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# PAC-13 Action Items

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**NSTX Program Advisory Committee Meeting (PAC-14)**

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PPPL

Princeton, NJ

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# PAC-13 NSTX Action Items and Status - I

PAC-13 Advice	Status
<b>ST Theory Coverage</b>	
1) Much of the theory work that he ( <i>Manickam</i> ) described seems to be work still in progress; <b>we look forward to seeing further results.</b>	Suggest that the required report be made to PAC-15 in September 2003.
<b>Charge #1 – FY03 NSTX Research Plan</b>	
2) It is the opinion of the PAC that the best way to sustain $\beta_{\tau_E}$ for long times is to address “interactions among resonant error field response, correction fields, and rotation”. Hence, the PAC was puzzled by the <b>proposal to delay this milestone by one year in the reduced funding scenario.</b>	$B_{\theta}$ and $B_R$ sensors are installed and commissioned for use in FY ‘03, to provide data needed to determine active feedback control requirements for design and implementation for use in FY ‘04. A very limited run time in FY03 will delay progress. (Detail to be addressed in presentations)
3) <b>Diagnostics</b> aimed at quantifying the effect of these modifications ( <i>feedthroughs, boron nitrite plates</i> ) ... <b>should be added</b> at the earliest possible opportunity. ... <b>An improvement in the understanding of HHFW coupling is needed</b> to provide confidence in future antenna modifications and in the design of HHFW launchers for new facilities.	High priority is given in FY ‘03 to HHFW XMP and XP to investigate the benefits of improved feedthroughs. HHFW heating and current drive reliability will be an important topic in the NSTX 5-year research plan. (Detail to be addressed in presentations)

# PAC-13 NSTX Action Items and Status - II

PAC-13 Advice	Status
<b>Charge #1 – FY03 NSTX Research Plan (continued)</b>	
<p>4) MAST is trying EBW, and will soon have results on heating. <b>NSTX should watch, and learn from these results.</b> ... Definition of the EBW system frequency may drive a need for tube development, so it is important to do the emission measurements in '03. NSTX has the appropriate detector. It is important that <b>the needed run time is made available.</b></p>	<p>Closer collaboration with MAST Team on this and other research topics is being arranged. EBW emissions will be measured in FY '03 to provide data needed to determine the appropriate EBW frequency for NSTX. (Detailed to be addressed in presentations)</p>
<p>5) The PAC is looking forward to <b>hearing results from this improved (CHI) system</b> at our next meeting. ... the <b>role of impurities in CHI-initiated discharges</b> in NSTX still needs to be assessed. ... <b>Additional theoretical support</b> should include exercising M3D (as modified by Tang) for exploring reconnection mechanisms, and comparisons with NIMROD, ... PPPL should <b>identify a person to work with Sovinic</b> to apply NIMROD to the modeling of CHI experiments on NSTX. ... The PAC encourages <b>continuation of a well-coordinated theory effort</b> on this challenging problem. In addition, the PAC encourages <b>Te measurements of CHI plasmas</b> ... and the PAC looks forward to experiments in which <b>RF</b> current drive (and heating) are applied immediately to CHI-initiated plasmas (could this be included in the FY '03 run plan?). ... <b>a strong commitment</b> to the development and evaluation of CHI as a means of initiating and sustaining the plasma current in NSTX.</p>	<p>High priority is given to the CHI research in FY '03. Benchmark between M3D and NIMROD is being carried out under the "Extended MHD" effort led by Jim Callen and Steve Jardin. Whereas M3D and NIMROD have not yet been used to model the CHI plasmas calculations, X. Tang has been encouraged to continue his effort to model the CHI plasma stabilities and compare with the CHI measurements on NSTX and HIT-II. Suggest the required report be made to PAC-15 in September 2003.</p>

# PAC-13 NSTX Action Items and Status – III

PAC-13 Advice	Status
<b>Charge #2: FY03-04 Research Program</b>	
6) ... the PAC believes that since NSTX has already installed ( <i>RWM</i> ) sensors, they should <b>go ahead with the active coils as soon as possible.</b>	See #2) above; active control is planned for FY '04.
7) The PAC looks forward to the <b>first data from the high-k scattering diagnostic</b> (expected in FY '03) and the imaging reflectometer (which we hope to see in '04). It is important that <b>kinetic TRANSP analysis of NSTX shots becomes routinely available</b> , ....	High-k scattering and low-k imaging reflectometer are both delayed to FY '04 and '05 during to inadequate funding in FY '03. Interesting shots are being "TRANSPed" as fast as requested and as validated data becomes available. (Detail to be addressed in presentations)
8) We encourage the NSTX team to <b>increase the edge resolution</b> when the Thomson scattering system is expanded to 30 channels (in '04) and when the CHERS system is expanded to 51 channels, and we look forward to routine availability of edge profile data from NSTX shots.	30-channel Thomson scattering system upgrade is presently planned for FY '05 campaign. 50-channel toroidal CHERS is being commissioned for FY '03 campaign.

# PAC-12 NSTX Action Items and Status - IV

PAC-13 Advice	Status
<p>9) ... we encourage the NSTX team to <b>report their results using <math>\beta</math> defined with the total magnetic field</b>. ... increasing <math>\beta</math> is through a <b>combination of the use of active coils</b> (for resistive wall mode stabilization), <b>and increasing the plasma elongation</b> (to broaden the pressure profile and lower li). The PAC also notes the surprising result that H-mode transitions in NSTX do not always result in an increase in the energy confinement time. Clearly, there is much left to be understood about energy confinement in STs, and we <b>encourage the NSTX team in their studies</b>.</p>	<p>We have started to present <math>\beta_T</math> as well as <math>\langle\beta\rangle</math> values in our presentations. We should do so more consistently. Elongation studies will be a key component of the FY '03 campaign, and in the 5-year plan. Systematic H-mode scaling studies will occupy several run days in FY '03.</p>
<p><b>Charge #2: Approach to Snowmass Discussion</b></p>	
<p>10) ... decision by the DoE to fund the NSTX 5-year research plan will be largely motivated by the contribution which ST's can make as <b>a fusion energy concept</b>, by the potential the ST configuration shows as the <b>basis for a Component Test Facility</b>, and as an experimental platform for obtaining a <b>deeper understanding of the physics</b> of toroidal plasmas.</p>	<p>Detail will be addressed in presentations on the NSTX 5-year plan.</p>
<p>11) ... it is important that the 5-year plan address the "nuts and bolts" aspects of <b>expanding the interactions between NSTX and the larger community</b>.</p>	<p>Brief status will be presented in the NSTX 5-year plan.</p>
<p>12) ... the PAC was intrigued by the possibilities of the proposed <b>lithium module</b>, and would like to hear more about it at a future meeting.</p>	<p>Preliminary ideas will be discussed by Maingi. Suggest that the required report be made to PAC-16.</p>