

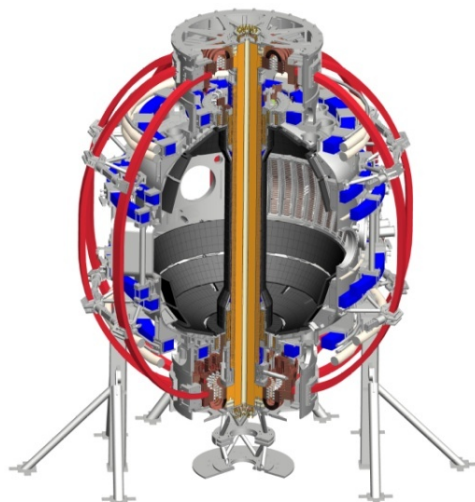
Program Update on Roles, Responsibilities, Goals for Task Forces and Working Groups

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J. Menard

For the NSTX-U Research Team

NSTX-U Pre-Forum Meeting #2 – Day 2
PPPL LSB B318
January 29, 2014



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 CEA, Cadarache
 IPP, Jülich
 IPP, Garching
 ASCR, Czech Rep

Agenda

- Roles, responsibilities, charges of groups
- Recap of guidance on run schedule, operational capability (near and long-term)
- Research Forum website
 - Open for idea submissions Feb 1
 - Request all ideas to be submitted by Feb 22

Roles / Responsibilities for Science Groups

- Work with Program/TSGs to set run-time allocation guidance
- Coordinate research of TSGs within the SG – promote experiments / plans that achieve multiple scientific goals
 - Critical to maximizing scientific output per shot
 - “Coordinated” XPs will receive higher priority / more run time
- Inform Run Coordinator when XP is ready for final review
- Provide summaries and highlights of scientific progress at/for NSTX-U team meetings, FES/quarterly reviews, other venues
- Aid dissemination of results with Physics Analysis Division
 - Journal publications, invited talks, seminars, colloquia, conferences, ITPA, BPO
- Coordinate / down-select milestone ideas from TSGs in SG
- Provide feedback / comment on annual Field Work Proposal
- Assist / report to the NSTX-U Program and Project directors

Roles / Responsibilities for Topical Science Groups

- Lead brainstorming, organization, writing of 5 year plan topics
- Determine and address highest priority scientific issues through discussion and consensus at open meetings
- Organize the NSTX-U Research Forum sessions for the TSG
- Draft scientific milestone ideas utilizing expertise of the TSG
- Propose and execute experiments to achieve milestones and address priorities
- With SG leaders, define facility and theory resources to achieve research goals
- Present TSG / SG results and plans at NSTX-U PAC meetings
- Assist / report to the NSTX-U Science Group leaders

Roles / Responsibilities for University Representatives

- Contribute to prioritization within TSGs
 - Help decide/draft milestones, XMP/XP prioritization
 - Help identify how your tools/codes/diagnostics/personnel can contribute to the group and the larger NSTX-U program
 - Advocate for your own research and for the needs of the larger NSTX-U research program
- Advocate for your TSG research outside of NSTX-U
 - Seek input/interest from those not funded by NSTX-U
 - Particularly from your own University and other universities
 - Includes giving seminars at other Universities / institutions describing NSTX-U and/or your research
- Help identify best tools for remote participation, and remote experimentation

Roles / Responsibilities for Task Forces

- Address specific operational and/or scientific goal that cuts across or impacts multiple SGs / TSGs
- Goal must be very high priority within research program
- Receives dedicated run-time, and has dedicated session at Research Forum
 - Similar to a TSG, but may not necessarily have theory/modelling or university representatives – depends on duration or scope
- Organizes experimental proposals to achieve goal
- Finite duration - nominally 1-2 years, renewable if necessary
- TF leadership should nominally have a leader and a deputy, and should include at least 1 collaborator if possible
- Reports directly to Program / Project

Roles / Responsibilities for Working Groups

- Responds to specific programmatic or technical charge from NSTX-U Program or Project
- Addresses issues that cross-cut more than one SG or TSG
- Nominal lifetime = 1-2 years, can be extended/renewed
- Provides points of contact between NSTX-U and other groups as necessary (e.g. PPPL theory, FESAC, ITPA)
- Does not have dedicated NSTX-U run time, but provides recommendations on XP prioritization, other resource needs
- WG leadership should nominally have a leader and a deputy, and should include at least 1 collaborator if possible

Goals / Charges to Task Force(s) and Working Group(s)

- Please see subsequent slides

Particle Control Task Force (PC-TF)

- Leader/Deputy: Rajesh Maingi, John Canik
- Task force goal:
 - “Develop pumping and fueling tools, operating scenarios, and control systems to achieve main-ion and impurity density control for long-pulse”
- Scope includes XPs related to:
 - Main-ion fueling optimization via PCS and/or real-time control
 - Wall coating and preparation optimization for increased particle pumping
 - Reduction / control of impurity ion source rates
 - Natural and paced ELMs for impurity and main ion flushing
 - Real-time density measurements for density feed-back control
 - Physics design and performance characterization of divertor cryo-pump (if/as resources permit implementation of cryo-pump)
- Due date: ASAP, end of FY16 run for non-cryo elements

Non-axisymmetric Control Coil Specification Working Group (NCC-WG)

- Leader/Deputy: Jong-Kyu Park, John Canik
- Charges:
 - Specify required coil current, frequency, and location for NCC
 - Consider full set (24 coils) and partial set (12 coils)
 - Consider range of applications: NTV, EFC, RWM, RMP, ELM pacing, etc...
 - Specify required number of independent SPA channels vs. applications and requested capabilities
- Deliverables:
 - Organize summary presentation(s) on IPECOPT analysis results
 - Give presentation(s) making recommendations on NCC and SPA performance requirements, gather and incorporate team input
 - Generate written report (5-20pp Word file) documenting NCC and SPA requirements for use in developing engineering requirements document (GRD) to drive engineering design
- Due dates:
 - Initial written report April 2015 if possible (no later than May)
 - Consult with Project/engineers/designers as needed until implementation

Disruption Prediction/Avoidance/Mitigation Working Group (DPAM-WG)

- Leader/Deputy: Steve Sabbagh, Roger Raman
- Charges:
 1. How will NSTX-U interface to the upcoming FES workshops, and longer-term, address the FESAC/FES Tier 1 issue of "Transients" generally?
 - a. In which disruption research areas can NSTX-U make leading contributions?
 - b. What are the associated long-term resource needs from NSTX-U?
 2. What are the leading/highest priority NSTX-U contributions to JRT-16?
 - a. What are the required resources during FY15-16 to support JRT-16?
 3. How can NSTX-U minimize disruptivity rates?
 - a. What are leading causes of disruptions in NSTX & during initial NSTX-U ops?
 - b. What prerequisites / tools are needed to prepare NSTX-U to operate a large # of sequential shot-seconds (say 1-5 shot minutes) without a disruption?
- Tasks: Organize meetings/reports to address above charges
- Due dates:
 - 1a – March/April 2015, 1b May/June 2015
 - 2a – April 2015, 3a – end of CY 2015, 3b – TBD/long-term

Run schedule assumptions

FY15			Early FY16	
Run Weeks 1-4	Run Weeks 5-8	Run Weeks 9-12	Run Weeks 13-16	17-18
Commissioning	Science	Science	Science	



Mid-run assessment



Scope of pre-forum meeting #2 - see next page for additional details



Scope of Research Forum

- Pre-forum meeting #2 emphasized XMP/XP title, goal, author identification to cover first 2 run months (Weeks 1-8)
- Forum should emphasize prioritization of XPs for weeks 3-18, but also document commissioning XMP/XP goals + run-time
- Mid-run (re-)assessment after first 6-8 Science run-weeks

Operations assumptions for first 2 run-months

- Machine Commissioning...assume 1 month (run weeks 1-4)
 - Develop basic breakdown, current ramp, shape/position control, diverted plasmas, H-mode access, basic fuelling optimizations.
 - Goal: 1 MA, 0.5 T, NBI-heated H-mode (i.e. ~NSTX fiducial levels)
 - Diagnostic commissioning
 - Boronized PFCs
 - Mostly XMPs
 - **What science (aka XPs) can be done during this phase?**
- 1st Month of Science Campaign (run weeks 5-8)
 - Boronized PFCs, possibly begin lithium coatings
 - Operations and basic profile diagnostics, neutron rate,...
 - Operation up to 1.4 MA and 0.65 T, 2 seconds
 - 6 beam sources up to 90 kV
 - HHFW available for commissioning
 - **What critical XPs can/should be done during this phase?**


Strategy / staging for achieving full NSTX-U parameters

Parameter	NSTX (Max.)	FY 2015 NSTX-U Operations	FY 2016 NSTX-U Operations	FY 2017 NSTX-U Operations	Ultimate Goal
I_p [MA]	1.2	~1.6	2.0	2.0	2.0
B_T [T]	0.55	~0.8	1.0	1.0	1.0
Allowed TF I^2t [MA ² s]	7.3	80	120	160	160
Longest I_p Flat-Top at max. I^2t , I_p , and B_T [s]	~0.4	~3.5	~3	5	5

- 1st year goal: operating points with forces up to ½ the way between NSTX and NSTX-U, ½ the design-point heating of any coil
 - Will permit up to ~5 second operation at B_T ~0.65
- 2nd year goal: Full field and current, but still limiting the coil heating
 - Will revisit year 2 parameters once year 1 data has been accumulated
- 3rd year goal: Full capability

Forum website now functional

Form for XP idea submissions will open Feb 1


 National Spherical Torus Experiment Upgrade

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NSTX-U Web Pages:

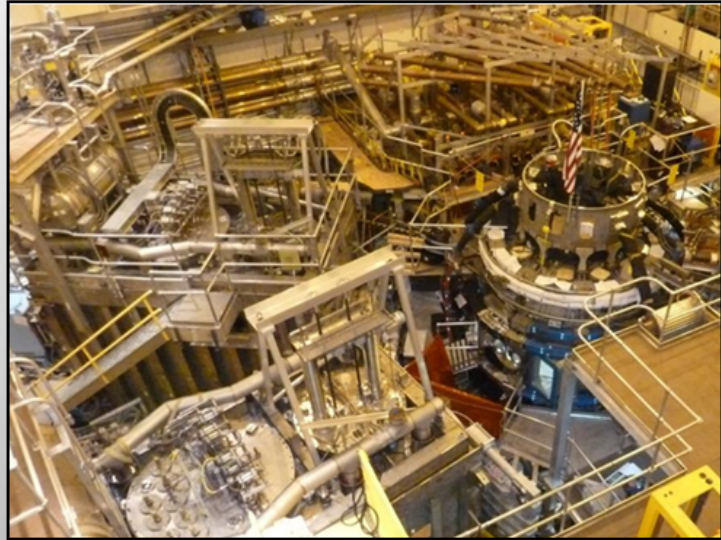

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- Scientific Conferences
- Software
- Surface Science
- Task Forces
- User Information Form
- Working Groups
- NSTX Upgrade Overview
- NSTX Upgrade Project



Additional Links:




Upcoming and Recent NSTX-U Meetings:

[NSTX-U 2015 Research Forum](#)
Feb 24-27, 2015



Quick Links for Additional Information:

- [NSTX-U Presentation Template & Graphics](#)
- [Run Schedule](#)