

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

◆ LITERS

- ▶ 18 (re)fills for total of ~1.3kg evaporation: filled LLD to 2x capacity
- ▶ All 4 units now under argon awaiting maintenance or replacement
 - One snout damaged, one heater failed; jammed shutters; bad t/cs

◆ LLD

- ▶ Installed air heating at end of run to replace failed electrical heaters
- ▶ Main experimental conclusions:
 - Solid and liquid Li on LLD required similar D_2 fueling (up to 2x non-Li) but reduction in local recycling was not observed
 - Impurity accumulation on LLD may have caused more ELMing
- ▶ Found damage to LLD mounts and surrounding tiles, cables and pipes
 - Appears due to forces occurring during disruptions and arcing
- ▶ Plates and cabling now removed from vessel
- ▶ ***Assessing whether LLD plates will be reinstalled***

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Boundary Physics [2]

- ◆ Designing molybdenum tiles for outer row of inner divertor
 - ▶ Final Design Review conducted on 1/14/2011 (R. Wood consultant)
 - ▶ Tiles would be coated with lithium by LITERs
 - ▶ Installation would be pacing item for 2011 outage
- ◆ Reviewed plans for a Centrifugal Lithium Granule Injector (D. Mansfield)
- ◆ Testing prototype liquid lithium fill system
 - ▶ Moved 10g molten lithium in vacuum through ~1m of horizontal tubing (0.95 cm ID) and injected stream of lithium about 8cm from nozzle
 - ▶ High temperature valve successfully contained molten lithium
- ◆ Exposed LLD sample to 30kV DNB for 1 – 3 s
 - ▶ Heat flux 1.5 MW/m² comparable to typical divertor fluxes (~ 3 MW/m²)
- ◆ Preparing to install Materials Analysis Particle Probe (MAPP – Purdue U)

Research Operations Division Diagnostics (*R. Kaita, B. Stratton*)

- ◆ Diagnostics performed well through 2010 run
 - ▶ Contributed much to our 2010 IAEA and APS presentations
 - ▶ Suffered some difficulties as a results of heavy lithium use
 - MPTS window coating reduced transmission by ~50%
 - ▶ Commissioned the $R = 1.4$ m view of the BES diagnostic (U. Wisc)
 - ▶ 2-color IR system operational
 - ▶ Data from high-density probe array on outer divertor
- ◆ Post-run calibrations completed in December
- ◆ Repairing shutters for MPTS and BES
- ◆ Planning for pre-run calibrations of existing diagnostics in February
- ◆ Diagnostics now under construction will be calibrated later in outage

Research Operations Division Diagnostics [2]

- ◆ MPTS Upgrade (PPPL)
 - ▶ 12 new polychromators assembled, aligned, tested and installed
 - ▶ Finalized location of new channels and started splitting fiber bundles
- ◆ MSE-LIF (Nova Photonics)
 - ▶ Move reconfigured and laboratory tested DNB to NTC in early February
 - ▶ Reinforcing platform, rerouting helium piping, modifying port for DNB
- ◆ Tangential FIDA (UC-Irvine)
 - ▶ Spectrometer, camera, fibers delivered; fabricating other components
 - ▶ Two new ports will be installed on vacuum vessel next week
- ◆ Real-time velocity measurement - rtCHERS (PPPL)
 - ▶ Fast readout and processing of CCD camera data successfully tested
 - ▶ Fibers have arrived and fiber holder has been fabricated
 - ▶ Developing plan to transfer data to PCS system

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RF systems (*J. Hosea*)

- ◆ This year, HHFW operation after filling LLD with LITERs was problematic
 - ▶ Reliable operation above 1.2 MW unachievable; $\int P_{RF} dt < 0.6 \text{ MJ}$
 - ▶ In 2009, antenna conditioned to 4 MW in post-lithium environment
- ◆ Observed material ejection from antenna and surrounding surfaces
 - ▶ Similar events did occur last year but less frequently
 - ▶ Antenna conditioning can be set back significantly by one “event”
- ◆ Inspection showed substantial deposits of lithium compounds on antenna
- ◆ Faraday shield has been removed for cleaning plasma-facing elements
- ◆ For 2011, need to condition antenna early and maintain it throughout run
 - ▶ Between-shot conditioning
 - ▶ Develop “plasma scrubbing” tried last year
 - ▶ Modify shields above array

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Physics Operations (*D. Mueller*)

- ◆ New Physics Operators enhanced productivity in extended run
- ◆ Commissioned enhancements to PCS (*E. Kolemen*)
 - ▶ “Relay” control
 - ▶ Combined X-point height and outer strike point control
 - ▶ Combined PF4/PF5 operation for outer squareness control
- ◆ New software team appointed and learning PCS programming
 - ▶ Rebuilt and successfully tested PCS (latency 0.71ms)
- ◆ Projects for outage
 - ▶ Controlling second SPA and modifying RWM algorithms to use it
 - ▶ New dZ_p/dt estimator with more input data for improved vertical stability
 - ▶ Density feedback using FReTIP measurement
 - ▶ Modify phase transition method
 - ▶ Data acquisition from rt-CHERS