the HHFW wave physics point of view, helium plasma has some attractive features:

Parameters	Ratio of helium to deuterium
$m_i$ (mass)	2.0 : 1.0
$n_i$ (density)	0.5 : 1.0
$Z_i$ (charge)	2.0 : 1.0
$\omega_{ci}$ (ion cyclotron frequency)	1.0 : 1.0
$\omega_{pi}$ (ion plasma frequency)	1.0 : 1.0
$V_{Ti}$ (ion thermal velocity)	0.707 : 1.0
$r_{Li} = V_{Ti} / \omega_{ci}$ (ion Larmor radius)	0.707 : 1.0
V-phase V-Alfvén	1.0 : 1.0
$\omega_{pe} = T_i k^2 / (n_i^2 m_i)$	0.5 : 1.0

This tighter ion Larmor radius significantly reduces the ion cyclotron harmonic absorption.