Princeton Plasma Physics Laboratory

NSTX Experimental Proposal

Title: Moveable Glow Probe Evaluation

NSTX-OP-XP-616	**Revision:**	Effective Date: 1/31/06 *(Ref. OP-AD-97)* Expiration Date: 1/31/08 *(2 yrs. unless otherwise stipulated)*

PROPOSAL APPROVALS

Author: H. Kugel	Date
ATI – ET Group Leader: R. Maingi	Date
RLM - Run Coordinator: R. Raman	Date

Responsible Division: Experimental Research Operations

Chit Review Board (designated by Run Coordinator)

MINOR MODIFICATIONS (Approved by Experimental Research Operations)

Moveable Glow Probe Evaluation

1. Overview of planned experiment

Previously, NSTX HeGDC was performed with 2 Fixed Wall Probes: Bay G Fixed Glow Probe (G-FGP) and Bay L Fixed Glow Probe (L-FGP).

Recently, the bias power to the L-FGP can be routed to a Moveable Glow Probe (MGP) at Bay K Top. The anode of the MGP can be inserted into the middle of the vessel. This experiment will test if the MGP will give a more efficient and uniform GDC coverage of the vessel to allow shorter GDC durations between discharges, and/or improved wall conditions for long pulse development.

2. Theoretical/ empirical justification

NSTX long pulse development would benefit from faster duty cycles and improved wall conditions.

3. Experimental run plan: obtain Fixed Wall Probe baseline

1. For a comparison baseline, configure GDC system for
   Bay G Fixed Glow Probe (G-FGP)
   Bay L Fixed Glow Probe (L-FGP)

NOTE: Do 3.1 the evening before, or requires 15 minute Opening.

• 11 Minute GDC for Long pulse DN

2. After the standard morning fiducials have been performed, apply 11 minute standard GDC using the G-FGP and L-FGP.

3. Test the resulting wall conditions by trying to <u>duplicate or enhance</u> the best DN long pulse discharges to date, e.g. 117707, 117424.

4. Repeat step 3.

5. Repeat step 3.

4. Experimental run plan: compare MGP with FGP

1. Configure GDC system for MGP operation (requires 15 minute opening).

• 11 Minute GDC for Long pulse DN

2. Apply 11 minute standard GDC using the MGP and G-FGP.

3. Test the resulting wall conditions by trying to duplicate or enhance the best DN long pulse discharges to date, e.g. 117707, 117424.

4. Repeat step 3.

5. Repeat step 3.

• 7 Minute GDC for Long pulse DN

6. Determine if a shorter GDC duration is possible. Apply a 7 minute GDC using the MGP and G-FGP.

7. Repeat step 3.

8. Repeat step 3.

9. Repeat step 3.

5. Experimental run plan: compare MGP at lower pressure

• Apply 7 Minute GDC at 1.5 Torr for Long pulse DN

1. Apply a 7 minute GDC using the MGP and G-FGP.

2. Test the resulting wall conditions by trying to duplicate or enhance the best DN long pulse discharges to date, e.g. 117707, 117424.

3. Repeat step 2.

4. Repeat step 2.

• Apply 7 Minute GDC at 1.0 or <1 Torr for Long pulse DN

5. Apply a 7 minute GDC using the MGP and G-FGP.

6. Test the resulting wall conditions by trying to duplicate or enhance the best DN long pulse discharges to date, e.g. 117707, 117424.

7. Repeat step 6.

8. Repeat step 6.

4. Required machine, NBI, RF, CHI and diagnostic capabilities

Machine and NBI conditions for DN 117707, 117424, and LSN 116313,116318, 117147.

5. Planned analysis

Comparison of performance and spectroscopic waveforms.

6. Planned publication of results

The results will be presented at the APS, PSI, and IAEA meetings, and submitted to archival journals.

PHYSICS OPERATIONS REQUEST

Machine conditions (specify ranges as appropriate)

I_{TF} (kA): _____ Flattop start/stop (s): _____/_____

I_P (MA): _____ Flattop start/stop (s): _____/_____

Configuration: **Inner Wall / Lower Single Null / Upper SN / Double Null**

Outer gap (m): _____, Inner gap (m): _____

Elongation κ: _____, Triangularity δ: _____

Z position (m): **0.00**

Gas Species: **D / He**, Injector: **Midplane / Inner wall / Lower Dome**

NBI - Species: **D**, Sources: **A/B/C**, Voltage (kV): _____, Duration (s): _____

ICRF – Power (MW): ____, Phasing: **Heating / CD**, Duration (s): _____

CHI: **On / Off**

Either: List previous shot numbers for setup:

a) The best DN long pulse discharges to date, e.g. 117707, 117424.

b) The best LSN long pulse discharges to date, e.g. 116313, 116318, 117147.

DIAGNOSTIC CHECKLIST

Diagnostic	Need	Desire	Instructions
Bolometer – tangential array	X		
Bolometer array - divertor	X		
CHERS	X		
Divertor fast camera		X	
Dust detector		X	
EBW radiometers		X	
Edge deposition monitor		X	
Edge pressure gauges		X	
Edge rotation spectroscopy			
Fast lost ion probes - IFLIP		X	
Fast lost ion probes - SFLIP		X	
Fast X-ray pinhole camera		X	
Filtered 1D cameras	X		
Filterscopes	X		
FIReTIP	X		
Gas puff imaging		X	
Infrared cameras	X		
Interferometer - 1 mm			
Langmuir probe array		X	
Magnetics - Diamagnetism	X		
Magnetics - Flux loops	X		
Magnetics - Locked modes	X		
Magnetics - Pickup coils	X		
Magnetics - Rogowski coils	X		
Magnetics - RWM sensors	X		
Mirnov coils – high frequency	X		
Mirnov coils – poloidal array	X		
Mirnov coils – toroidal array	X		
MSE	X		
Neutral particle analyzer		X	
Neutron measurements	X		
Optical X-ray	X		
Plasma TV	X		
Reciprocating probe		X	
Reflectometer – core		X	
Reflectometer - SOL		X	
RF antenna camera		X	
RF antenna probe		X	
SPRED		X	
Thomson scattering	X		
Ultrasoft X-ray arrays	X		
Visible bremsstrahlung det.	X		
Visible spectrometer (VIPS)	X		
X-ray crystal spectrometer - H	X		
X-ray crystal spectrometer - V	X		
X-ray PIXCS (GEM) camera		X	