

Research Operations Division Boundary Physics (*H. Kugel*)

- ◆ Lithium Pellet Injector mounting scheme and installation
 - ▶ Resolving chits from PR for FDR in early December
- ◆ Supersonic Gas Injector (NSTX/CDX-U)
 - ▶ First trials conducted in CDX-U showed different pattern of H_{α} light
- ◆ Advanced Lithium Wall Coating (NSTX/CDX-U, ORNL, SNL, UCSD)
 - ▶ Installed TIVs for divertor evaporators
- ◆ Calibrated IR camera viewing lower-divertor during bakeout
- ◆ Fast reciprocating probe inspected and readied for operation (UCSD)
 - ▶ Upgraded analysis software in preparation for experiments
- ◆ Assessing bakeout and planning for hot/cold boronization comparison
- ◆ Papers presented by Kugel, Gettelfinger, Sichta at 20th SOFE, 10/03
- ◆ 26 proposals for boundary physics experiments at Research Forum

Research Operations Division Diagnostics (*D. Johnson, R. Kaita*)

- ◆ Much work on diagnostics accomplished over the opening, *e.g.*
 - ▶ RWM sensors reinstalled with upgraded shielding & tested with PFs
 - ▶ Spatial calibrations of GPI, CHERS, edge rotation and MPTS
 - ▶ Thomson scattering window replaced
 - ▶ Neutron detector calibrated
 - ▶ Installed and calibrated new divertor camera view
- ◆ Need Rayleigh/Raman calibration of MPTS & Ne-glow for CHERS/ERD
- ◆ MSE/CIF
 - ▶ Continuing fabrication of filter assemblies and controls
 - ▶ Goal remains 4 channels instrumented for start of run
- ◆ Conducted 2 “diagnostic shakedowns” to prepare for experiments
- ◆ Proceeding with design and preparation for upgrades in next opening
 - ▶ high-k scattering, poloidal CHERS, edge rotation, add'l MPTS channels

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Diagnostics [2]

Diagnostic	Capability (NEW)	Availability
Bolometer – tangential array	Repaired, re-aimed	Start of plasma ops
Bolometer array - divertor	4 ch. (unchanged)	Start of plasma ops
CHERS	51 ch, 10ms (unchanged)	Needs Ne glow calibration; ready for start of ops.
Divertor fast camera	Tangential divertor view	Will be shipped to PPPL in Dec/Jan.
Dust detector	New	Commission early in run
EBW radiometers	Movable limiter; oblique view	Needs non-dedicated commissioning time; available mid-run
Edge deposition monitor	Facing & occluded views	Start of plasma ops.
Edge pressure gauges		Start of plasma ops.
Edge rotation spectroscopy		Start of plasma ops.; neon calibration desirable mid- & end- run
Fast camera for RF antenna	New	Start of plasma ops.
Fast lost ion probes - iFLIP		Ready
Fast lost ion probes - sFLIP	New	External work underway, ready by start of ops
Filtered 1D cameras (4)		Start of plasma ops.
Filterscopes		Start of plasma ops.
FIReTIP	4 ch inter/pol (unchanged)	Start of plasma ops.
Gas puff imaging		Within 1 st month of operation
Infrared cameras		Replacing power supply; Start of plasma ops.
Interferometer - 1 mm	Density and fluctuations	Ready for commissioning at start of ops.
Langmuir probe array		Operational but not manned
Magnetics - B coils		Need field-only calibration shots
Magnetics - Diamagnetism		Needs recalibration for new TF; Feb
Magnetics - Flux loops		Need polarity checks on new SPP loops
Magnetics - Locked modes		Need field-only calibration shots
Magnetics - Rogowski coils	Compensation to be upgraded	Need field-only calibration shots
Magnetics - RWM sensors	Repaired, upgraded shields	Need field-only calibration shots

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Diagnostics [3]

Diagnostic	Capability (NEW)	Availability
Mirnov coils – high freq.		Ready; need to test new d/a
Mirnov coils – poloidal array		1 month after start of ops.
Mirnov coils – toroidal array		Ready; need to test new d/a
MSE	3–4 ch Feb. → 10 ch June	Commission from start of NBI; need 1–2 run days twice
Neutral particle analyzer	Additional electrostatic analyzer for 100kHz data	Start of plasma ops. Vertical scanning subject to interference with LPI when deployed
Neutron measurements	Developing prototype collimator	Standard detector recalibrated; ready for ops
PIXCS camera	Added translation stage for variable field of view	Reassemble after bakeout; expect to be ready by start of plasma ops.
Plasma TV	New filter capability	Start of plasma ops
Reciprocating probe	New contoured probe tip	Calibrated and ready
Reflectometer - SOL		
Reflectometers - Core	Phase fluctuations & radial correlations	Start of plasma ops. for standard 3 ch. system; other modes under development or by request
RF antenna Langmuir probe	Characterize plasma at antenna	Awaiting control unit; expect to commission early in run
SPRED VUV spectrometer		Start of plasma ops
Thomson scattering	20ch, 60Hz (unchanged)	February
Ultrasoft X-ray arrays	5 arrays, repaired diodes, reduced vignetting, higher rate	Operational for start of plasma ops; calibrated data 1 week later
Visible bremsstrahlung det.		Start of plasma ops
Visible spectrom (VIPS-1,2)		Start of plasma ops
X-ray crystal spectrom - H	T _i profile capability	
X-ray crystal spectrom - V		
X-ray pinhole camera	300 frame @ 1MHz	Assembling in lab.; available early '04
X-ray TG spectrometer	Awaiting new detector	6 weeks after approval of detector purchase

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Diagnostics [4]

- ◆ After vessel pumpdown, a cracked viewing window was found
 - ▶ Camera support installed against bolting surface of window flange, pressed on window surface, which protruded by a few thou'
 - The window was from a new supplier
 - ▶ A vacuum vent was needed to replace the window
- ◆ Lessons learned:
 - ▶ Whenever possible, avoid using windows lacking a reasonable clearance between the bolting surface and the window surface;
 - ▶ Generic procedure covering installation of vacuum flanges should be modified to address issues specific to installing vacuum windows, such as assurance of proper clearance to window surfaces.

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RF Systems (*R. Wilson*)

- ◆ Planning to be ready for plasma operation at beginning of February
- ◆ Additional RF filters provided for magnetic diagnostics

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Physics Operations (*D. Mueller, D. Gates, R. Raman*)

- ◆ Reducing delays in real-time feedback loop to increase elongation
 - Optimized data transfer software
 - Working with GA to improve vertical control algorithm
 - Upgraded real-time (Skybolt II) computer boards for FPDP output
 - Fabricating PCLIM (parallelizes output to power supplies)
- ▶ Need testing/debugging time in Dec. to be ready for Jan. startup
 - Can fall back to existing link in case of delay
- ▶ Want to do development of rt-EFIT control with final system
- ◆ Also ready to install capability for RF loading control
- ◆ Designing capacitor bank (~100kJ) to power "transient" CHI scheme
 - ▶ Reduce jitter in applying CHI voltage for breakdown
 - ▶ Decrease external inductance to accelerate rise and decay of current
 - ▶ Minimize energy in fault conditions