

Status of NSTX internal RWM/EF sensor system and electronics

J. Menard for NSTX GMS-WG

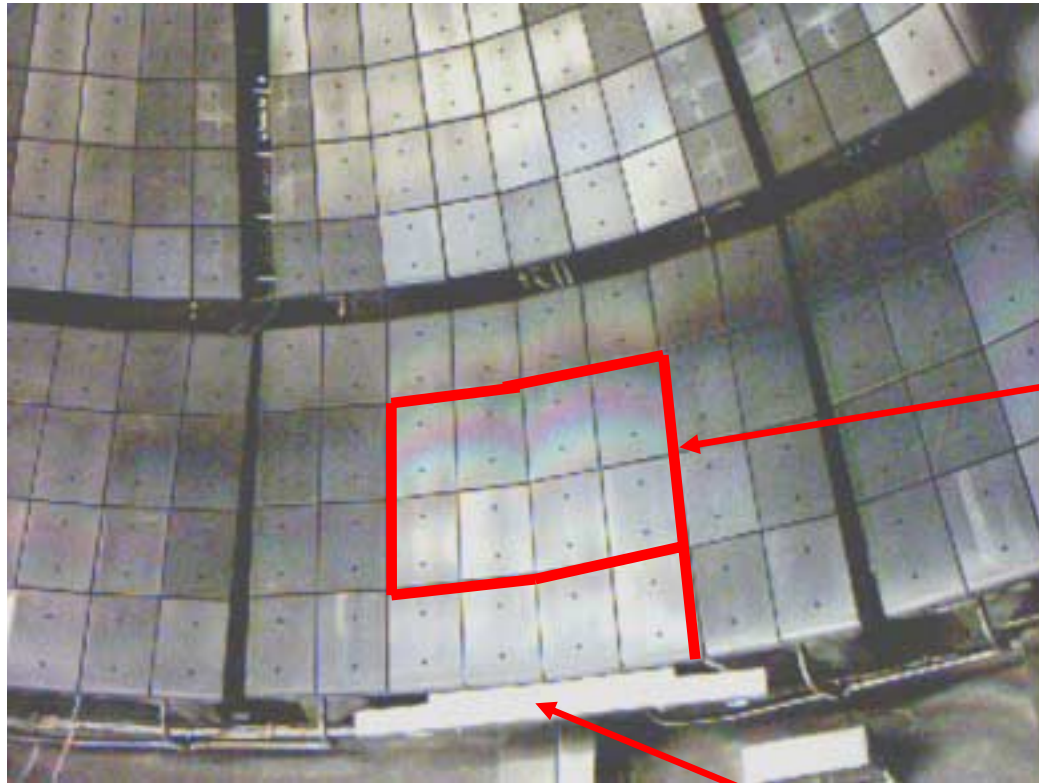


RWM/EF sensor and electronics status



- Sensors
 - All 48 sensors installed during last outage
 - All cabling in-place up to integrator input
 - Cables from integrator output to digitizers need to be finished, labeled
- Integrators
 - All integrator modules, crates, and timing modules now on-site
 - Need to finish etching of module front panels, then test modules
- Digitizers
 - Present plan is to use 2 CAMAC 908s – need to decide layout
 - Could do 12 δB_p channels plus 4 others at 10kHz, other 32 at 5kHz
 - Do we need faster data acquisition, or higher than 12bit resolution?
- What are we going to do about real-time DAQ
 - Do we need to purchase at least 1 PCS digitizer module?
 - Is the PCS DAQ too slow?

Each primary plate will measure B_{\perp} and B_P



- Full toroidal coverage
 - 24 B_{\perp} and 24 B_P
 - Each 12 above, 12 below
- B_{\perp} measured by single turn loop
 - Embedded in tiles
 - Centered in plate
- B_P measured at ends of primary plates
 - Glass insulated Cu wire wound on macor forms
 - SS304 shields

Thermocouple connectors allow easy installation and upgrade potential (PnP) (Plug-and-pray)

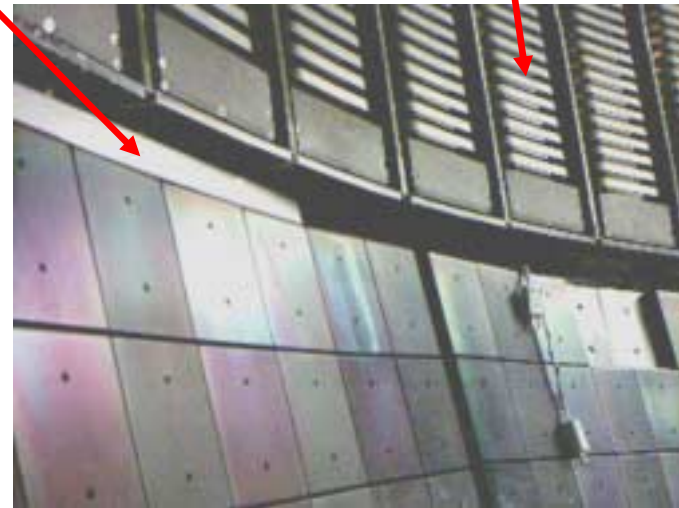


Sensors will measure RWM/EF helicity



B_P and B_{\perp} mounted symmetrically above and below mid-plane:

- Chosen to avoid ports, etc....
- Mounted 1/2" behind limiter boundary
- B_P sensors must avoid HHFV antenna



Use up/down average for n=1 feedback

Implementation plan



- A partial to-do list:
 - Make final decision on toroidal separation of difference measurements
 - Best options: $\Delta\phi = 6 \times 60^\circ$ or $2 \times 180^\circ + 4 \times 90^\circ$
 - Label and hook up sensors accordingly
 - Sensor calibration
 - Calibrate integrators in-situ
 - B_p calibration
 - Compute expected gain and inductance, infer actual gain from measured L
 - B_R calibration
 - Process measurement arm data and use tile/plate drawings to infer sensor area
 - Stimulate PF3U/L and PF5 with Crown amplifier to determine polarities and obtain preliminary gains (need integrated signals).

Potential issues....



- Impact of TF failure – timing of outage
 - There is presently discussion of installing ex-vessel control coils near the end of the present outage
 - The coils would be installed where the present locked-mode sensors are, and would almost certainly displace them
 - With this plan, we will have no measurement of locked $n=1$ until the internal sensors are proven/shown to work
 - Do we want some type of B_R sensor loop on new ex-vessel coils?
 - Can we re-cycle the present ex-vessel sensors?