



# Detector Support Group

## Weekly Report, 2017-08-30

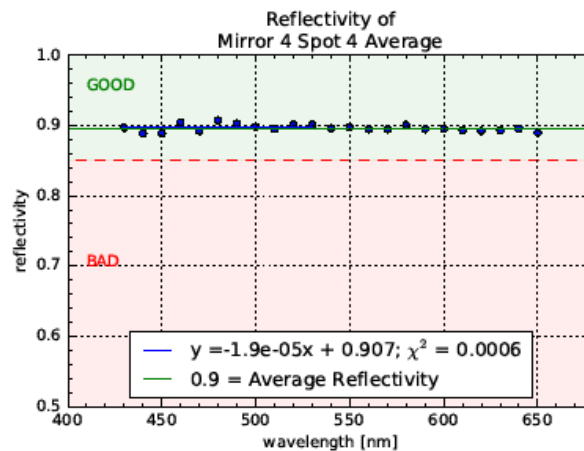
### Status

#### Solenoid

- Twenty-eight of thirty Pre-Power-Up interlock checks completed.
  - ★ System cable interlock and He liquid level interlock remain to be tested.
- PLC code modified to interlock load cells at 1<sup>st</sup> and 2<sup>nd</sup> thresholds.
  - ★ PLC code edited to interlock load cells' thresholds separately.
    - Signal over 1<sup>st</sup> threshold causes a controlled ramp down.
    - Signal over 2<sup>nd</sup> threshold causes a fast dump.
- Issues with Cryocon unit #1 debugged.
  - ★ Loss of communication occurred.
    - Checked Ethernet cable, cryocon settings, and replaced cryocon unit.
- Noticed fault in PT-100 sensors (TS-21 and TS-27).
  - ★ Splice (Coil 2-Coil 4) Sensor TS-21 has low readout (~133 K) in comparison with the other temperature sensor TS-22 (~155 K). Average splice temperature ~ 150 K.
  - ★ Resistance of suspension sensor TS-27 is out of range, greater than 122 Ohms.
- Voltage tap calculations improved on FastDAQ cRIO.
  - ★ Average values sent from cRIO to PLC.
  - ★ Moved scaling factors to FPGA instead of the cRIO which simplified the code.
  - ★ Evaluating filters on the FPGA to reduce noise.

#### RICH

- Reflectance measured for visually bad areas on spherical mirror 3.
- Reflectivity test results analyzed for Mirror 3 and 4 in Python.

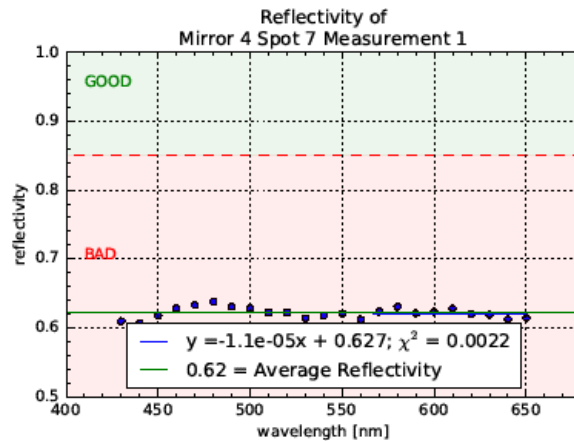


Reflectivity results from Mirror 4, spot 4 (visually good spot). Average reflectivity for spot was 90%.



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Reflectivity results for Mirror 4, spot 7 (visually bad spot). Spot corresponds to a pocket in mirror's reflective surface. Average reflectivity for spot was 62%.

- Five planar mirrors unpacked and inspected.
  - ★ No major issues with reflective surface caused by shipping to JLab.
- Spherical mirror 3 and 4 packed to send from JLab to CMA.
- Hardware Interlock cRIO moved to EEL 124 to monitor temperature during cosmic tests.
- Stiffening tool removed from detector shell.

#### Gas Systems

- Two pressure regulators ordered for MVT, for C<sub>4</sub>H<sub>10</sub> and CF<sub>4</sub> gas supply cylinders.
- DC mix gas and standard gas TCU readings evaluated to check for drifts from the previous week's calibration.
  - ★ On 8/24 TCU1 set to 8.65 mA for mix gas, after checking value of calibrated gas. When checked on 8/28, value was still at 8.65 mA.
  - ★ On 8/24 TCU2 set to 8.24 mA for mix gas. When checked on 8/28, value was 8.08 mA, a 2% change from starting value of 8.24 mA.



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#### Antonioli, Mary Ann

- Began writing Note on cRIO test stand.
- Began formatting and editing Marc's Note on LTCC leak study.
- Began formatting George's Note on MVT gas mixing system.

#### Arslan, Sahin

Absent

#### Bonneau, Peter

Vacation

#### Campero, Pablo

##### Solenoid

- Completed 28 of 30 Pre-Power-Up interlock checks with Brian.
  - ★ Verified comparator interlocks software for 1<sup>st</sup> and 2<sup>nd</sup> thresholds.
  - ★ Checked voltage drop interlocks for leads A and B.
  - ★ Ensured proper function for load cell interlocks at 1<sup>st</sup> and 2<sup>nd</sup> thresholds.
  - ★ Two interlocks left to complete once solenoid get cooled (~4.5 K)
    - System cable and liquid helium level interlocks.
  - ★ Removed two unused interlock checks from the P005 interlock procedure.
    - ESR and EPICS Heartbeat signals are not connected to the Solenoid PLC.
  - ★ Added load cell 2<sup>nd</sup> threshold interlock check steps to the P005 interlock procedure.
- Modified PLC code on-line to interlock the load cells at 1<sup>st</sup> and 2<sup>nd</sup> thresholds.
  - ★ Disable used 'Add-On-Instructions' that were generating 'Fast Dump' with 1<sup>st</sup> thresholds.
  - ★ Wrote PLC code to interlock load cells separately.
    - 1<sup>st</sup> threshold generates a controlled ramp down.
    - 2<sup>nd</sup> threshold generates a fast dump.
  - ★ Verified thresholds for all 16 axial and radial load cells.
  - ★ Tested proper functions of the Load Cell Controls/Interlock EPICS screens with the PLC code implemented.
- Debugged issues with Cryocon unit #1.
  - ★ Noticed loss of communication during the last two weekends.
  - ★ Reset unit to re-enable communication and communication error.
  - ★ Verified proper connection on the Ethernet cable using tester cable.
    - Indicated that cable had no issues.
- Monitored fault in PT-100 sensors (TS-21 and TS-27).
  - ★ Noticed sensor TS-21 still has low readout (~133 K) in comparison with the other splice temperature sensor TS-22 (~155 K). First time the fault was noticed prior to the cooldown.



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- ★ Sensor TS-27 is out of range (330 K readout), it was commented from the PLC code to avoid large differential of temperatures in the cooldown calculations.

#### RICH

- Performed inspection of RICH planar mirrors in EEL 121 clean room with Tyler.
  - ★ All mirrors did not appear to have any large scratches or issues.
- Calculated load contact area for the RICH electronic panel.
- Removed stiffening tool from RICH detector shell.
  - ★ Loosened all bolts for lateral arms and supports.
  - ★ Lifted horizontal crossbars along with gantry that was attached to the lift point of the stiffening tool.
- Corrected Solenoid Pre-Power Up I&C DSG note.

#### Eng. Brian

- Changed DC mixing to have a limit of 100 psig, above which the flow of the mixing MFCs is set to 0.

#### Solenoid

- Completed all pre-power-up checkouts with Pablo that was possible during cool-down.
  - ★ Two items related to helium liquid level and one for the system cable (all the sensors) remaining to be completed.
- Working with Cryocon vendor in order to debug issues with units. One unit in production has lost communication with the PLC several times (no errors on Cryocon or NBX), the spare unit gets an error when trying to set the NTP time server.
- Found a bad switch on the voltage tap panel that Scot replaced.
- Fixed voltage tap calculations on cRIO.
  - ★ Moved scaling factors to FPGA instead of the cRIO which simplified the code.
  - ★ Evaluating filters on the FPGA to reduce noise.

#### Hoebel, Amanda

- Created hardware interlocks screen in EPICS for SVT.
- Investigated TCU changes for DC gas system with Marc.
  - ★ TCU1 had 0.82% offset added to Mix1 last week. After offset, TCU1 measured 8.65 mA for mix gas. When checked on 8/29, value was at 8.65 mA.
  - ★ TCU2 had 1.25% offset added to Mix 2 last week. After offset, TCU2 measured 8.24 mA for mix gas. When checked on 8/29, value was 8.08 mA.
  - ★ TCU2 measurement had greater difference from calibrated measurement from week prior.

#### RICH

- Unpacked planar mirrors with Tyler and Mindy.
- Removed stiffening tool from detector frame.
  - ★ Loosened bolts.
  - ★ Pushed gantry into position.



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#### ET

- Met with Morgan to discuss condensation sensors.
  - ★ He wants to try the wire sensor instead of point sensor.

#### HDICE

- Program loses control of power supply after about 400 cycles.
  - ★ Program loses control after 26 cycles when GPIB card was inserted.
  - ★ Investigating source of program failure.
- Created and edited weekly report.

#### Jacobs, George

- Ordered pressure regulators for MVT C<sub>4</sub>H<sub>10</sub> and CF<sub>4</sub> gas supply cylinders.

#### HALLB

- Updated userweb index.html page to remove “old” CLAS6 links and info.
- Met with Bob M. about pressure system requirements when modifying or altering the DC Gas system.

#### RICH

- Removed lifting fixture from RICH shell.
  - ★ The SVT and MVT power cords interfere with movement of the gantry. These need to be run along the wall using longer extensions cords.
- Completed LTCC Single Sector Test Run Overview.docx
- Completed The MVT Gas Mixing System.docx

#### Leffel, Mindy

#### RICH

- Tested reflectivity of mirrors 3 and 4 with Tyler.
- Drilled missing screw holes in electronic panel with Tyler.
- Removed stiffening tool with DSG.
- Assisted with planar mirror crate unpacking.
  - ★ Transferred mirrors from curtain room to clean room and removed packaging for inspection.

#### Lemon, Tyler

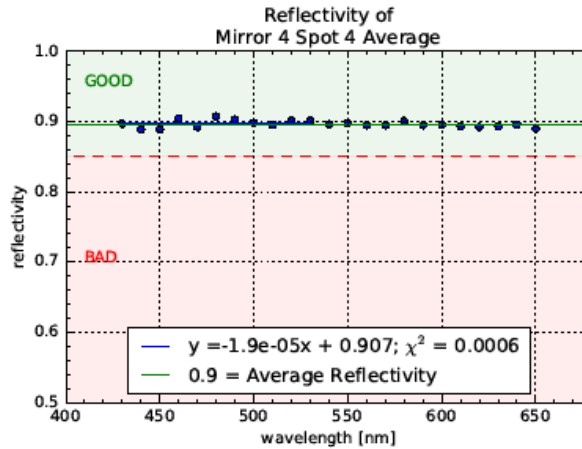
#### RICH

- Measured reflectance of visually bad areas on spherical mirror 3 with Mindy.
- Analyzed reflectivity test results for Mirror 3 and 4 in Python.
  - ★ Plotted and fit reflectivity results for wavelength range of 430 nm – 650 nm.

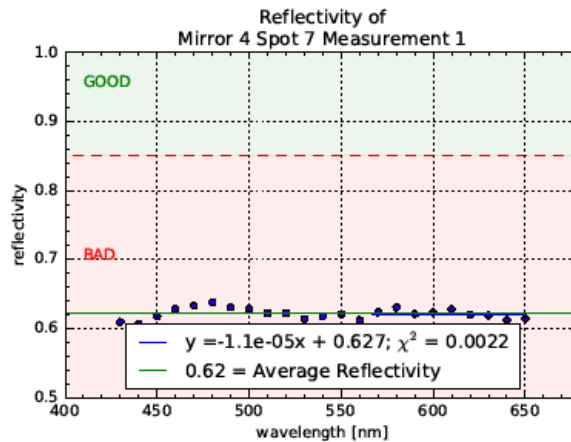


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- Results for best and worst spot measured below.
- ★ Results compiled in my DSG talk to be given August 30, 2017.



Reflectivity results from Mirror 4, spot 4 (visually good spot). Average reflectivity for spot was 90%.



Reflectivity results for Mirror 4, spot 7 (visually bad spot). Spot corresponds to a pocket in mirror's reflective surface. Average reflectivity for spot was 62%.

- Unpacked and inspected planar mirrors.
  - ★ Planar mirrors opened confirm no major issues with reflective surface caused by shipping to JLab.
- Packed spherical mirror 3 and 4 to send from JLab to CMA.
  - ★ Mirrors picked up by UPS on August 29, 2017.
  - ★ Delivery to CMA expected on August 30, 2017.
- Moved Hardware Interlock cRIO to EEL 124 to monitor temperature during cosmic tests.
  - ★ After cRIO's setup, CAEN crate mainframe was not responding to EPICS and was showing that all cards were externally disabled.
  - ★ Removed interlock cable between cRIO and CAEN mainframe to confirm cRIO was not causing issue.
    - Issue remained without any connection to cRIO.



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- ★ CAEN mainframe issue has since been resolved, yet to reconnect cRIO to mainframe to test interlock system.
- Stiffening tool removed from detector shell to avoid extra stress on detector shell from weight of stiffening tool.

#### **McMullen, Marc**

##### **DC**

- Evaluated the mix gas and standard to check to see if the TCUs have drifted from the previous week's calibration with Amanda.

<b>Calibrate Mix to Standard 8/24/2017</b>					
Time	TCU1(I)	TCU1(V)	TCU2 (I)	TCU2(V)	Comment
13:34	8.36	2.73	7.8	2.38	Starting condition (mix measurement). CO2 flow Mix 1 (1.8l/m), Mix2 (1.22L/m)
13:44	8.68	2.92	8.27	2.67	Standard Measurement
13:57	8.37	2.73	7.8	2.38	Switch back to mix
14:29	8.65	2.92	8.24	2.66	Offset Mix1 (0.82%) Mix2 (1.25%). CO2 flow Mix 1 (1.98L/m), Mix2 (1.37L/m)
<b>Recheck Mix and Standard values 8/28/2017</b>					
11:22	8.65	2.91	8.08	2.55	Starting condition (mix measurement)
11:45	8.63	2.89	8.16	2.59	Standard Measurement
11:55	8.66	2.92	8.24	2.64	mix measurement (Flow % offset from 8/24 remains without changes)

##### **RICH**

- Worked with DSG to unmount the Stiffening tool.
- Procurement department has received the official quote for the Load test parts, Trolley parts, and Strongback to Rich parts.
- Additional hardware for the Stiffening Tool was ordered.

##### **LTCC**

- On 8/23 Hall B has requested a leak study of S4. The sector has been removed and the gas lines have been configured so that the gas supply is directly connected to the exhaust with tubing.
  - ★ The gas consumption readings from the mass flow controllers has records a reduction from 50L/d to 1L/d.
  - ★ The sector piping pressure increases to about 2 (iwc) during filling.
  - ★ The due to the volume, gas pressurization of the sector takes a few seconds (max). Fills can be observed by viewing pressure spikes.



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