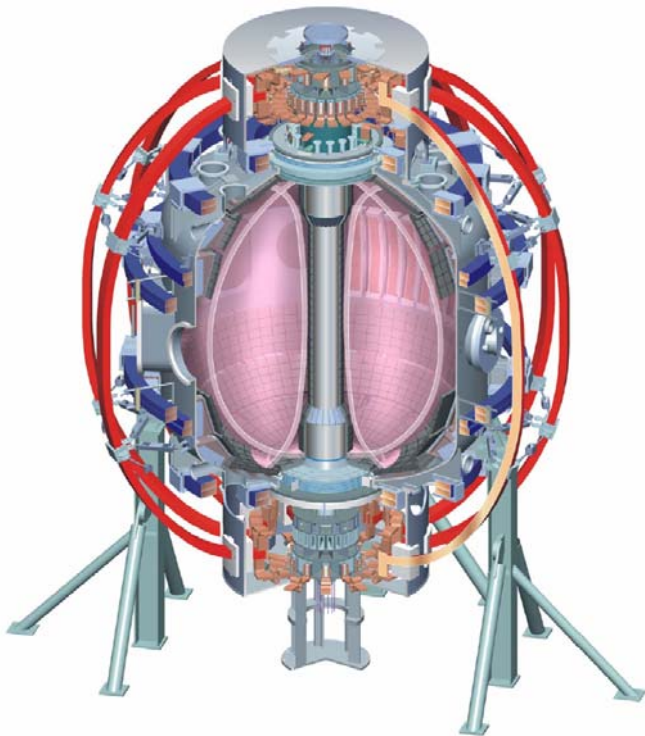




Action Items and Introduction



Martin Peng

On behalf of the NSTX National Team

NSTX PAC-17th Meeting

January 20 – 21, 2005
PPPL

- Columbia U*
- Comp-X*
- General Atomics*
- INEL*
- Johns Hopkins U*
- LANL*
- LLNL*
- Lodestar*
- MIT*
- Nova Photonics*
- NYU*
- ORNL*
- PPPL*
- PSI*
- SNL*
- UC Davis*
- UC Irvine*
- UCLA*
- UCSD*
- U Maryland*
- U Rochester*
- U Washington*
- U Wisconsin*
- Culham Sci Ctr*
- Hiroshima U*
- HIST*
- Kyushu Tokai U*
- Niigata U*
- Tsukuba U*
- U Tokyo*
- JAERI*
- loffe Inst*
- TRINITI*
- KBSI*
- KAIST*
- ENEA, Frascati*
- CEA, Cadarache*
- IPP, Jülich*
- IPP, Garching*
- U Quebec*

Comments and action items from the previous PAC meeting are accounted for



| | PAC-16 th Report | NSTX Actions & PAC-17 th Presentations |
|---|--|---|
| 1 | <ul style="list-style-type: none"> • Non-inductive operation – continue emphasis on long-pulse/steady-state issues • Pedestal physics – define adequately in topical areas | <ul style="list-style-type: none"> • ETs on ISD and RF will continue this study with Milestones: FY05: characterize high-BS, low-induction plasmas FY05: assess effects of beam-driven instability on core J_{NB} FY06: understand & optimize HHFW-edge coupling FY07-I: test solenoid-free ramp-up FY07-I: evaluate $V_L = 0$ plasmas for $> \tau_{skin}$ • ETs on Macro, Micro, and Boundary will cover aspects of pedestal physics: FY05: characterize pedestal & SOL of low-A, H, high-P/R FY06-I (07): characterize Li pellet & evaporator coating FY07-I: assess lone-pulse heat & particle control requirements of low-A, H-mode, high-P/R plasmas |
| 2 | <ul style="list-style-type: none"> • Specify “2005-2007” in Program Letter | <ul style="list-style-type: none"> • Done |
| 3 | <ul style="list-style-type: none"> • Synchronize diagnostic review | <ul style="list-style-type: none"> • DOE extended grant by one year; diagnostic collaboration proposals to be reviewed in autumn 2005 |

Comments and action items from the previous PAC meeting are accounted for – cont.



| | PAC-16 th Report | NSTX Actions & PAC-17 th Presentations |
|---|---|---|
| 4 | <ul style="list-style-type: none"> More theoretical calculations for NSTX; so far under-reported | <ul style="list-style-type: none"> Presentation on “Theory and Computational Support” by J. Manickam |
| 5 | <ul style="list-style-type: none"> Investigate EBW launch location as control knob for NTM studies | <ul style="list-style-type: none"> Physics of EBW steering will be studied via off-mid-plane emission measurements with radiometer orientation set by EBW emission calculations. Steering by mirrors in EBW launchers is expected to allow control of EBWCD location. FY07-I: characterize tearing mode onset conditions & impact |
| 6 | <ul style="list-style-type: none"> Measure EBW O and X emission polarizations directly | <ul style="list-style-type: none"> Measurements of EBW emission and conversion to O and X modes will be extended up to ~40 GHz beginning in 2005 campaign, covering the likely frequency range of interest |
| 7 | <ul style="list-style-type: none"> Theory and modeling for EBW current drive | <ul style="list-style-type: none"> Ohkawa current, plus trapped electron pinch, over a wider parameter range to be studied by CQL3D and BANDIT-3D Electron transport → ~2cm spreading if $D_e \sim 10\text{m}^2/\text{s}$ Parametric decay at edge to be developed in near future |

Comments and action items from the previous PAC meeting are accounted for – cont.



| | PAC-16 th Report | NSTX Actions & PAC-17 th Presentations |
|---|--|---|
| 8 | <ul style="list-style-type: none"> • Study further HHFW coupling in NBI plasmas • Study mechanisms that limit coupling to HHFW • Study effects of electron transport on HHFW CD • Compare non-inductive current profiles with modeling | <ul style="list-style-type: none"> • FY04 data suggested a couple conditions in which HHFW appears to be more effective. This will be pursued in FY05. • Complex interactions between high-harmonic wave and the edge plasma will be investigated over broad parameter ranges including RF H-mode, using new tools: FY06-3: characterize and optimize HHFW-edge coupling • Since HHFWCD in theory drives electron current in broad regions in r, electron transport related effect is expected to be small. However, presence of significant MHD tearing activities so far always prevented effective HHFW H&CD. • Comparison of J from MSE-EFIT and AORSA/CURRAY will be carried out during FY05-06, if effective NBI-HHFW operation can be achieved. |
| 9 | <ul style="list-style-type: none"> • Study fast particle/wave interactions further | <ul style="list-style-type: none"> • Research to resolve beta and current dependence of supra-Alfvénic ions driven modes and turbulence will continue, also contributing to 2005 ITPA joint experiments: FY05: assess effects of beam-driven instabilities on core J_{NB} FY07-I: measure fast-ion transport due to fast-ion modes |

Comments and action items from the previous PAC meeting are accounted for – cont.



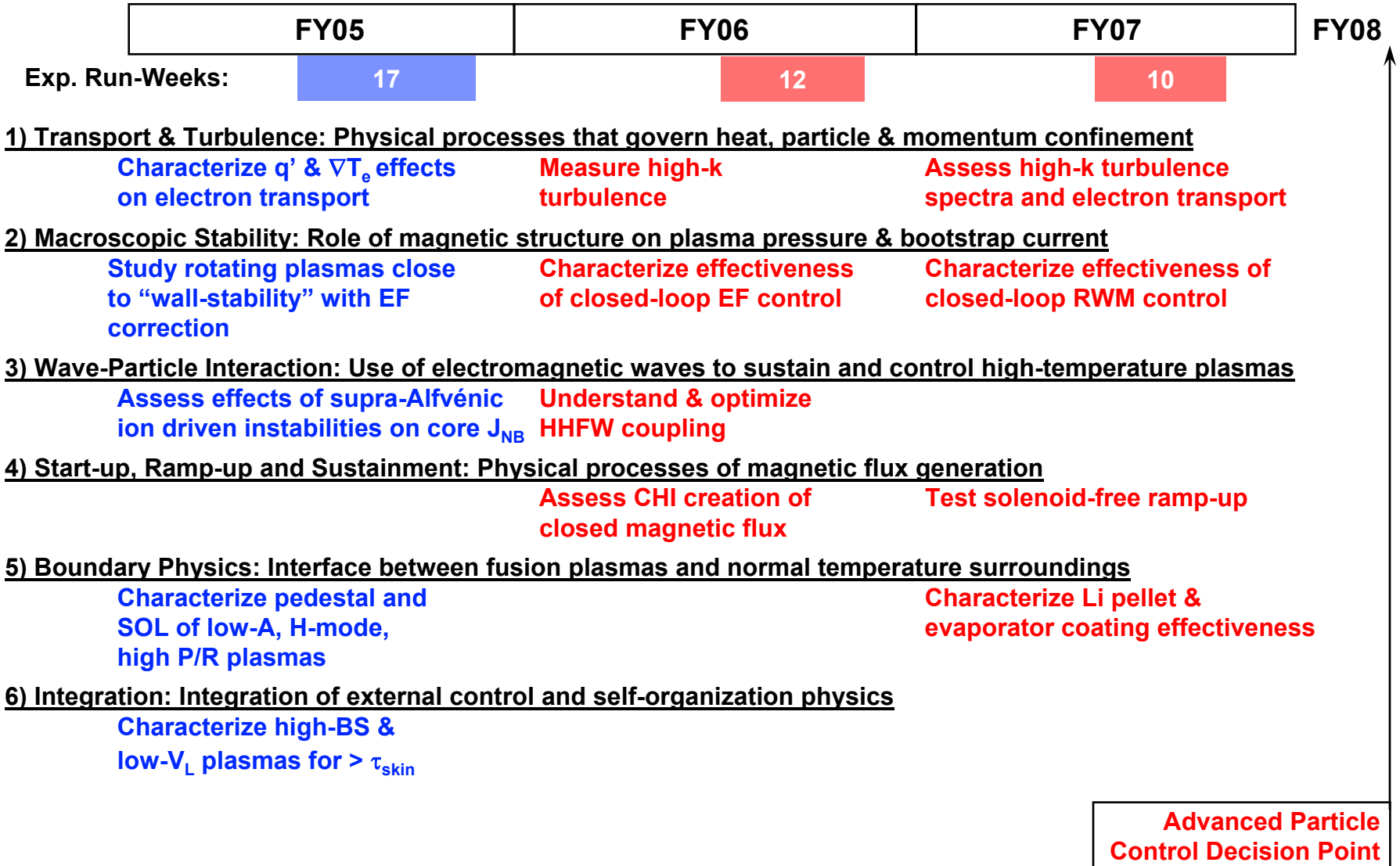
| | PAC-16 th Report | NSTX Actions & PAC-17 th Presentations |
|----|--|--|
| 10 | <ul style="list-style-type: none"> Collaborate with MAST to study outer-divertor detachment | <ul style="list-style-type: none"> MAST collaboration on edge-divertor plasmas will continue in FY05-06, as part of ITPA joint experiments, leading to: FY07-I: assess long-pulse heat & particle control requirements of low-A, H-mode, high-P/R plasmas Participation in the upcoming MAST research forum (2/1-2) |
| 11 | <ul style="list-style-type: none"> Collaborate with MAST & DIII-D on ELM studies | <ul style="list-style-type: none"> Collaborations with MAST, DIII-D, and C-Mod(!) on this, including ELITE analysis, are established as part of the ITPA joint-experiments: FY05: characterize pedestal & SOL of low-A, H-mode, high-P/R plasmas |
| 12 | <ul style="list-style-type: none"> Keep inventory of coatings, like B, Li, etc. | <ul style="list-style-type: none"> B flakes and/or C dusts are suggested as cause for “UFOs” seen by fast camera. Additional spectroscopy will look at B and Li ion concentrations in plasma edge, as part of: FY06I (07): characterize Li pellet & evaporator coating effectiveness |

Comments and action items from the previous PAC meeting are accounted for – cont.

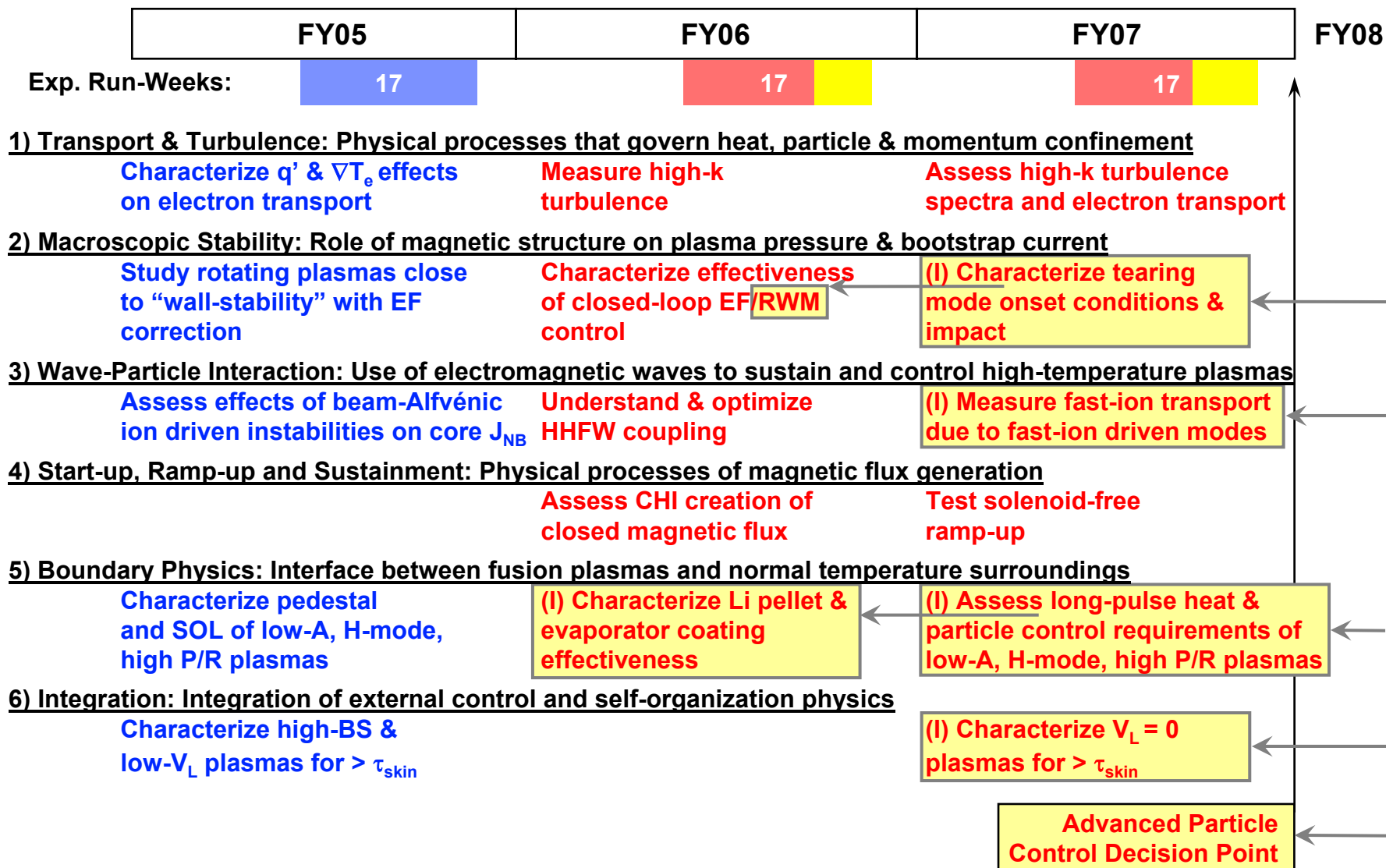


| | PAC-16 th Report | NSTX Actions & PAC-17 th Presentations |
|----|---|---|
| 13 | <ul style="list-style-type: none"> Clarify strategy and schedule of Li-related research leading up to the advanced particle control decision | <ul style="list-style-type: none"> Updated plan leading to the decision point was recently developed jointly with VLT collaborators, delaying to end of FY07. A strongly restrained funding for FY06-07 will lead to delay of supporting Li research on NSTX, forcing a decision to end of FY08. Incremental funding will regain the earlier schedule. FY07 (06-I): characterize Li pellet & coating effectiveness FY07-I: assess long-pulse heat & particle control requirements of low-A, H-mode, high-P/R plasmas Presentation on strategy and schedule by R. Kaita. |
| 14 | <ul style="list-style-type: none"> Use MSE data to constrain EFIT reconstruction of equilibrium current profile | <ul style="list-style-type: none"> Preliminary MSE data from FY04 have been available for use in improved EFIT analysis. MSE and improved EFIT will be available routinely beginning in FY05. Presentation on initial tool development results by S. Sabbagh |

FY05-07 research milestones will take advantage of planned capabilities and contribute to key FE science



Increased funding will enable in FY05-07 key progress in science of sustained high performance ST plasmas



NSTX Increased Participation in ITPA-IEA LT 2005 Joint Experiments

ITPA-IEA LT Meeting: December 8-10, 2004



| ID No | Topical Group | Proposal Title | Keypersons ¹ | Devices ² | NSTX |
|--------|-------------------|---|--|---|----------------|
| CDB-2 | Conf DB & Mod | β confinement scaling in ELMy H-modes: β degradation | F Ryter, C C Petty, D. C. McDonald, T. Takizuka, G. T. Hoang(TS), M. Valovic | AUG, DIII-D, JET, JT-60U, Tore-Supra(L), MAST, NSTX | NSTX interest? |
| 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, E. Synakowski | MAST, NSTX, DIII-D | S Kaye |
| TP-8.1 | Transport Physics | ITB Similarity Experiments | M. Peng (NSTX), A. Field (MAST) | MAST, NSTX | M Peng |
| TP-9 | Transport Physics | H-mode aspect ratio comparison | E. Synakowski (NSTX), C. Petty (DIII-D), M. Valovic(MAST) | NSTX, DIII-D, MAST | E Synakowski |
| PEP-9 | Pedestal and Edge | NSTX-MAST-DIII-D pedestal similarity | T Osborne, A Kirk, R Maingi | DIII-D, MAST, NSTX | R Maingi |

NSTX Increased Participation in ITPA-IEA LT 2005 Joint Experiments

ITPA-IEA LT Meeting: December 8-10, 2004 - continued



| | | | | | |
|---------|----------------------------|---|---|---|---|
| PEP-16 | Pedestal and Edge | C-MOD/NSTX/MAST SMALL ELM REGIME COMPARISON | A. Hubbard, R. Maingi, H. Meyer | NSTX,MAST, C-mod | R Maingi |
| DSOL-9 | Divertor & SOL | ¹³ C injection experiments to understand C migration | Guy Matthews, JET , P. Stangeby (DIII-D), V. Philipps (Textor), K. Tsuzuk, V. Rohde, C. Skinner | JET, DIII-D, TEXTOR, ASDEX-Upgrade, JT-60U, NSTX? | C Skinner: new joint proposal on micro-balance deposition studies |
| DSOL-15 | Divertor & SOL | Inter-machine comparison of blob characteristics | J. Terry (C-Mod), S. Zweben (NSTX), C. Hidalgo (TJ-II), R. Maqueda (NSTX), O. Grulke, D. D'Ippolito, J. Myra, P. Ghendrih(TS), N. Asakura | C-Mod, NSTX, TJ-II, Tore-Supra(06), JT-60U | S Zweben |
| 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, TEXTOR, JT-60U, NSTX. AUG | S Sabbagh |

NSTX Increased Participation in ITPA-IEA LT 2005 Joint Experiments

ITPA-IEA LT Meeting: December 8-10, 2004 - continued



| | | | | | |
|---------|----------------------------|--|---|--|----------------|
| MDC-4 | MHD, Disruptions & Control | Neoclassical tearing mode physics - aspect ratio comparison | M Maraschek (AUG), D Howell (MAST), E. Frederickson, R. LaHaye | AUG, MAST, NSTX(05,06), DIII-D (05/06) | E Fredrickson |
| MDC-6 | MHD, Disruptions & Control | Low beta error field experiments | <u>S Wolfe</u> , I Hutchinson (C-Mod), <u>T Hender</u> , T Scoville (DIII-D), R Koslowski (TEXTOR), D Howell (MAST), (NSTX?) | C-mod, TEXTOR, MAST, DIII-D, NSTX, JET | NSTX interest? |
| MDC-9 | MHD, Disruptions & Control | Fast ion redistribution by beam driven Alfvén modes and excitation threshold for Alfvén cascades | A. Fasoli, <u>D.Borba</u> (JET/AUG), S.Pinches and D.Testa (JET), K. Shinohara (JT60-U), <u>W.Heidbrink</u> (DIII-D), R. Nazikian(DIII-D) E. Frederickson | JT-60U, JET, AUG, DIII-D, NSTX | E Fredrickson |
| SSO-2.1 | Steady-State Operation | Complete mapping of hybrid scenario | <u>E. Joffrin</u> (JET), S. Ide, M. Wade, A. Sips, J. Menard | JET, JT-60U, DIII-D, AUG, NSTX | J Menard |