NSTX-U

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Research Operations Update

Stefan Gerhardt

June NSTX-U Team Meeting
B-318 PPPL
6/5/2015

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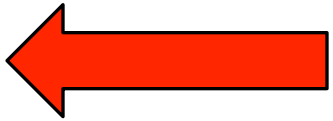
This Talk

- Diagnostic Operations
- RF Operations
- Physics Operations
- Boundary Physics Operations

This Talk

- Diagnostic Operations 
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Diagnostics: MPTS (B. Stratton)

- Installation of MPTS hardware is complete, exit flight tube has been baked and is open to NSTX-U.
- Week of June 1: alignment being checked/adjusted with He-Ne laser (co-linear with YAG laser beam trajectories)
- Plan for week of June 8: fire YAG lasers through the machine and check/adjust alignment
- Following completion of alignment, assess stray light with YAG lasers
- Following stray light assessment, perform Rayleigh-Raman calibration
- QT (sensitivity) calibration of rebuilt Phase 3 polychromators will be performed during NSTX-U bake
- Remaining task is to complete fabrication of calibration probe and install it (by September)

Diagnostics: Other (R. Ellis)

- Divertor SPRED
  - Drawings of stand and flight tube near completion.
  - Vacuum Vessel transition assembly ready for installation
- Divertor Imaging Radiometer
  - Ready for installation
- MAPP
  - Chamber and probe installed; working on rack installation
- XEUS, LoWEUS, Mona Lisa
  - Installation of stand underway
- Bay "H" top IR cameras
  - Support brackets being fabricated, FDR planned
- Bay "G" cameras
  - Bracket drawings in process in drafting, material on hand
- NSTX-U Diamagnetic Loop
  - Rewiring of I_P rogowski return loops to provide diamagnetic loop is complete
  - Need a Rogowski on the TF coil to measure dI_{TF}/dt
    - Coil is wound
    - Support drawing approved
- Divertor Tangential Imaging
  - Fabrication of re-entrant assembly nearly complete
- BES
  - Fibers being installed in new holder
- Fusion products diagnostic
  - Design being developed with FIU

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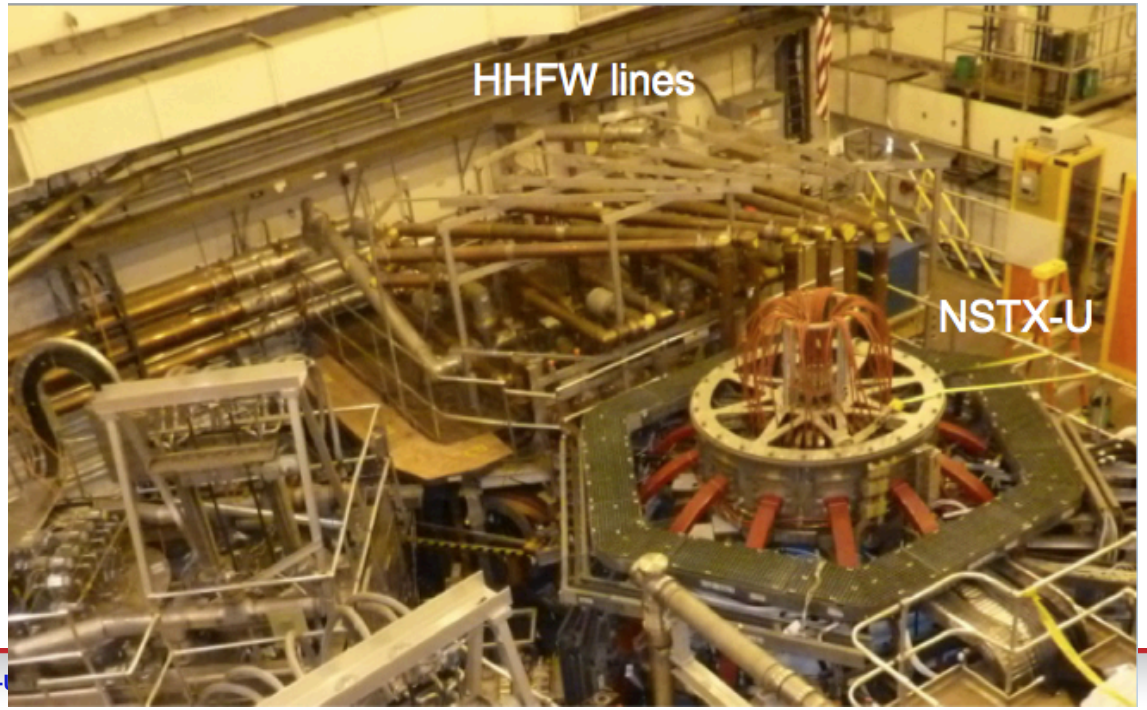
HHFW System Status (J. Hosea)

- Transmission lines reinstalled
- Antennas tuned to the RF enclosure and awaiting source commissioning
- Sources #3, #4, #5, and #6 commissioned into dummy load to 1 MW each
- Commissioning of sources #1 and #2 underway
- Should be ready for power conditioning of antennas into vacuum in ~ 2 weeks



RF Diagnostics (J. Hosea)

- ORNL reflectometer antennas re-installed
- Installation of IR camera for HHFW antenna view is progressing well:
  - Camera working on bench
    - Camera and associated hardware have been ordered and received.
    - Camera and data pipeline (electro-optical converters, frame grabber card, and PC software) have been tested on a personal computer
    - Slim-frame computer for use in test-cell was just received
  - Work remaining to be done
    - Setup the slim-frame computer and test the data pipeline on it
    - Calibrate the camera using a blackbody source
    - Get an NSTX-U trigger to the camera
    - Install camera on vessel (waiting on magnetic shield and mounting bracket)
    - Ensure that data is being saved to the tree properly
- Reconfiguration of ORNL multi-tip Langmuir probe underway
- Development of circuitry for coaxial Langmuir probes at Bay J underway

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PCS Algorithm Development

- PCS requirements for CD-4 are met:
  - TF control, OH control, pre-programmed PF control, pre-programmed gas control.
- Development work for early commissioning:
  - Gas feedback - algorithms extensively tested, needs some hardware before full operational test (next week?)
  - I_P feedback - algorithms extensively tested, needs plasma to fully test (should be able to test with CD4 plasma)
  - Outer gap, Z position, and vertical stability - algorithms under testing and incremental development
  - ISOFLUX, beam feedback, X-point/snowflake control - on-track for completion for XMPs in commissioning phase

PHYSICS OPERATIONS COURSE

Session #1 July 18th to Aug 7th (tentative)
Session #2: Sept 14th to 24th (tentative)
Times 10 AM – noon in CR Annex

- Power supplies, coil systems : Weigou Que
- Control Logic, organization: Gates
- PCS hardware: Lawson
- Conditioning: Mueller
- Break-down, ramp-up, ramp-down: Mueller
- PCS user interface, Gas injection system, etc.: Battaglia
- Magnetics, 3-D coils, NBI feedback, DCPS, ramp-off: Gerhardt, Myers
- NBI characteristics: Stevenson
- Computer systems, MDSplus: Davis, Zimmer, Sichta
- CR chain of command, Responsibilities, Machine Techs: Camp, Blanchard
- Control Theory as applied to NSTX-U: Kolemen
- EFIT: Sabbagh
- HHFW: Taylor
- CHI: Raman

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Boundary Operations Update (R. Kaita)

- Installation of new brackets for LITERs begun on upper umbrella structure
- Work about to start on new signal conditioning electronics and field wiring for new outboard divertor Langmuir probe array
- Conceptual Design Review for row of high-Z outboard divertor tiles tentatively scheduled for June 15
- Hardware complete for Lithium Granule Injector - Final Design Review for remote control system on June 5