Princeton Plasma Physics Laboratory

NSTX Experimental Proposal

Title: Initial Lithium Pellet Injection

OP-XP-???	**Revision:**	Effective Date: *(Ref. OP-AD-97)* Expiration Date: *(2 yrs. unless otherwise stipulated)*

PROPOSAL APPROVALS

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ATI – ET Group Leader: H.Kugel, R.Kaita	Date
RLM - Run Coordinator: S.Kaye	Date

Responsible Division: Experimental Research Operations: M. Bell

Chit Review Board (designated by Run Coordinator)

MINOR MODIFICATIONS (Approved by Experimental Research Operations)

NSTX EXPERIMENTAL PROPOSAL

Title: Initial Lithium Pellet Injection **OP-XP-???**

1. Overview of planned experiment

• Commission initial Lithium Pellet Injector operation using robust, long pulse, LSN, H-mode plasmas (e.g. 3 NBI, 110194).

2. Theoretical/ empirical justification

• Demonstrate and characterize the initial performance of the new Lithium Pellet Injector for operation during the ramp-down, ramp-up, and flat-top of long pulse, H-mode plasmas.

• Li Pellet injection into the NSTX high edge density, temperature, and rotation gradients may exhibit unique ablation, transport, and divertor behavior in different plasma, pellet mass, and velocity regimes (e.g., at low velocity, in SOL, surface ablation with no NGS, at higher velocity, beyond LCFS, NGS and grad effects)

3. Experimental run plan

• Single Li Pellets into Ramp-Down
  1 mg: 25, 100 m/s: 2 velocities, 1 shots/velocity = 2 shots
  5 mg: 25, 100 m/s: 2 velocities, 1 shots/velocity = 2 shots
  10 mg: 25, 100 m/s: 2 velocities, 1 shots/velocity = 2 shots
• Single Li Pellets into Ramp-Up
  1 mg: 25, 100 m/s: 2 velocities, 1 shots/velocity = 2 shots
  5 mg: 25, 100 m/s: 2 velocities, 1 shots/velocity = 2 shots
  10 mg: 25, 100 m/s: 2 velocities, 1 shots/velocity = 2 shots
• Single Li Pellets into Flat-Top
  1 mg: 100 m/s: 1 shot/velocity = 1 shot
  5 mg: 100 m/s: 1 shot/velocity = 1 shot
  10 mg: 100 m/s: 1 shot/velocity = 1 shot
• Multiple Pellets into Flat-Top
  Two, 10 mg, 100m/s, Δt= 50 ms, 100 m/s: =1 shot
  Four, 10 mg, 100m/s, Δt= 75 ms, 100 m/s: =1 shot
  Eight, 10 mg, 100m/s, Δt= 100 ms, 100 m/s: =1 shot

• Measurements
• Pellet Ablation along radial trajectory [filtered cameras]
• Midplane Impurity transport, core to edge [filtered cameras, UXR, ..]
• Transport to and from Divertor [filtered cameras, UXR, bolom,..

4. **Required machine, NBI, and diagnostic capabilities**

- 3 NBI, Discharge 110194.

5. **Planned analysis**

Determine density control, Tau-E, Tau-P*, stored energy, fueling efficiency, profiles, edge rotation, neutron and power yields.

6. **Planned publication of results**

The results will be presented at PSI 2004.

DIAGNOSTIC CHECKLIST

Title: Initial Lithium Pellet Injection

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

Machine conditions (specify ranges as appropriate): Discharge 110194

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 □: _____, Triangularity □: _____

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: _____

Or: Sketch the desired time profiles, including inner and outer gaps, □, □, heating, fuelling, etc. as appropriate. Accurately label the sketch with times and values.