

Macroscopic Stability (MHD) Topical Science Group Planning Session

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U Wisconsin

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NSTX Research Forum

December 1 - 3, 2009
Princeton Plasma Physics Laboratory

Culham Sci Ctr
U St. Andrews
York U
Chubu U
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U Quebec

MHD XPs guided by Milestones, ReNeW ST, and ITPA needs

❑ NSTX R10-1 Milestone

- ❑ *Assess sustainable beta and disruptivity near and above the ideal no-wall limit*

❑ Priorities (summarized in two lines)

- ❑ *Understand active and passive mode stabilization physics to improve mode control and assess sustainable beta and disruptivity near and above the ideal no-wall limit (Milestone R10-1)*
- ❑ *Study mode-induced disruption physics and mitigation, including halo current generation and the properties of the thermal quench, and 3-D field effects including plasma viscosity*

❑ XPs serving NSTX Milestones, ReNeW Thrust 16, ITPA joint XPs, ITER support, general joint experiments highly desired

- ❑ 7 MHD ITPA tasks addressed (see http://nstx-forum-2010.pppl.gov/macrosopic_stability.html)
- ❑ Cross-cutting tasks outside MHD ITPA also addressed by MHD TSG

MHD breakout session will prioritize ideas

- ❑ Tuesday, Dec. 1st, 1:00 PM – 5:30 PM, Room B318
- ❑ Schedule presently has 23 presentations
 - ❑ EMAIL presentation to sabbagh@pppl.gov
 - ❑ http://nstx.pppl.gov/DragNDrop/NSTX_Meetings/Research_Forum/FY2010/Opening%20plenary%20session/ (repository for files)
- ❑ Presently about 3 - 4 times oversubscribed (!)
 - ❑ 6 – 8 day run guidance, 20.5 – 23.5 days requested so far
- ❑ Agenda calls for 4.5 hours duration
 - ❑ 3.0 hours for XP presentations
 - Approximately 7 minutes per idea + 10 minute break
 - ❑ 1.5 hours to discuss and prioritize XPs
- ❑ Prioritized list of XPs will be produced
 - ❑ Key opportunity for national research team to define priority

Macroscopic MHD TSG 2010 XPs: as proposed

Could utilize COUNTER-INJECTION capability

XP Idea presentations (23 ideas)

- ❑ Error field threshold study at high-beta – reduced torque (J. Park) 1.0 – 1.5 days
- ❑ Resonant Field Amplification of n=2 and n=3 applied fields (J. Park) 0.5 – 1.0 days
- ❑ Error field threshold scaling in H mode - next step devices (Buttery) 1.0 days
- ❑ 2/1 NTM stability (and EF sensitivity) vs q profile (Buttery) 1.0 days
- ❑ Effect of rotation on amplitude of 3/2 NTMs (La Haye) 1.0 days
- ❑ Onset beta of 2/1 NTMs with counter rotation, rev. flow shear (La Haye) 1.0 days
- ❑ Halo current study w/ extended diagnostic capability + LLD (Gerhardt) 1.0 days
- ❑ Optimization of beta-control (Gerhardt) 1.0 – 1.5 days
- ❑ Looking for ITPA MHD WG3 relevant data in NSTX (Gerhardt) 0.0 days
- ❑ Comparison of RFA suppression using different sensors (Gerhardt) 1.0 days
- ❑ Optimized RWM feedback for high $\langle \beta_N \rangle_{\text{pulse}}$ at low v and I_i (Sabbagh) 1.0 days
- ❑ NTV behavior: low collisionality and maximum variation of ω_E (Sabbagh) 1.0 days
- ❑ Global MHD / ELM stability vs edge current, n^*q_{ped} , edge v (Sabbagh) 1.5 days
- ❑ Passive/active stability of kink, RWM, V_ϕ control: KSTAR Joint (Y. Park) 1.0 days
- ❑ Measuring resonance frequencies relevant for RWM stab. (Reimerdes) 0.5 – 1.0 days
- ❑ LQG controller for RWM stabilization (Katsuro-Hopkins) 1.0 days
- ❑ Search for tokamak disruption precursors (Wong) 0.0 days
- ❑ Peeling-ballooning stability and access to QH-mode in NSTX (Sontag) 1.5 days
- ❑ Influence of LLD-induced collisionality, profile on ST stability (Menard) 1.5 days
- ❑ Effects of non-res. fields on low/moderate beta locking threshold (Menard) 1.0 days
- ❑ Determination of, navigation through weak RWM stability $V_\phi(\psi)$ (Berkery) 1.0 days
- ❑ RWM stabilization by energetic particles (Berkery) 1.0 days
- ❑ Assess DEFC near-magnetic-axis using Fishbone-driven RFA (Michio) 0.0 – 1.0 days ?

v1.0

Run time guidance: 6 – 8 run days

Run days: 20.5 – 23.5