

NSTX-U Program Update

J. Menard

For the NSTX-U Research Team

NSTX-U Team Meeting
PPPL – B318
June 5, 2015

*Coll of Wm & Mary
Columbia U
CompX
General Atomics
FIU
INL
Johns Hopkins U
LANL
LLNL
Lodestar
MIT
Lehigh U
Nova Photonics
Old Dominion
ORNL
PPPL
Princeton U
Purdue U
SNL
Think Tank, Inc.
UC Davis
UC Irvine
UCLA
UCSD
U Colorado
U Illinois
U Maryland
U Rochester
U Tennessee
U Tulsa
U Washington
U Wisconsin
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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Inst for Nucl Res, Kiev
Ioffe Inst
TRINITI
Chonbuk Natl U
NFRI
KAIST
POSTECH
Seoul Natl U
ASIPP
CIEMAT
FOM Inst DIFFER
ENEA, Frascati
CEA, Cadarache
IPP, Jülich
IPP, Garching
ASCR, Czech Rep*

Outline

- Diagnostic Solicitation
- Impact of Schedule on Research Milestones
- Draft Run Schedule

FES solicitation for U.S. University and Industry DIAGNOSTIC Collaboration on NSTX-U

- Expected Issue Date for FOA: 07/01/2015
 - Letter of Intent Due Date: **Not Applicable**
- Pre-Application Due Date: 07/29/2015 at 5 PM Eastern Time
 - **Pre-Application is required, 2-3 pages (Title, abstract, collaborators, ...)**
- **Application Due Date: 09/18/2015 at 11:59 PM Eastern Time**
- Gathering diagnostic idea updates from team via Google form
 - Will share these with SG/TSG leaders once gathered (i.e. next week)
- NSTX-U PAC-36 will review draft Program Letter via videoconference later in June (probably on June 23)
- Program letter will be available no later than July 7

Impact of restart schedule on milestones

- For now, to zeroth order, assume FY15 milestones will be shifted to FY16, FY16 → FY17, etc.
 - Will likely run early FY18, then have outage for major enhancement(s)
- Some milestones and all run-week distributions will need to be revised based on when we actually begin operations
- FY15 JRT will have to be based on NSTX data, NSTX-U simulations, and/or analysis of results from other devices
- MS and ASC TSGs should assess ability to meet JRT-16 goals using only hardware that will be available in early FY16
 - We can/should modify text/deliverables accordingly

Latest / possible / tentative run plan for 2015-16

Goal is to operate 14-16 run weeks as per research forum

- September: 0-2 run weeks Fiscal Year Boundary
- October: 3-4 run weeks
- November: 0-2 run weeks
 - May want to pause for ST workshop, APS, Thanksgiving
- December: 3 run weeks
- January: Mid-run assessment (if applicable), PAC-37
- Feb/Mar: Complete FY16 run
- Mar/Apr: Start outage to install high-k, high-Z tiles, ...
- Resume operations fall 2016 for FY17

Very preliminary (and unvetted) modified milestone schedule

FY2016

FY2017

FY2018

Run Weeks: **Incremental**

14 16

18 20

10 12

Boundary Science + Particle Control

R16-1
Assess H-mode confinement, pedestal, SOL characteristics at higher B_T , I_p , P_{NBI}

R17-1
Assess scaling, mitigation of steady-state, transient heat-fluxes w/ advanced divertor operation at high power density

R18-1
Assess impurity sources and edge and core impurity transport

R17-2
Assess high-Z divertor PFC performance and impact on operating scenarios

IR18-1
Investigation of power and momentum balance for high density and impurity fraction divertor operation

Core Science

R16-2
Assess effects of NBI injection on fast-ion $f(v)$ and NBI-CD profile

R17-3
Assess role of fast-ion driven instabilities versus micro-turbulence in plasma thermal energy transport

Begin long outage for major facility enhancement(s)
Timing TBD pending resources, readiness

Integrated Scenarios

R16-3
Develop physics + operational tools for high-performance: κ , δ , β , EF/RWM

R17-4
Assess fast-wave SOL losses, core thermal and fast ion interactions at increased field and current

R18-2
Control of current and rotation profiles to improve global stability limits and extend high performance operation

R17-5
Develop high-non-inductive fraction NBI H-modes for sustainment and ramp-up

R18-3
Assess transient CHI current start-up potential in NSTX-U

FES 3 Facility Joint Research Target (JRT)

C-Mod leads JRT
Assess disruption mitigation, initial tests of real-time warning, prediction

DIII-D leads JRT
TBD

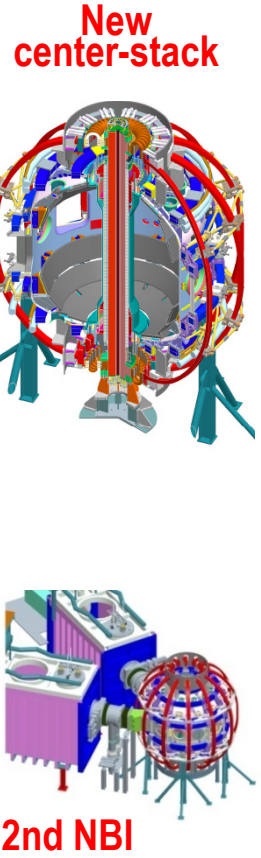
Five Year Facility Enhancement Plan (green – ongoing)

2015: Engineering design for high-Z tiles, Cryo-Pump, NCC, ECH

Fiscal Year:	2015	2016	2017	2018	2019
Upgrade Outage		1.5 → 2 MA, 1s → 5s			
Run Weeks:		14-16	18-20	10-12	10-12

Major enhancements:

- Base funding
- +15% incremental



Boundary Science + Particle Control

Core Science

Integrated Scenarios

