

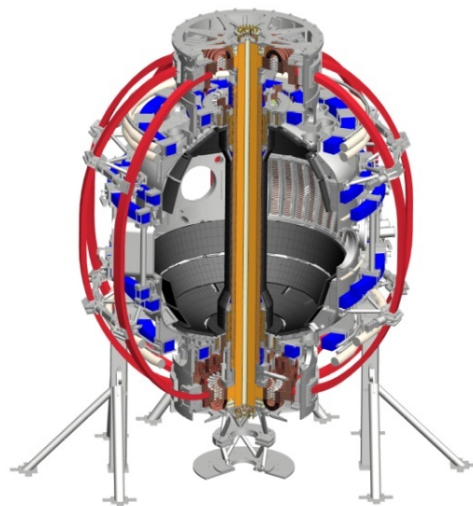
Intro. and Magnetics Discussion

S.P. Gerhardt

E. Fredrickson, C. Myers

**Diagnostic/Ops Update
B318
1/28/2015**

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This Meeting

- Day 1: Operations/Diagnostics/Software Update (Gerhardtapalooza)
 - Gerhardt: Intro., Magnetics
 - von Halle: Engineering Operations
 - Mueller: Physics Operations
 - Kaita: Boundary Operations
 - LUNCH: 12:15-1:30
 - Stratton: Diagnostic Operations
 - Hosea: RF Operations
 - Davis: Analysis Software Update
- Day 2: Program and Initial XP/XMP Preparation (Menardstock)

Magnetics Status: People

- Stefan Gerhardt: Equilibrium measurements
- Eric Fredrickson: High-f array, high-n array
- Clayton Myers: RWM sensors, help with whatever else.
- Ed Lawson, Bob Mozulay, Weiguo Que,....: Engineering support

But really, it is a team, with overlapping knowledge and mutual support.

Magnetics Status: Currents

- Coil currents names will be similar:
 - Engineering tree, tags like \IPF5, \IOH
 - Of course, there are more of them
 - Now digitized with DTACq boards instead of CAMAC.
- Still two Rogowski coils for measuring I_p , but new processing electronics
 - Analog chassis in the JA replaced by a fancy digital system.
 - Each signal will have a high-gain and a low-gain version.
 - Motivated by the fact that the rogowski links the plasma (2 MA) and four divertor coils (>1 MA-turn), but we also want to resolve small CHI currents.
 - So more tags to remember: \IP1_LG, \IP1_HG, \IP2_LG, \IP2_HG.
 - \IP1 -> \IP1_LG, \IP2->\IP2_LG
- A third Rogowski coil has been installed as an in-place spare.
- We will not have optimized the vessel current compensation early in the run.
 - Don't be surprised if I_p is not as nice as before during the current ramp.
- Maybe important: the equilibrium magnetics and the coil currents will no longer be on the same time base.
 - If your codes assumed that they were, then you will need to fix them.

Magnetics Status: Poloidal Flux and Poloidal Field

- After much soul searching, decided to NOT abandon CAMAC for the first run.
 - We will test DTACq boards, but we were not 100% confident that they would survive CHI.
 - So, for pulse lengths exceeding ~1.5 seconds, may need to drop to 2 kHz.
 - Depends how early we need to start digitizing...which depends on when coils need to turn on...
 - Operations trees have been rebuilt using rearranged CAMAC, are now collecting data.
- Integrators are being checked/calibrated.
- Sensors on the outer vacuum vessel are essentially untouched.
 - Flux loops on the outer vessel are newly installed, but at same locations as before.
 - Were in good shape for continuity/isolation when the vessel was closed.
- Many more sensors on the CS
 - More redundancy in the poloidal field measurements, more loops in the vicinity of the divertor coils, many more LPs.
 - But I don't have enough integrators for all of them...will remedy this once the push for the CD-4 plasma is over.
 - Added an additional realtime digitizer in the Cat. 3 crate to handle additional data.

Magnetics Status: Low Frequency 3D Perturbations

- “RWM Sensors”
 - In-vessel configuration is same as before (24 B_P sensors and 24 B_R sensors) , and they were all continuous and isolated from the vessel on the day we pumped down.
 - And with moly covers that were installed for the 2011 run but never used.
 - Electronic signal processing is identical, with the caveat that we need to adjust the integrator time constants.
 - Compensation software needs some work on the margins, but is in general in decent shape.
 - Given other constraints, anticipate data some 2-4 weeks into the run.
 - And realtime data soon after that.
- “Locked Mode Sensors” are not on the machine.
 - Removed to facilitate the construction project, and have not been reinstalled.
 - And it is not clear if they could be reinstalled in their original form.
 - If this proved a problem, it might be possible to recreate the system, though with considerable effort.

Magnetics Status: Rotating and High-Frequency MHD

- High-f array was heavily modified on account of the J-K cap and expanded Bay L port.
 - Poloidal (5 coils) and toroidal arrays now at Bay F
 - Additional 3 coil arrays at Bay J and Bay L
 - Each with 2 B_P and 1 B_T sensors
 - In the process of designing/fabricating/installing new termination boxes and cabling.
- High-n array coils were shifted toroidally on account of vessel changes, but not otherwise modified.
 - Once termination box is checked out and installed, cabling will be complete.
- Digitizers:
 - Old NI/PC systems not appropriate for the Upgrade...too little memory.
 - We are planning to use fast DTACq digitizers.
 - Have one already, will purchase at least one more.

Magnetics Status: Halo Current Measurements

- Shunt Tiles:
 - 10 tiles in the outboard divertor (12 during final runs of NSTX)
 - 18 tiles on the CS (0 for NSTX)
 - Need to fabricate additional isolation amplifiers to process the data.
- Magnetic Measurements:
 - New “tilted” Mirnov sensors at the CS midplane act as parts of a segmented rogowski.