

XP-217 Issues

So far, the plasma edge conditions in a $I_p = 900$ kA, $B_T = 4$ kG, lower single-null diverted discharge were varied by 1) increasing NBI heating power from 2 to 6 MW and 2) comparing with L-mode discharges. Issues raised so far

1) using edge profiles from the reciprocating probe for 2-D modeling using UEDGE to calculate edge (SOL) perpendicular and parallel heat and particle transport -- H-modes not well described by models. Interest in running an L-mode XP.

2) Reciprocating probe not run on a continuing basis -- need a separate XP? What are the conditions desired? If different XP, then ECX can be run with far fewer shots

3) Discharge conditions were hard to set up and took a lot of run time. Need reference discharges, especially for 3 source H-modes.

4) No tile Langmuir probe data analyzed (even taken?). Do we need to have this operational before continuation.

5) GPI camera data analyzed? If we don't utilize, then we should not restrict outer field line angles.

6) Generally a lot of overlap with heat flux scaling desires.

Divertor and plasma boundary research in NSTX

Main ways of changing edge transport in this XP:

- ***L-mode to H-mode comparison***
- ***power scan in H-mode***
- ***Configuration scan, LSN, DND***
- ***Density scan***

Not proposed:

- ***Plasma current or B scan***
- ***RF power input***
- ***Impurity injection***

Diagnostics installed for simultaneous data taking:

- ***A divertor bolometer array to measure radiation along chords that pass through the divertor for emission profiles***
- ***Infrared cameras to measure the surface temperature from which the heat flux is derived.***
- ***Spatially resolved D camera***
- ***Edge reciprocating probe***

Summary of Observations

- *Power flux to outer divertor is three times flux to inner divertor, radiated power is comparable to inner divertor*
- *50% Higher divertor heat flux in L-mode than H-mode with same NBI power*
- *D up to five times brighter in inner divertor - partly due to gas injection on the high field side of the plasma*
- *Divertor detachment has not been clearly observed*
- *Main impurities: carbon and oxygen
No metallic impurity accumulation*
- *T_e profile in the edge/SOL is flat at ~ 20 eV and n_e profile has a very long decay length (~ 4 cm)*