

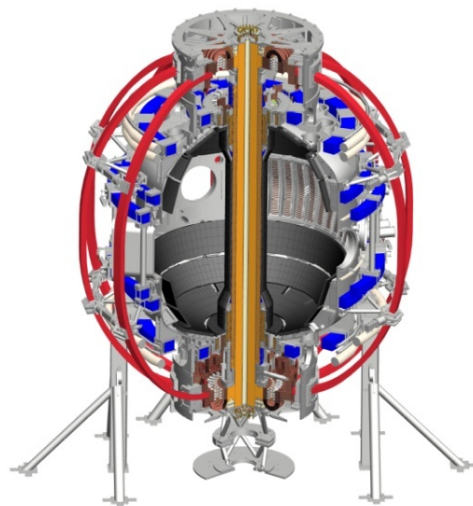
Research Operations Update

S. P. Gerhardt

*J. Hosea, R. Ellis, R. Kaita, L. Roquemore
and the NSTX Research Team*

**NSTX-U Team Meeting
B318
5/7/2013**

*Coll of Wm & Mary
Columbia U
CompX
General Atomics
FIU
INL
Johns Hopkins U
LANL
LLNL
Lodestar
MIT
Lehigh U
Nova Photonics
ORNL
PPPL
Princeton U
Purdue U
SNL
Think Tank, Inc.
UC Davis
UC Irvine
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U Colorado
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U Tennessee
U Tulsa
U Washington
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X Science LLC*



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York U
Chubu U
Fukui U
Hiroshima U
Hyogo U
Kyoto U
Kyushu U
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Ioffe Inst
TRINITI
Chonbuk Natl U
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KAIST
POSTECH
Seoul Natl U
ASIPP
CIEMAT
FOM Inst DIFFER
ENEA, Frascati
CEA, Cadarache
IPP, Jülich
IPP, Garching
ASCR, Czech Rep*

This Talk

- NSTX-U Port Allocations and Diagnostic Installation Prep
- MAPP on LTX
- HHFW center conductor upgrade update

Overall Comments on Diagnostics

- From the May 2nd rollover meeting:

1151-****-X450 NSTX Diag Ops Support						
Diagnostic Installation & Calibration						
2000	Installation Period #1	01-Aug-13*	30-Sep-13	43	116	STRATTON
2010	Installation Period #2	01-Oct-13*	29-Nov-13	44	161	STRATTON
2020	Calibration Period #1 (2nd Shift)	01-Oct-13*	29-Nov-13	44	116	STRATTON
2040	CENTER STACK INSTALLATION (Lift in New Center Stack ID-1230)	15-Apr-14*	16-Jun-14	45	20	Strykowski
2050	Final Calibrations (2nd Shift)	15-May-14*	16-Jun-14	23	20	STRATTON
2060	Begin Machine Pumpdown (ID-1300)	11-Jul-14*	11-Jul-14	0	2	Strykowski

- Diagnostic installations can/will start as soon as Aug. 1st.
 - And some work possibly can/should be sooner
- December 2013-March 2014: Presently scheduled for test pump-down.
- Test-cell work is approaching critical path...diagnostic installation work must be timely and efficient.
 - If your diagnostic goes on exactly as before, then the installation will be as per existing procedures written by construction group.
 - Be ready to support them.
 - If your diagnostic is new, then it needs custom procedures for installation.
 - Talk to me, Brent, Bob, Lane, about what procedure it should go in.
 - No major in-vessel diagnostic work should be planned before CD-4 in 2014.

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- Coming months are critical for finalizing diagnostic design and fabrication, installation plans and procedures.
 - NSTX-U project is NOT going to wait for any diagnostic not required for CD-4.
 - Have your vacuum interface ready by middle/end of summer.**
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Complete Port Allocation Tables & Maps Have Been Developed

Contain all Diagnostics, GDC Anodes and Filaments, Electrical Feedthroughs, Vacuum Gauges and Gas Injectors

NSTX-U Midplane Port Allocations, S.P. Gerhardt, et al. 4/24/2013											
Gray Background: Same Flange As Before											
Yellow Background: Flange to Be Fabricated, Or New Port on NSTX-U											
Not Included: BES, T-FIDA, S-FLIP, MPTS Laser Entrance...											
	Diagnostic	Cognizant	Flange Size	Flange Location	Vacuum Interface	Shutter Type (if Any)	Drawing or Reference	NSTX-U Same as NSTX	Comment	Any Manual TIV	Any Pneumatic TIV (Automatically Generated)
Bay A	None							Yes			
Bay B	Main Flange							Yes			
	Tangential Camera	L. Roquemore	6"	center	Window w/ shutter			Yes		0	0
	Toroidal CHERS and MSE Collection Optics	R. Bell & H. Yuh	Custom	9:00	Window w/ shutter			Yes	MSE and Toroidal CHERS Collection Optics are Not Changed		
	Plasma TV #1	L. Roquemore	6"	12:00 port	Window w/ shutter			Yes		0	0
	GPI Gas Inlet	S. Zweben	1 1/3"	1:00 port	mini-conflat TIV			No	Take TIV From Old 4.5" port	0	1
	SSNPA	D. Liu	4.5"	2:00 port	4.5" to 6" "Expander", then 6" TIV			No	Need to find TIV	0	1
	Camera		6"	3:00 port	Window w/ shutter			Yes		0	0
	GPI Gas Inlet	S. Zweben	1 1/3"	3:30 port	mini-conflat TIV			No	Take TIV From Old 4.5" port	0	1
QMB	C. Skinner	4.5"	5:00 port	Diagnostic Itself			Yes		0	0	
GPI Shutter	S. Zweben	1 1/3"	5:30 port	Mechanical Feedthrough			Yes		0	0	
GPI View	S. Zweben	6"	6:30 port	Reentrant window w/ shutter			Yes		0	0	
Bay C	Main Flange							Yes			
	ORNL Reflectometry	T. Gray	2 3/4"	12:00 location	Same as Before			Yes		0	0
	ECH Preionization	???	2 3/4"	6:00 location	Same as Before			Yes		0	0
	ECH Preionization	???	2 3/4"	Center	Same as Before			Yes		0	0
MIG 2	W. Blanchard	2 3/4"	9:00 location	Manual TIV			Yes		1	0	
Bay D	Main Flange							Yes			0
	Blank		6"	12:00 port	Blank			???		0	1
	TIV	L. Roquemore	6"	center	TIV			Yes		0	0
	Blank		6"	6:00 port	Blank			???		0	0
Bay E	Main Flange						9D11246	No			
	XEUS	V. Soukhanovskii	2 3/4"	12:00 Location	TIV			No	Must Purchase TIV	0	1
	LoWEUS	V. Soukhanovskii	2 3/4"	center	TIV			No	Must Purchase TIV	0	
	MONA LISA	V. Soukhanovskii	2 3/4"	6:00 Location	TIV			No	Must Purchase TIV	0	1
	Blank	Blank	2 3/4"	3:00 Location	Blank			Blank		0	0
MIG 1	W. Blanchard	2 3/4"	9:00 Location	Manual TIV			Essentially Yes		1	0	
E-F Gap	Blank	Blank	2 3/4"	Between Flanges, Below Midplane	Blank			View B-B of DB1485		0	0
Bay F	Main Flange							Yes			
	MPTS	B.P. LeBlanc		Central	Window w/ Shutter			Yes		0	0
	Blank		1 1/3"	12:00 port	Blank			Blank		0	0
	High-f Array	Kalish/Fredrickson	4 5/8"	12:30 port	Electrical Feedthrough			No	High-f Array Feedthrough on Largest Flange	0	0
I-FLIP	D. Darrow	3 3/8"	3:00 port	Electrical Feedthrough on 3 3/8" to 2 3/4" Zero Length			No	Change which port the wires come out of compared to NSTX			

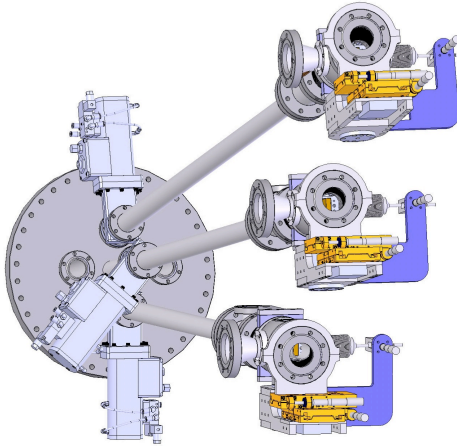
Example sheet for midplane ports: Using these to synchronize diagnostic and engineering needs for port space. If you want to see these, let me know...these are what we are working towards implementing

New Port Covers Have Been Designed For Bays E, I, and J

More Clever Diagnostic Engineering By L. Roquemore

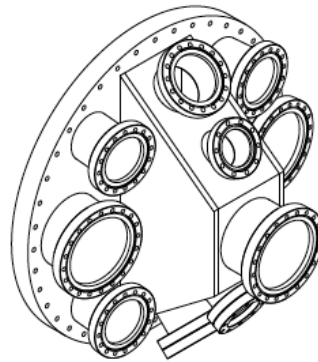
Bay E Supports 3

UV Spectrometers (LoWEUS, XEUS, MonaLisa) and MIG1



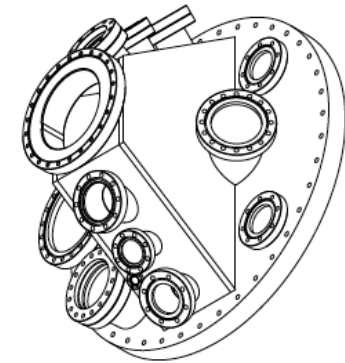
Bay J Supports

IR and Visible Cameras, UT-K and Divertor Spectrometers, Upward LITER, UCLA Reflectometer and Polarimeter, LBO, RF Probe.



Bay I Supports

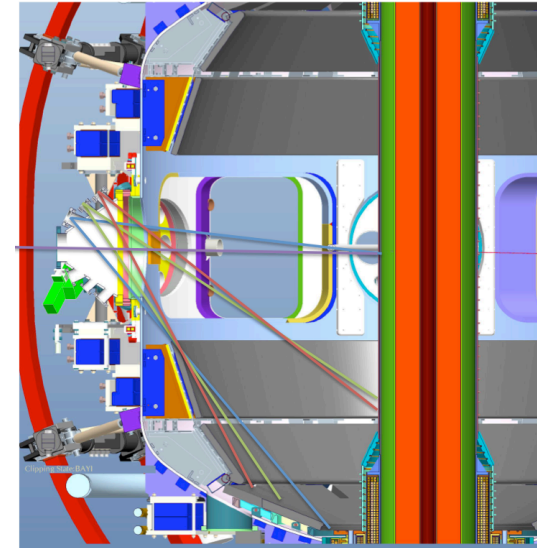
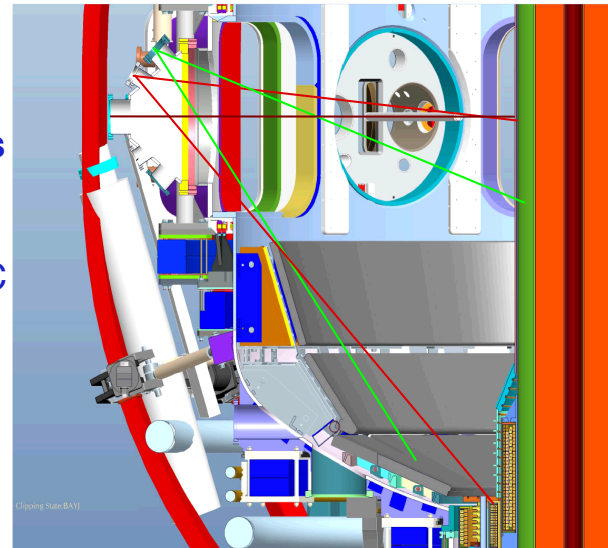
XCS, TGS, IR & Visible Cameras, SSNPA, SGI, 1D CCD & EIES, Microwave Imaging, QMB, Bolometers
Design is very close to done.



Warning: These images are a few weeks old. Details have changed slightly. Talk to Lane or Brent for most up to date.

Bay-L Cap (not shown) Supports

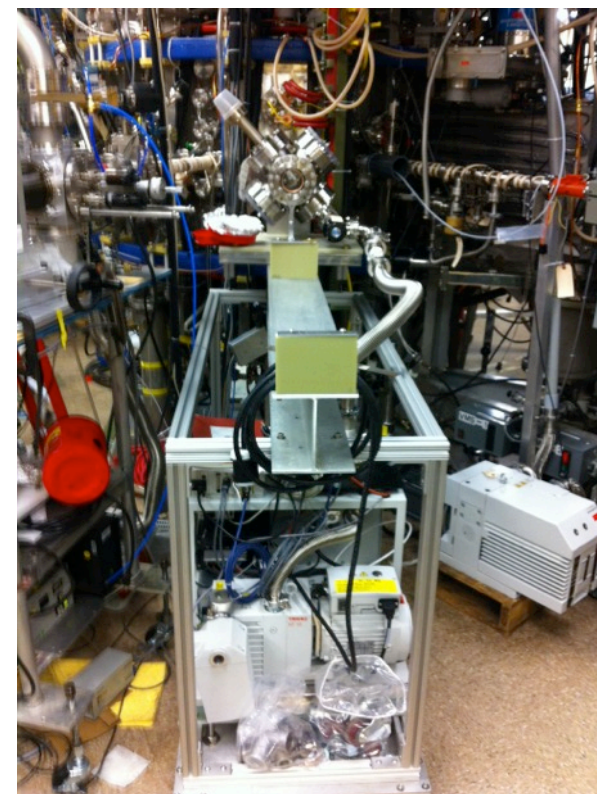
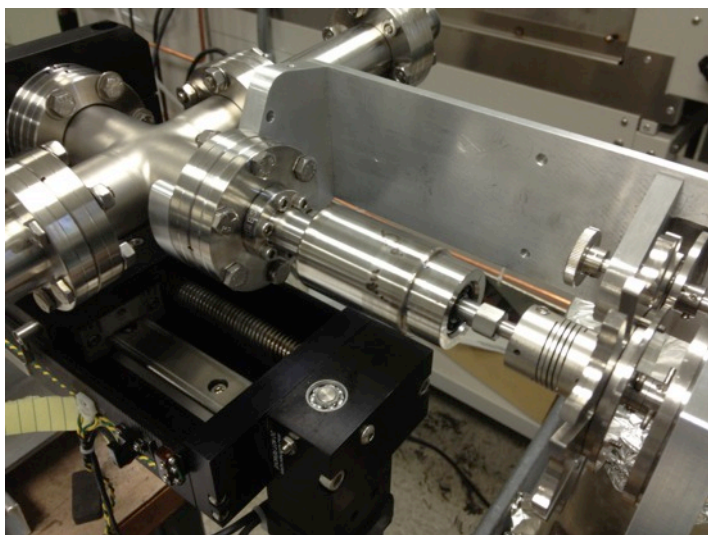
MPTS exit window, High-k exit, plasma TV+GPI view, SSNPA, spectroscopy & CHERS view, GDC feedthroughs, magnetics feedthroughs.



Some Background Activities on Gas Injection System Preparation

- Had an engineering peer review of “electromagnetic” MGI valves for NSTX-Upgrade.
 - Provided input on valve design to U.-Washington collaborators.
- “Finalized” with NSTX-U engineers the locations of all injectors, pressure gauges, and GDC feedthroughs.
- Begun conceptual design work on high-throughput divertor gas injectors for NSTX-U.
- Developed a PCS software specification for the NSTX-U gas injection system.
 - Includes (as long-term goal) PCS control of SGI, divertor gas, MGI.
- Note: most software engineer resources presently dedicated to Upgrade scope tasks.

Preparation of Purdue University Materials Analysis and Particle Probe – MAPP – for sample exposure on LTX nearing completion



- “Geneva” drive for reproducible positioning of samples designed, installed, and tested
- Molybdenum alloy (TZM) holders machined for four samples to be exposed and heated individually
- Successful fit-up of probe drive with test chamber on LTX
- Near-term plans
 - Pumpdown , leakcheck, and bakeout of bellow drive prior to installation on LTX
 - Thermal Desorption Spectroscopy planned as first measurements for samples exposed to LTX plasmas
 - Heating samples and observing spectrum with residual gas analyzer allows determination of molecules adsorbed by surface due to plasma exposure

J.P. Allain (Purdue), D. Andruczyk (U. of Illinois), R. Ellis, R. Kaita, D. Labrie, M. Lucia, M. Mardenfeld, et al.

NSTX HHFW Compliant Center Conductor Upgrade Status

R. Ellis and J. Hosea

- Successful CDR March 30.
- Bids for copper non-compliant portion of center conductors are due today; award May 6.
- We will order compliant section prototypes from two separate vendors.
 - Drawing for compliant section approved May 6.
 - Uses geometry shown at CDR.
 - Requisitions by May 7.
- Two back plates successfully test fit in RF Test Facility.
 - Spools connecting feedthroughs to backplates are complete.
- Designing adapter plates for two feedthroughs.
- Fabricate adapters in May.
- Install antenna mockup beginning of June.

Fit-up of two antenna back plates in RF test stand



Test mock-up utilizes single feed from design pre-2008 configuration.

Will use actual Faraday cages and BN limiters in test stand.