

ET3 (CHI) XPs to be developed (8-12 / 99)

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XP1. Establishment of a 200 kA CHI driven plasma current

(Roger Raman, Thomas R. Jarboe, Dennis Mueller)

Physics Objectives:

Primary objective:

1. Demonstrate that CHI can drive 200 kA of plasma current in a large ST and study machine size scaling (8-9/99)

Additional objectives and analysis:

(Individual leaders - please provide by May 10, a 1/2 page summary of the type of analysis you will perform and other diagnostics you will need. An ET3 group discussion meeting will be held during the third week of May to plan for these experimental runs)

1. Visible cameras for start-up location and edge MHD (Ricardo Maqueda, Glen Wurden 8-9/99)
2. I-R measurement for surface temperature and analysis for heat loads to divertor plates (Rajesh Maingi, 8-12/99)
3. Wall Conditioning studies (Henry Kugel, 8-12/99)
4. Reconstruction of CHI plasma equilibrium (Mike Schaffer, 10-12/99)
5. Investigate current penetration using temperature profiles measured by Thomson (?? 10-12/99)
6. Ultra-soft X-ray tomography - calculate emission profiles: (Dan Stutman, 10-12/99)
7. Mirnov coils: MHD mode structure for low and high current discharges (?? 10-12/99)

Diagnostics needed:

8/99 Plasma current measurement capability to the 100 kA level.

8/99 Visible cameras

8/99 I-R cameras

8/99 Transient pressure measurements at the following locations in the torus (near CHI injector, near absorber, near mid-plane)

8/99 Fast neutral pressure gauge

8/99 Between shots HeGDC

8/99 Core interferometer

10/99 Multi-point Thomson

10/99 Spectroscopy for C and O

10/99 Ultra-soft x-ray system

10/99 Mirnov coil array

10/99 Magnetics for E-fit reconstruction

Machine specific commissioning needed by 8/99

1. Fast gas system and fast gas system calibrations
2. Test of CHI power supplies at 2kV with short at electrode
3. Voltage monitor signal across electrodes using voltage divider
4. Software capability to program CHI waveforms
5. Software capability to program lower dome fast gas valves
6. Software capability to program lower dome Maxtek valve
7. Software capability to open and close lower dome TIV valves
8. Discharge initiation with EC and scan of operating range
9. CHI discharge initiation with EC, TF, PF, CHI power supplies
on

XP2: Demonstration of the addition of a CHI current drive to an Ohmic discharge

(Roger Raman, Dennis Mueller, Thomas R. Jarboe - 10-12/99)

Primary objective:

Show that CHI can increase the plasma current of an Ohmic discharge by about 50 kA.

Analysis to be performed: Study the alteration in the following parameters as far as confinement is concerned.

Change in temperature profile (multi point Thomson)

Change in density profile (multi point Thomson)

Alteration in MHD activity

Apply CHI at the end of an Ohmic phase and compare plasma current decay rates for the cases with and without CHI (plasma current monitor)

E-fit reconstruction for the phases with and without Ohmic

Requirements:

In addition to the requirements of XP1, a 500 kA single null Ohmic discharge is needed.