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NSTX Program Update:

Collaboration reminder,
Tokamak workshop comments,
5 year plan completion schedule,
Research Forum and Task Groups

J. Menard, PPPL

September 26, 2007

NSTX Team Meeting

Princeton Plasma Physics Laboratory

*College W&M
Colorado Sch Mines
Columbia U
Comp-X
General Atomics
INEL
Johns Hopkins U
LANL
LLNL
Lodestar
MIT
Nova Photonics
New York U
Old Dominion U
ORNL
PPPL
PSI
Princeton U
SNL
Think Tank, Inc.
UC Davis
UC Irvine
UCLA
UCSD
U Colorado
U Maryland
U Rochester
U Washington
U Wisconsin*

*Culham Sci Ctr
U St. Andrews
York U
Chubu U
Fukui U
Hiroshima U
Hyogo U
Kyoto U
Kyushu U
Kyushu Tokai U
NIFS
Niigata U
U Tokyo
JAERI
Hebrew U
Ioffe Inst
RRC Kurchatov Inst
TRINITI
KBSI
KAIST
ENEA, Frascati
CEA, Cadarache
IPP, Jülich
IPP, Garching
ASCR, Czech Rep
U Quebec*

NSTX Collaboration Opportunities for 2008-2010



- If you are a collaborator or research contact for an incoming collaboration for the 2008-2010 solicitation period, please **complete Record of Discussion (RoD) ASAP**
- Approved RoD requested to be completed by Oct. 4
 - RoD requires Program and Project concurrence & signatures
 - Jon and Masa will be on foreign travel week of Oct. 8
 - RoD must be included with proposal due to DOE on Oct. 11
 - Forms located at: http://nstx.pppl.gov/nstx/NSTX_Program_Letters/

Few comments on MIT workshop



- Ending at 7:30-8PM made people grumpy
- DIII-D and C-Mod very ITER-focused
 - We need to highlight our ITER-relevance where valid
- 2nd NBI for off-axis J-control well-received
 - Tilted NBI proposed by DIII-D – want to work together on this
 - ASDEX-U welcomes more research on this topic
- Off-axis RMP/RWM coils – some wondered why so many machines were proposing coil upgrades
 - NSTX proposal was viewed as useful/complementary
- Coordinators did a good job of identifying areas of collaboration, joint experiments - thanks
- Facilitator sessions – mixed results depending on approach
 - Summary sessions were good

U.S. Department of Energy's
Office of Science



Office of Fusion Energy Sciences Perspective

U.S. Tokamak Workshop
Massachusetts Institute of Technology
September 17-19, 2007

Stephen Eckstrand
Program Manager

www.ofes.fusion.doe.gov



The Next 5-Year Period is a Critical Time for the Fusion Program

- Need to compete in an ACI world
 - Requires a world-leading domestic fusion science program
 - Initially must work within our present resource levels
- FES engaged in developing new strategic plan
 - Work with FESAC to address all program elements
 - FESAC identifying scientific opportunities for ITER-era
- National Academy of Sciences reports recommend increased stewardship of plasma science, HEDLP
- Role of major facilities in FY 2009-2013
 - Transition from supporting ITER design to planning for operation
 - Define next major step(s) in the domestic fusion program

FY 2008 Fusion Energy Sciences Congressional Budget Request



	(\$ Millions)		
	FY 2006	FY 2007	FY 2008
	<u>Actual</u>	<u>Sept. AFP</u>	<u>Cong. Req.</u>
Science	148.7	145.2	159.6
Facility Operations	104.2	122.9	237.0
Enabling R&D	<u>27.8</u>	<u>43.6</u>	<u>31.3</u>
OFES Total	280.7	311.7	427.9
DIII-D	55.1	56.7	59.7
C-Mod	21.5	22.3	23.5
NSTX	34.2	33.8	36.1
NCSX	17.8	16.6	16.6
ITER	24.6	60.0	160.0
Non-ITER	256.1	251.7	267.9





Guidance on Planning for the Next 5-Year Period

- A world-leading domestic fusion science program is necessary to compete in the future
 - What are the compelling scientific opportunities?
 - What significant and exciting scientific advances are likely to be achieved?
- Need to start planning within our present resource levels
 - Use FY 2008 budget (with adjustments for inflation) as a baseline funding level
 - Provide complete description of what can be accomplished within this level
 - Describe what can be accomplished with additional resources as incremental an incremental case

Meeting and 5 year plan completion schedule



- **September 17-19** **Tokamak Planning Workshop at MIT**
- **Oct. – Dec. 2007** **Improve the draft plan
Prioritize upgrades, finalize the draft text**
- **November 12-16** **APS DPP meeting**
- **November 27-29** **NSTX Research Forum**
- **January 22-24, 2008** **NSTX PAC – Review of draft plan**
- **February 2008** **Final draft plan ready for review by the team**
- **April 1, 2008** **Final plan (document) ready**
- **3 wks before review** **Draft presentation material ready**
- **2 wks before review** **Dry run of the presentation**
- **1 wk before review** **Final presentation material ready**
- **~ May 2008 (TBD)** **New 5 Year Plan Review meeting**



We
are
here

5 year plan prioritization schedule



- Team needs to prioritize facility and diagnostic upgrades
 - Have 25% increment (umbrella) case already
 - Need base case (FY2008 + inflation) – this will be “painful” compared to +25%
 - Need 10-15% increment case (above base case)
- October 1-12 - Plan chapter leaders should:
 - Hold meeting(s) with broad participation (invite NSTX team)
 - Rank in order - facility & diagnostic upgrades in your topical area
 - See Masa’s MIT overview talk for items & schedule
 - Prioritize based on scientific & programmatic impact (not cost)
 - Provide bulletized executive summary of why you chose what you chose
 - Project and Program heads - will update budget & schedule numbers
- Week of October 15 – Project and Program heads:
 - Using prioritization, assess which items we can afford & when
- Week of October 22
 - Discuss budget/schedule outcome with chapter leaders
 - Discuss budget/schedule outcome with team (at team meeting perhaps)
- Week of October 29
 - Iterate & finalize base and 10-15% increment plans for 5 year plan and PAC

Five Year Plan Write-up Structure and Status



- Modification: “Fusion development” text moved to beginning of document
 - Useful to motivate ST, NSTX, subsequent chapters up-front
 - Martin unavailable to lead writing of this chapter

		Lead	Status
Chapter 1	NSTX overview and role in fusion development	M. Ono J. Menard	Outline
Chapter 2	MHD	S. Sabbagh	Text
Chapter 3	T&T	S. Kaye	Text
Chapter 4	Waves & Particles	G. Taylor	Text
Chapter 5	Boundary	R. Maingi	Outline
Chapter 6	Integration	J. Menard	Outline + SFSU text
Chapter 7	Facility/Diagnostics/Control	M. Bell	Outline + intro text
Appendix	NSTX Collaboration Plan	M. Peng	Gathering collaborator info

5 year plan write-up schedule



- Interim DRAFT TEXT DUE November 2, 2007
 - Program/Project then edit for content/schedule consistency
- FINAL DRAFT TEXT DUE December 7, 2007
 - Correct chapter numbers, figures, references, etc.
 - Program/Project then edit for format consistency – finish by December 21
- PAC preparation, dry runs to be held in early January
- APS, Research Forum, PAC are all coming soon!
 - Please keep writing
- Fold in prioritization guidance, increment assumptions during Oct.
- For those who have contributed text – thanks
- For those who haven't written text...
 - Intro material can should be written NOW
 - Plan text can be based on workshop presentations + prioritization

Research Forum and Run Preparation



- Dates: November 27-29 – Tuesday morning through mid-day Thursday
- Michael Bell will organize, with help from Stan
- Michael Bell has also agreed to be next run coordinator (thanks Mike!)
- In process of identifying Deputy RC and ET leaders and deputies
- Are we as a team satisfied with present ET structure?
 - Interested in getting feedback from you on possible improvements
 - Have a few weeks to implement changes if you want them
- **One proposal: formation of “Topical Science Groups”**
 - Longer-term planning/prioritization/milestone responsibilities

Proposed guidelines for NSTX Topical Science Groups (TSG)



- TSG Goal: Sustain scientific program focus beyond annual milestones
 - Expected tenure for leadership team = 2-3 years (flexible, renewable)
- One TSG leader and 1 deputy – 2 experimentalists + theorist(s)
 - Request strong sharing of responsibilities (and glory)
 - Achieve consensus on priorities when possible
- Report to Program/Project directors
 - Leaders would have invitation to 11AM Monday NSTX management meeting

TSG leader responsibilities - through group discussion/consensus:

- Determine & address highest priority scientific issues within topical area
 - Organize Research Forum guided by (but not limited to) these priorities
- Define draft scientific/performance milestones - utilize expertise of TSGs
 - Organize and execute experiments to achieve milestones
- Define facility/theory resources required to achieve research goals
- Provide monthly scientific progress/update report for team meeting
- Aid dissemination of results (help Physics Analysis & Simulation Division):
 - Make NSTX results visible to fusion community – seminars, colloquia
 - Foster journal publications (target PRL), invited talks, APS, EPS, ITPA, BPO, etc.

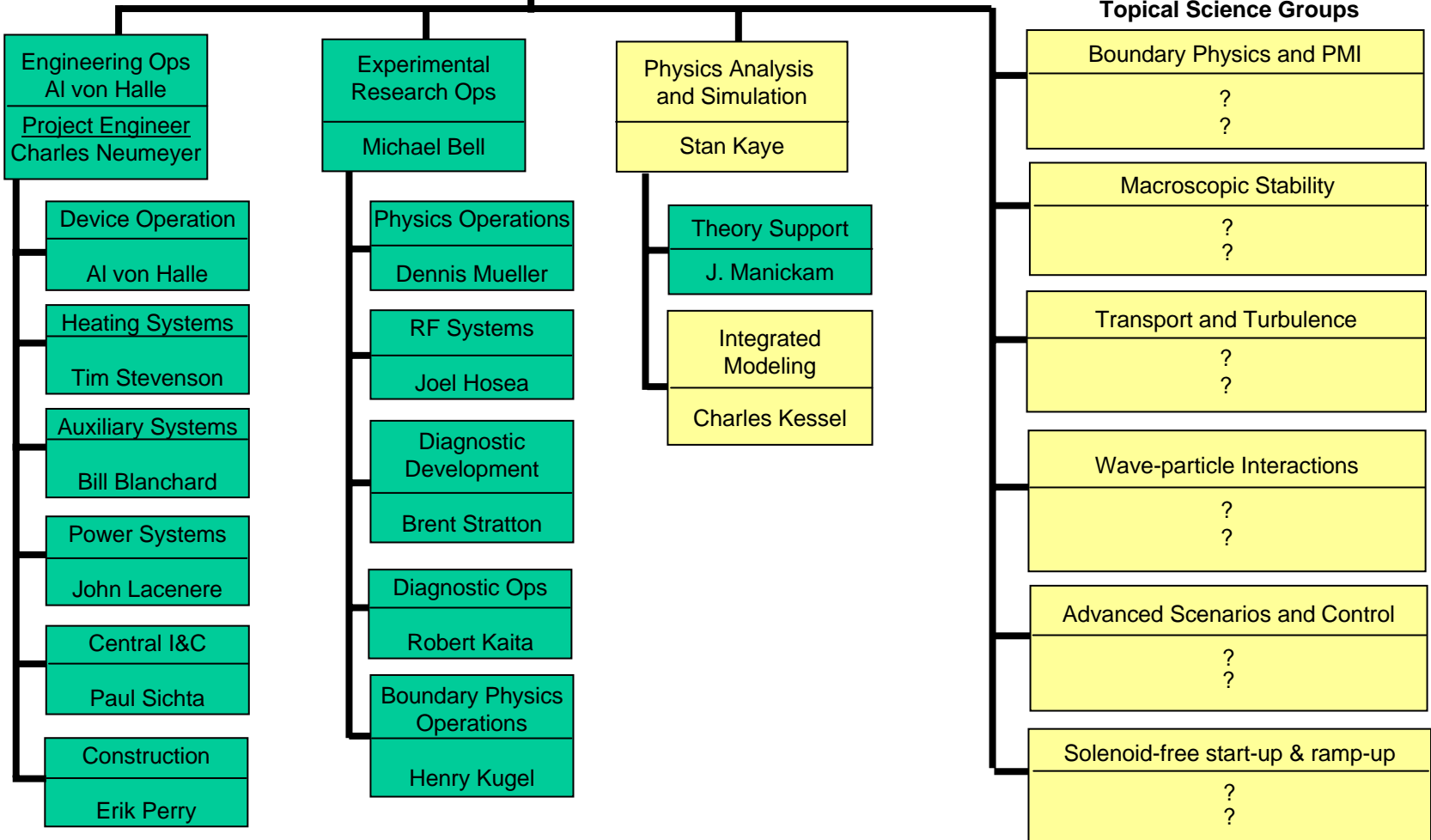
Yellow = change from 2007 org. chart

PPPL Director's Office — NSTX PAC

NSTX Department
Project Director
 Masayuki Ono
Program Director
 Jon Menard
 Deputy: S. Kaye

FY08
 Run Coordination
 Michael Bell
 Deputy: ?

TSG Proposal:



Enhanced Integrated Modeling Effort for NSTX – C. Kessel



- Lead modeling effort assessing predicted impact of 5-year plan upgrade elements on operating scenarios - aid prioritization of upgrade plans
 - 2nd NBI, LLD, upgraded HHFW, sub-cooled TF, etc
- Develop more routine usage of predictive modeling (pTRANSP, TSC, etc) for NSTX, and broaden user base
 - Aid scenario development – examples:
 - Model CHI coupling to Ohmic – extend long-pulse 1MA shots using CHI
 - Model impact of HHFW: early heating, I_p ramp-up, heating in H-mode
- Enhance modeling of NSTX plasma control
 - First, benchmark TSC against existing rEFIT/isoflux control methods
 - If successful, predict gains to enhance shape/strike-pt. control (LLD)
 - Modeling/algorithm development for current profile control with 2nd NBI
- Enhance NSTX representation and participation
 - Present NSTX integrated modeling results: ITPA-SSO, IAEA-TM-SSO, BPO
 - Develop, oversee, and strengthen collaborations in modeling and SSO