

NSTX Program – Nov05 Team Meeting

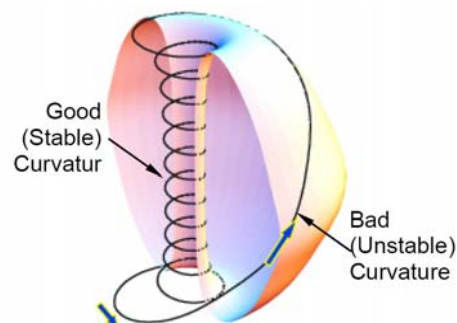
- Major upcoming programmatic events of FY06
 - 12/7-9/05: USBPO Burning Plasma Mtg – ORNL
 - 12/12-13/05: NSTX FY05 Results Review – PPPL
 - 12/14-16/05: NSTX FY06 Research Forum – PPPL
 - 2/22-24/06: NSTX PAC-19th Mtg – PPPL
 - Mid-March/06: Budget Planning Mtg – OFES
- Ongoing program planning
 - 11/14-18/05: update FY06 research milestones based on risk assessment and mitigation
 - 11/21-22/05: issue programmatic guidance for Research Forum
- Collaboration
 - ITPACC-IEA Mtg on Joint 2006 experiments (11/1-2/05)
 - 11/15-17/05: DIII-D Research Opportunities Forum

NSTX Mission: Address Broad Fusion Energy Sciences Missions Through Scientific Investigations

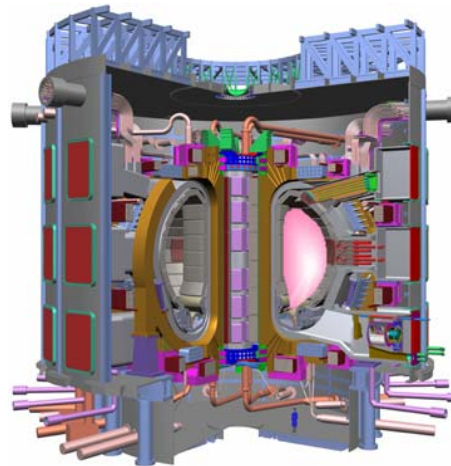


- Determine physics principles of ST (very high β_T and $A \sim 1.5$)
- Complement lower β_T and $A \sim 3$ experiments in addressing key scientific issues of fusion plasmas
- Support preparation for burning plasma research (ITPA, ITER) and benefit from it
- Complement ITER by establishing attractive configurations for Component Test Facility (CTF) and Demo

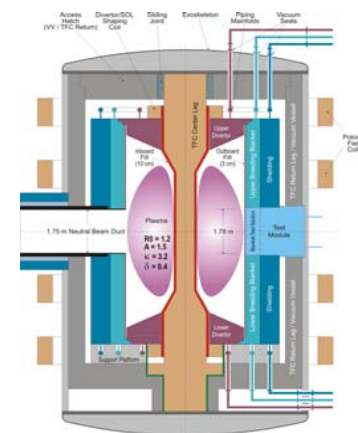
Spherical Torus
($A \sim 1.5$, $\beta_0 \sim 1$)



ITER
($A = 3.1$, $R = 6.2$ m)



CTF
($A \sim 1.5$, $R \sim 1.2$ m)



NSTX Research Milestones for FY06 Are Being Reviewed and Updated for Use at Research Forum



	FY06	FY07	FY08
Exp. Run-Weeks:	12-14	12-14	12-14
1) Transport & Turbulence: Physical processes that govern heat, particle and momentum confinement	Assess high-k turbulence	Measure high-k turbulence spectra and electron transport	TBD
2) Macroscopic Stability: Role of magnetic structure on plasma pressure and bootstrap current	Characterize effectiveness of closed-loop EF/LM control	Characterize effectiveness of closed-loop RWM control	TBD
3) Wave-Particle Interaction: Role of electromagnetic waves & modes in sustaining and controlling hot plasmas	Characterize & optimize HHFW coupling	*Measure and identify modes driven by super-Alfvénic ions	TBD
4) Start-up, Ramp-up and Sustainment: Physical processes of magnetic flux generation and reconnection	Assess CHI creation of closed magnetic flux	Test solenoid-free ramp-up	TBD
5) Boundary Physics: Interface between fusion plasmas and normal temperature surroundings	Test Li coating of wall using evaporator	Characterize Li pellet & evaporator coating effectiveness	TBD
6) Physics Integration: Synergistic effects of external control and self-organization	TBD	*DOE-Level "JOULE" Milestone	Advanced Particle Control Decision Point

US Burning Plasma Meeting

Input to Presenters & Group Leaders Encouraged

Wednesday, December 7

- 8:30 Introduction
- 8:45 Engaging the US fusion community in development of the USBPO (R. Fonck)
- 9:30 Status and Plans for ITER - Domestic (C. Strawbridge)
- 10:30 break
- 10:45 International Perspective and ITPA (R. Stambaugh)
- 11:45 lunch

Topical Plenary Presentations

- **13:00 Technology (S. Milora)**
- **13:30 Macroscopic Stability (J. Menard)**
- **14:00 Transport/Confinement (W. Houlberg)**
- **14:30 Pedestal Physics (A. Leonard)**
- **15:00 Break**
- **15:15 Boundary (B. Lipschultz)**
- **15:45 Energetic Particles (W. Heidbrink)**
- **16:15 Integrated Scenarios (T. Luce)**
- **16:45 Diagnostics and Control (R. Boivin)**
- 17:30 End of formal session

Thursday, December 8

- 8:00 Charge to Breakout Groups

Topical Break-out sessions (co-leaders) 8:30

- **Integrated Scenarios (A. Hubbard, C. Kessel)**
- **Macroscopic Stability (C. Hegna, G. Navratil)**
- **Boundary (S. Krashennikov, R. Maingi)**
- **Transport/Confinement (C. Petty, P. Terry)**
- **Diagnostics and Control (S. Allen, D. Johnson)**
- **Energetic Particles (B. Breizman, J. Snipes)**

Strong Input of NSTX/DIII-D Joint Experiments to DIII-D Research Opportunities Forum

To work with DIII-D and NSTX management to finalize plan following Research Forums

Lead	#	Topic	ITPA 2006?	NSTX Interest
Fredrickson	554	A and ρ^* scaling of NTM	Y	Potentially important for high beta ST plasmas
Taylor	571	EBW conversion and CD		Emission measured mode conversion successful and on-going; important long term NSTX goal
Taylor	572	EBWCD at high n		Important long term NSTX goal
Peng	644	NBI Driven momentum transport	Y	Include counter, extend to balanced injection
Maingi	659	ELMs vs. rotation		Compare small ELM structure to NSTX ELMV data
Maingi	674	A scaling of Ped	Y	Started, finish in 2006
Kaye	672	ELM mitigation using C coil		Hints of success in initial tests, need to do more; coil configurations similar to ITER
Kaye	673	A scaling of confinement	Y	Data up to 4.5 kG, requires higher Bt
Bitter		XCS intrinsic rotation		Measurement capability verified on NSTX using injected argon, high relevance also to astrophysics
Okabayashi		RWM controllability using ex-vessel coils		High priority topic for NSTX during 2006-2007
Hosea		HHFW power accountability		Parametric decay observed with significant edge ion heating, strong k dependence of efficiency observed
Sontag		NSTX/DIII-D RWM similarity experiment	Y	Successful start, finish in 2006

Suggestions of NSTX Participation from ITPACC-IEA-LT

Joint Meeting, November 1-2, 2005 – Part I

ID No	Topical Group	2006 Proposal Title	Keypersons ¹	Devices ²	2005 Ext	Ctg	Comments/ Recommendations/ Results	NSTX Forum	DIII-D Forum
CDB-2	Conf DB & Mod	Confinement scaling in ELMy H-modes: β degradation	F Ryter, C C Petty, D. C. McDonald, T. Takizuka, F. Imbeaux(TS), M. Valovic(MAST), S. Kaye	AUG, DIII-D, JET, JT-60U, Tore-Supra(L), MAST, NSTX	YES	E/D	Report, E for beta scans at fixed shape. D implies we need specific experimental proposals to investigate delta/DN dependence on various machines		Kaye
CDB-6	Conf DB & Mod	Improving the condition of Global ELMy H-mode and Pedestal databases: Low A	R Akers, S Kaye, C. Petty, M.Valovic/R. Akers(MAST).	MAST, NSTX, DIII-D	YES	E	Report		Kaye
CDB-8	Conf DB & Mod	ρ^* scaling along an ITER relevant path at both high and low beta	D.C. McDonald, C. Petty, M. Greenwald, S.Kaye, A. Staebler	JET, DIII-D, C-mod, AUG, NSTX	YES	E	Report, Possibly coordinate with SSO-2.3		Kaye
CDB-9	Conf DB & Mod	Density profiles at low collisionality	H. Weisen(JET), M. Valovic(JET), T. Casper(DIII-D), D.ErnstC-mod), C. Angioni(AUG), H. Takenaga(JT-60U), H. Weisen(TCV), O. Sauter(TCV), T. Hoang(Tore-Supra), M. Valovic(MAST), B. LeBlanc(NSTX)	JET, DIII-D, C-mod, AUG, JT-60U, TCV, Tore-Supra, MAST, FTU, NSTX, T-10	NEW	D	Can equal Ti and Te be achieved at low collisionality? Specific joint machine experiments are requested.		LeBlanc
TP-6.1	Transport Physics	Scaling of spontaneous rotation with no external momentum input	J. Rice (CMOD), J. deGrassie (DIII-D), F. Crisanti, L.G. Eriksson (JET), Y. Koide (JT-60U), B. Duval (TCV), A. Field(MAST), C. Fenzi (Tore-Supra), B. LeBlanc(NSTX), J. Noterdaeme(AUG)	CMOD, DIII-D, JET, JT-60U, Tore-Supra, TCV, FTU, MAST, NSTX, AUG	NEW	E	Data is not routinely obtained on machines. Even Ohmic data is valuable.		LeBlanc
TP-6.3	Transport Physics	NBI-driven momentum transport study	P. Gohil (DIII-D), J. Fujita (JT-60U), M. Peng (NSTX), A. Field (MAST)	DIII-D, JT-60U, NSTX, MAST, AUG	NEW	D	Additional definition should be done.		Peng
TP-8.1	Transport Physics	ITB Similarity Experiments	M. Peng (NSTX), A. Field (MAST)	MAST, NSTX	YES	E	Report		
TP-9	Transport Physics	H-mode aspect ratio comparison	B. LeBlanc(NSTX), C. Petty (DIII-D), M. Valovic/A. Field (MAST)	NSTX, DIII-D, MAST, T-10	YES	E	Report		LeBlanc
PEP-9	Pedestal and Edge	NSTX-MAST-DIII-D pedestal similarity	T Osborne, A Kirk, R Maingi	DIII-D, MAST, NSTX	YES	E	Report		Maingi

Suggestions of NSTX Participation from ITPACC-IEA-LT

Joint Meeting, November 1-2, 2005 – Part II

PEP-10	Pedestal and Edge	The radial efflux at the mid-plane and the structure of ELMs	Andrew Kirk, Albrecht Herrmann, R. Maingi	AUG, MAST, NSTX, C-mod	YES	E	Report. AUG strongly encouraged		
PEP-13	Pedestal and Edge	Comparison of small ELM regimes in JT-60U and AUG and JET	N. Oyama, H. Urano (JT-60U), L.D. Horton (AUG), G. Saibene, R. Sartori, A. Loarte, P.J. Lomas (EFDA-JET)	AUG, JT-60U, JET, NSTX, C-mod	YES	E	Report. Strongly encourage AUG		
PEP-16	Pedestal and Edge	C-MOD/NSTX/MAST SMALL ELM REGIME COMPARISON	A. Hubbard, R. Maingi, H. Meyer	NSTX, MAST, C-mod	YES	E	Report. Strongly encourage Cmod		
PEP-18	Pedestal and Edge	NSTX/AUG/JET impurity migration and deposition study	C. Skinner (NSTX), P. Rhode (AUG), V. Phillippe (JET)	NSTX, AUG, JET	NEW	E	To be added to ITPA list		
DSOL-15	Divertor & SOL	Inter-machine comparison of blob characteristics	J. Terry (C-Mod), S. Zweben (NSTX), C. Hidalgo (TJ-II, JET), R. Maqueda (NSTX), O. Grulke, D. D'Ippolito, J. Myra, R. Pitts (TCV), G. S. Xu (HT-7), E. Tsitrone (Tore-Supra), N. Asakura (JT-60U)	C-Mod, NSTX, TJ-II, JET, TCV, HT-7, Tore-Supra, AUG, JT-60U	YES	P	No Report. Scope should be broadened to not be specific to one diagnostic. Then becomes important programmatic work. gsxu@ipp.ac.cn		
MDC-2	MHD, Disruptions & Control	Joint experiments on resistive wall mode physics	H Reimerdes, M Okabayashi (DIII-D), M Gryaznevich (JET), S D Pinches (JET), R Koslowski (TEXTOR), M Takechi (JT60-U), S Sabbagh (NSTX), H Zohm (AUG)	DIII-D, JET (experiments scheduled Feb 06), NSTX, JT-60U, AUG and TEXTOR	YES	E	Report,		Sabbagh
MDC-4	MHD, Disruptions & Control	Neoclassical tearing mode physics - aspect ratio comparison	M Maraschek (AUG), D Howell (MAST), E. Frederickson (NSTX), R. LaHaye (DIII-D)	AUG, MAST, NSTX, DIII-D	YES	E	Report. Must have either AUG or DIII-D to vary A.		Fredrickson
MDC-5	MHD, Disruptions & Control	Comparison of sawtooth control methods for neoclassical tearing	O Sauter, R Pinsker, R La Haye (DIII-D), A Mueck, H. Zohm (AUG), S. Coda (JET), R Buttery (JET), J Menard (NSTX), T	AUG, DIII-D, JET, NSTX, TCV and HL2A, C-mod, FTU	YES	E	Report		Menard
MDC-6	MHD, Disruptions & Control	Low beta error field experiments	S Wolfe, I Hutchinson (C-Mod), T Hender (JET), T Scoville (DIII-D), R Koslowski (TEXTOR), D Howell (MAST), Menard (NSTX)	C-mod, TEXTOR, MAST, DIII-D, NSTX, JET (done)	YES	E	Report		Menard

Suggestions of NSTX Participation from ITPACC-IEA-LT

Joint Meeting, November 1-2, 2005 – Part III

To work with ITPACC and NSTX management to finalize plan following Research Forums

MDC-9	MHD, Disruptions & Control	Fast ion redistribution by beam driven Alfvén modes and excitation threshold for Alfvén cascades	A.Fasoli, D.Borba(JET/AUG) , S.Pinches and D.Testa (JET), K. Shinohara (JT60-U), W.Heidbrink (DIII-D) , R. Nazikian(DIII-D) E. Frederickson(NSTX), M. Gryaznevich/S. Sharapov(MAST), P. Martin (AUG)	JT-60U, JET, DIII-D, NSTX, MAST, AUG	YES	E	Report		Fredrickson
SSO-2.1	Steady-State Operation	Complete mapping of hybrid scenario	E. Joffrin(JET) , S. Ide, M. Wade, G. Sips , C. Kessel	JET, JT-60U, DIII-D, AUG, NSTX, C-mod	YES	E	Report		Kessel
SSO-2.2	Steady-State Operation	MHD effects on q-profile and confinement for hybrid scenarios	S. Guenter, R. Buttery, M. Wade, Isayama , C. Kessel	AUG, JET, DIII-D, JT-60U, NSTX, C-mod	YES	E	Report		Kessel
SSO-2.3	Steady-State Operation	ρ^* dependence on confinement, transport and stability in hybrid scenarios	C. Petty, D. McDonald, A. Stäbler, S. Ide	DIII-D, JET, AUG, JT-60U, C-mod, NSTX	YES	E	Report. Connection to CDB-8		Kessel
DIAG-1	Diagnostics	Assessment of the effect of noise on vertical velocity measurement	Tim Hender (JET) , Y Kamada (tbc) (JT60), G Navratil (tbc) (DIII-D), J. M. Moret (TCV)	JET, JT-60U, TCV, NSTX, AUG, C-mod	NEW	P		D Gates as contact	
DIAG-2	Diagnostics	Environmental tests on Diagnostic First Mirrors (FMs)	K. Vukovic, A. Litnovsky , M. Lipa, M. Rubel, D. Rudakov, G. DeTemmerman, V. Voitsenya, N. Ashikawa, R. Pitts (TCV), Y. Kamada(JT-60U). C.Skinner(NSTX)	T-10, TEXTOR, Tore-Supra, JET, DIII-D, TCV, AUG, LHD, FTU, NSTX, C-mod, JT-60U	NEW	E			Skinner

Added NSTX Responsibilities

(Rob Goldston, October 2005)

Run Coordinator	<ul style="list-style-type: none">• Develop proposed ET's and ET leadership, and• Develop proposed runtime allocations to ET's for approval by Director
Head of Experimental Research Ops	<ul style="list-style-type: none">• Lead team-wide discussion of key ongoing programmatic decisions
Head of Physics Analysis	<ul style="list-style-type: none">• Lead team-wide development research scenarios in support of near-term program• Coordinate internal peer review of presentations and journal articles and approves publications and reports
Project Director	<ul style="list-style-type: none">• Responsible for implementing ongoing NSTX program plan• Coordinate activities of Division Heads in support of ongoing programs• Approves weekly XP schedule
Program Director	<ul style="list-style-type: none">• Coordinate joint experiments with other facilities• Working with Division Heads, develop plan for major presentations and journal articles, for approval by Directors