

Posts in category Com-8

Com-8 Day 8 - 26 May 2019

Based on their arrival times in the kitchen area, the Com-8 team had their first decent night of sleep since arriving on the mountain.

Maria, Moritz, and Tom went up to Level 6 to install the SX GWS f/15 source bracket. Unfortunately, it appears that there is a manufacturing error in the base plate, since only one of the two bolt holes lined up. They also performed a "re-bolt test" with the DX bracket. It seems that we can reliably remove and replace the source without changing the alignment.

Based on our de-brief at the end of night 3, our plans for tonight are:

1. Try Pathfinder reconstructor on DX (it worked during Com-6)
2. If possible, have John Hill assist us with DX collimation (at the beginning of the night)
3. Take GWS-SE offload calibration data
4. Test the repetition parameter on faint sources in closed loop
5. Test how faint we can go in closed loop (related to number 4)

Maria and Tom exchanged the Barilotto and returned the retro-reflector to the dog house on Level 5. They also inventoried the food, throwing out expired stuff, etc.

Dinner was Florian and Micah's amazing chicken curry. Better with boiled bones!

Nighttime Activities

23:00 - The winds continue high and blustery. We have not yet opened. Keep your fingers crossed.

01:14 - Still in the red

02:30 - No change

03:30 - Josh is standing up the telescope. No hope.

04:45 - Maria, Micah, Moritz, and Tom went up to Level 6 to stop the cooler, start the heater, and reinstall the DX GWS light source bracket. Micah located the spot and reported that the focus was good. We should double check the first 15 minutes of warm-up (03:45 - 04:00). It looks like the science detector had an initial steep gradient for ~15 min....8K in 15 minutes and then it turned over to a much slower gradient.

Posted: 2019-05-27 04:20 (Updated: 2019-05-27 13:46)

Author: [herbst](#)

Categories: [News Com-8](#)

[Comments \(1\)](#)

Com-8 Day 6 - 25 May 2019

14:00 - Tom locks out both axes and starts the pump. Initial pressure (beforehand) $2.3E-2$. When the turbo was at full speed and the pressure a few $E-3$, Tom went over to SX to start the cooldown, **he noticed that the Detector Heater had not switched off automatically**. The detector was over 290K in ambient conditions of ca. 279K. Tom switched off the Heater and tried to start the cooler just after Moritz started the cooldown script.

The cooler would not start and the display read "Invalidate instruction pressure to high". He then went down to the control room and executed the stopcooldown script. He then went back to Level 6 to try to start the cooler again. Same result. He then went to Level 4 to check for anomalous conditions with the Stirling. Nothing obvious...

14:45 - After consultation with Thomas, Tom tried one more time (we have been pumping for 45 min, Zabbix Pressure Gauge 1 is $\sim 3E-3$, Gauge 2 is $4E-4$). On Level 6, the gauge on the pump control (B-DX) read $3.3E-3$. The interlock unit gave the same message and would not start the cooler.

Based on the conversation with Thomas, Tom decided to let the pumps run for another 30-60 minutes before trying again.

16:30 Pressure $1.3E-3$. Finally, the cooler started. Started the script at 16:32

Dinner was giant steaks. Très paleo.

Nighttime Activities

21:00 - Luckily, the wind seems to have dropped. It was definitely threatening a few hours ago. We will take the second half, starting at 00:09.

We still have a number of activities to complete from yesterday's list (in bold below):

1. Work on fainter asterism acquisition

2. Work on HWS closed loop

3. Test channel bias tracking (Micah)

4. Take data for GWS SE offload

5. Work on DX closed loop (GWS and HWS)

6. GWS Throughput data (good seeing, A-type star)

7. Continue work on synthetic IM (centering in X-Y)

8. Try double-sided presets

Additional things to do:

A. See how faint we can close the loop

Nighttime Activities

23:49 - LBT engineering activities have encountered a snag and hand over early (nominally 00:09)

23:53 - Josh had to unwind the telescope (azimuth cable wrap).

00:04 - We are getting yellow wind warnings (16+ m/s)

00:08 - Crash. Restarting stuff

00:11 - Going to 1834.4+5148 (single 5th mag for Carmelo calibrations)

00:30 - Serious issues with SX K-mirror...switch to DX

00:47 - Acquired GWS star on DX. Carmelo begins work...

01:44 - We solved the problem and have been working steadily on A. finding the XY centering of the synthetic IM on SX (Maria) and B. trying to understand the loop closure issues on DX (Carmelo)

1:50 - The seeing is considerably worse (ALTA predicted this). ca. 1.4 arcsec.

02:40 - Micah is searching for fainter HWS stars, while Maria and Carmelo are working on the performance of the synthetic IM. They have managed to close the loop with 90 modes. Seeing 1.1 arcsec.

02:50 - Carmelo and Maria complete their measurements with one extra minute on the de-rotator. They measured the center of the synthetic IM and closed the loop with 90 modes.

02:51 - Going to 1943.2+2317_N6823

Carmelo and Tom discussed the vibration spectrum and noted that our old enemy, the 11 Hz vibration is not nearly as severe as in the past. It is definitely there (along with 18Hz), but it has not been nasty.

03:20 - Carmelo is working on SX, while Maria collimates DX. We see a strong trefoil that is difficult to control. Finally, Josh clears the DX primary and then the triangular shapes disappear.

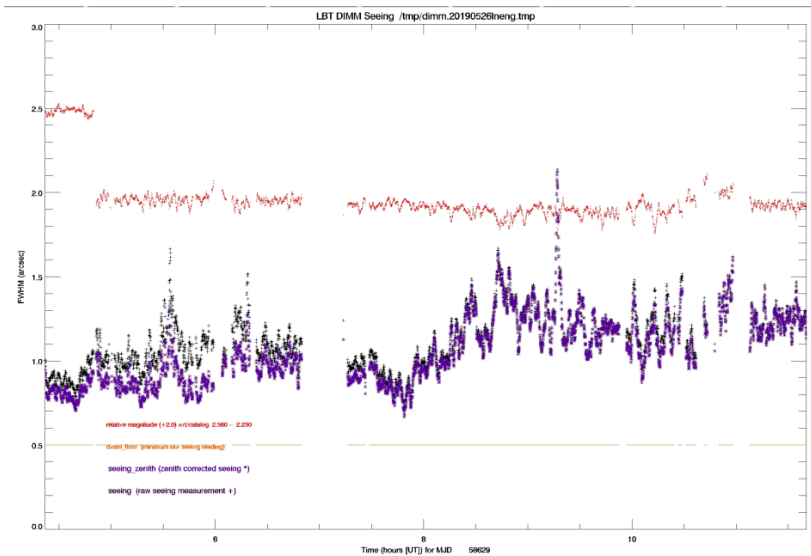
Carmelo continued to work, until we were forced at 04:00 to switch to another target due to high wind.

04:30 - Working on 2023.0+3831_M29 to get an idea for the GWS SE offload test.

04:40 - Stopped by sunrise

Summary

- Carmelo and Maria worked further with the synthetic IM, determining the centering with respect to the DM actuators. This allowed them to close the loop stably with 90 modes in ~ 1.4 arcsec seeing.
- Discovered a problem with closing the loop on DX (should work, given SX experience). Also, significant collimation challenges on DX near focus.



Posted: 2019-05-25 23:59 (Updated: 2019-05-26 13:51)

Author: [herbst](#)Categories: [News Com-8](#)
[Comments \(0\)](#)

Com-8 Day 5 - 24 May 2019

The start of the day was very successful, with Florian and Maria identifying the cause of the DX GWS CCD problem. Apparently one strip of remote-control power sockets on the bench is dead. They found this by plugging the CCD controller directly into line power. Luckily, there were additional sockets available.

The cryostat continues to warm up nominally. At 17:00, the detector was at 205K and the pressure is $3.5E-2$. An opportunity presented itself, so Tom put the cryostat on the pump.

Dinner was leftovers...still great.

Based on our morning de-brief and our dinnertime discussion, our priorities for tonight are (not in priority order):

1. Work on fainter asterism acquisition
2. Work on HWS closed loop
3. Test channel bias tracking (Micah)
4. Take data for GWS SE offload
5. Work on DX closed loop (GWS and HWS)
6. GWS Throughput data (good seeing, A-type star)
7. Continue work on synthetic IM (centering in X-Y)
8. Try double-sided presets

Potential AOV Stars for GWS Throughput Test

Tom used the tool at [this website](#) to produce catalog files for 3 or 4 AOV stars suitable for the GWS throughput test. They are located in the GWS_Throughput folder of the Targets_Com8 folder.

Nighttime Activities

19:36 - Sending preset to 1250.1+2316 - initializing. Trouble with TCS.

19:49 - Collimating

20:05 - SX GWS de-rotator stopped without warning. Restarting acquisition.

20:33 - Closing loop (there were a few problems - de-rotator took too long to start, etc.)

20:41 - G30s (indicates GWS 30 modes, synthetic IM)...90 modes...100 modes...a little unstable: back to 90.

20:58 - FS: we have had the HWS stars for some time. Working on the tracking. MB: 90 modes is the maximum for now with synthetic IM

Maria is working on the XY offset of the synthetic IM with respect to actuators. The field transited with high rotation rates. We are also outside of the "clean" angle range for the GWS de-rotator. This seems to be piling up offsets for the HWS.

1250.1 - We acquired star V003 with SE4 and star v001 with SE3. MB: SE2 is misaligned, so avoid it.

21:13 - Micah is testing automatic bias offsetting..."Cool ! It kinda works..."

21:19 - We worked until the very last minute of GWS de-rotator

21:21 - Going to M13 field.

We had Josh go to a nearby pointing standard and then we centered up with Steve's paddle. We then did a dual-sided pre-set to M13, which came in very close to spot on.

21:38 - Acquired one star and closed loop to clean up

The de-rotator is turning the "wrong" way. We started at -30° and then it started going more negative (i.e. outside of the ideal calibrated range).

22:12 - Micah - HWS 3 stars acquired in 156 seconds.

22:15 - All 3 GWS acquired. Centering.

22:17 - Number 4 acquired! Great going Fabio! 4 stars in ca. 10min

22:43 - Taking frames with the PCam...see Moritz's log. Things are behaving much better wrt GWS and HWS (offloads etc.). Maria notes that we are in a slowly rotating part of the sky.

22:45 Maria reports something...we both forgot what.

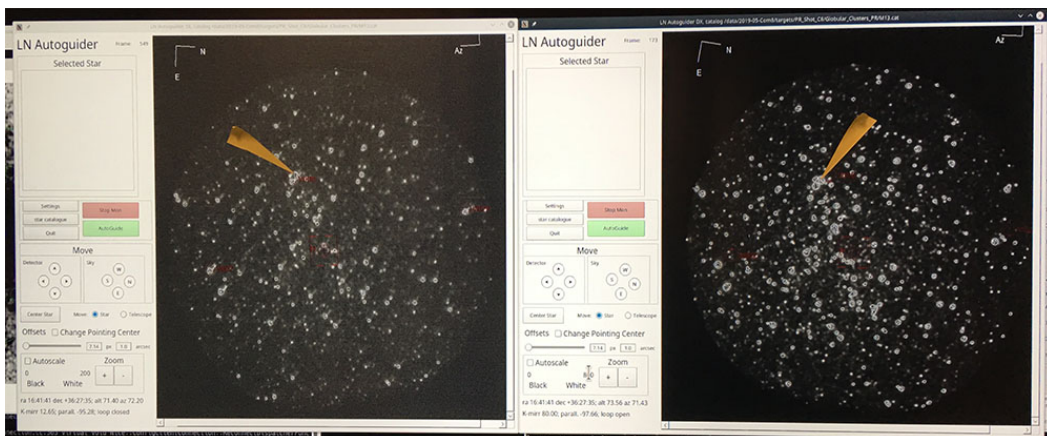
22:54 - We took a bunch of PCam frames (for what it is worth) with Open, GWS, and MCAO

22:55 - Maria is checking the SE alignment by looking at the GWS stars one-by-one. Then, she will attempt to localize the "center" of the IM.

23:00 - Carmelo says that we need something like 9th mag for this test. In the meantime, we are acquiring the field with DX, while keeping SX closed (G20s).

23:18 - We have the field on DX...Maria and Moritz have started collimating.

23:37 - Both fields aligned ! Check out the picture:



23:43 - SX in (low order) closed loop, acquiring DX. We are running out of de-rotator on SX.

00:14 - Issues with GWS DX acquisition - perhaps the dual-sided preset? We decide to go to the bright Vega like star, since it will let us debug. Going to 1754.1+1658. Note: Dual-sided preset!

Acquired field (and fine tuning with paddle) with both sides. Autoguiding simultaneously on both sides!

00:43 - Acquired GWS star on SX as normal. Maria will use 905 Hz to close loop. FS had to restart DX camera...acquiring with DX. The GWS DX CCD is misbehaving.

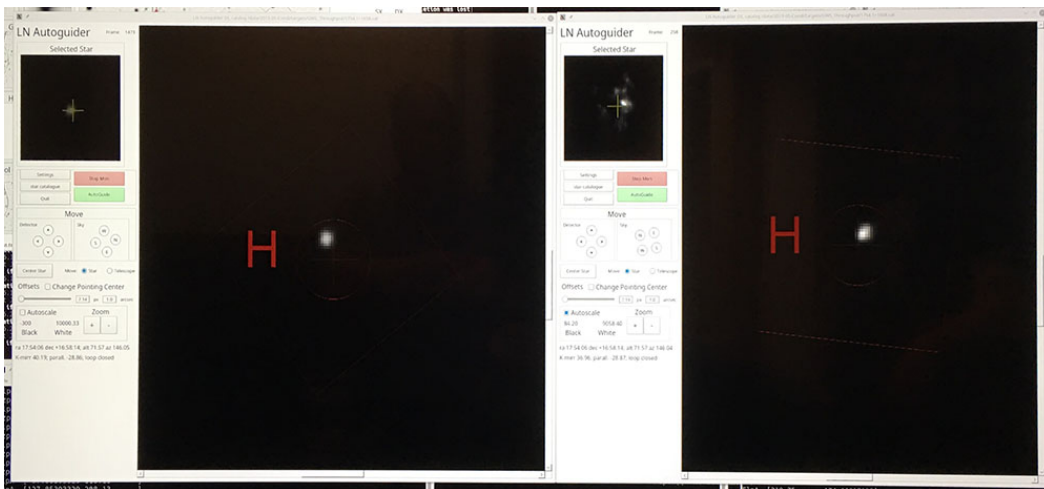
00:55 - SX in closed loop. DX star appears where it should 💡

01:00 - Maria taking SX GWS Throughput data in 0.95 arcsec seeing.

01:14 - We ran out of DX GWS de-rotation...restarted, reacquired. Trying to close the DX loop (SX nice and stable and closed). RecMat service DX not working...

01:17 - Cryostat is at 277K.

01:18 - Maria closes DX loop. Simultaneous ground-layer closed loop SX and DX !!! Look:



01:32 - Maria tried optimizing (we are using the Nov18 reconstructors). Not great. Nevertheless, she is taking throughput data (seeing 0.85).

01:36 - We are unquestionably seeing the signature of vibration / oscillation on DX: two bright end separated by a bridge (dumbbell shape).

Without better knowledge / understanding of the DX reconstructors, we should move on. Going to 1943.2+2317_N6823 for pushing on faint GWS acquisition.

01:49 - The preset hit the target within 4 arcsec. Maria has to collimate, however.

01:55 - Strange shape - an antenna sticking out of the PSF

02:07 - Finally sorted shape. Now going faint.

02:09 - Found V008 (10.83 mag), V020 (11.72)

Seeing 0.77

Working on pushing to faint (GWS and HWS).

GWS: 12.10, 13.10, HWS: 12.84, 13.16, 13.46

3:50 SX AdSec RIP

4:30 - Too bright for HWS 4:35 - Too bright for tweaking DX AdSec w/ Patrol Cam

Summary

- Closed loop with 90 modes and synthetic IM
- Successful test of automatic bias tracking in closed loop (GWS CCD)
- Dual sided pre-set, working with Steve's paddle
- Crowded field acquisition on M13 (confusion)
- Simultaneous field acquisition and autoguiding, SX and DX
- Simultaneous ground-layer closed loop SX and DX 🌟
- Pushed GWS and HWS to fainter magnitudes: GWS: 13.10 HWS: 13.46

Posted: 2019-05-25 02:08 (Updated: 2019-05-25 13:40)

Author: [herbst](#)Categories: [News Com-8](#)[Comments \(1\)](#)

Com-8 Day 4 - 23 May 2019

This morning, the skies are clear and the prospects are good, although the humidity has been pinned at 100% for hours. At noon, the outside temperature was -4 C...on the 23rd of May in Arizona 🌟.

The team is on mixed schedules (some new arrivals, some on night schedule, etc.), so morning startup was somewhat disjoint.

By all indications, the cryostat cool down has been going well. At 12:40, the science detector was at 77.8 K and the pressure was 1.8E-6.

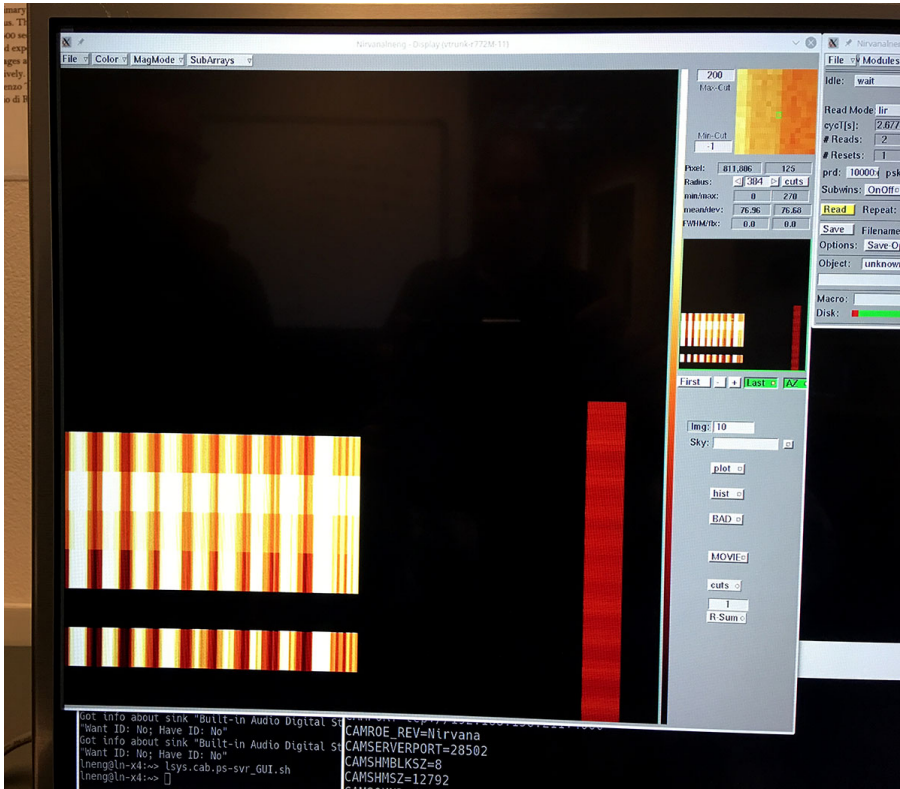
Unfortunately, we still have no internet, and our lives have been made even more difficult by the absence of the 4G connection, which was moved downstairs for some reason. We are simply cut off. Some of us can get one or two bars of ATT service if we stand still in the correct place in the kitchen.

Tom began working with the new version of GEIRS in preparation for trying it on sky. At about 13:30, he let the detector read endlessly, which it did for about an hour.

At ca. 14:30, Tom noticed an odd pattern in the readout. Half the channels were black and half white. He stopped the endless read and began taking frames. Only about 4 or 5 channels in the lower left quadrant showed signal, and one channel in the lower left (see cellphone image below). The remaining channels were all zeroes. After a few stops and starts of the readout, all pixels were zero.

In consultation with Peter, Tom took some frames and then switched to single correlated mode to examine the individual reads. It turns out that all pixels are saturated (65535), not zero.

We cycled the power on the readout electronics three times and rebooted lircs. Same result. We have now (16:00) switched off the ROE and will wait one hour and restart.



17:00 We turned the ROE back on and tried again...nothing. We tried moving the derotator back and forth...also nothing.

Dinner was our traditional "build your own soft taco", which was great. Also at dinner (but not great), we recognized that in addition to all of our other problems (Stirling cooler struggles, detector malfunction, no internet, two extended power failures, snow in late May in Arizona, etc.. etc.), at least two of the team seem to be getting sick (fever). What's next? An asteroid strike?

Nighttime Activities

Just as we were opening the dome, Maria remembered the DX GWS bracket with the f/15 light source. Maria, Tom, Moritz, and AI went up to remove it, and at the same time, did another visual inspection of the IR camera and a wiggle of the cables.

19:50 - We are at a collimation target. Issues with the hatches...now open.

19:55 - Problem with TCS. Cannot go to a bright star

20:00 - We send our own preset...comes in Ok. 1250.1+2316 Bright_C8

20:05 - Astigmatic images: quite extreme. John says that the AdSec cannot do this.

20:10 - Some issues with M1 de-activated actuators...astigmatism

20:17 - Better...tweaking

20:20 - Good. Autoguiding.

20:23 - Starting acquisition

20:30 - Got both stars in 7 minutes! Well done Fabio and Micah!

20:32 - Closing GWS loop

20:35 - 20 Modes.

20:42 - Carmelo reports a number of vibration frequencies, 16 and 25 Hz

20:45 - Working on HWS acquisition script. Seeing 1.3. GWS beautifully stable.

20:50 - Seeing 1.5...seems to be improving

20:55 - s1.2 - Carmelo optimizing GWS. Fabio&Micah some issues w/ HWS acq. Working on it.

21:18 - Seeing variable 0.9-2.0. we have been losing DIMM stars frequently as well. Optimization and commissioning work continues.

21:21 - s1.15

21:26 - CA: We have an ear..

21:39 - Fabio is closing TT on HWS. Adsec Arbitrator failures happening regularly with GWS. CA and MB are investigating. s0.98

21:45 - s0.88 HWS TT closed.

21:47 - H5, but the PCam images may be a little worse.

21:49 - AdSec in panic (same AdSec Arbitrator issue...went into panic when CA tried to recover). s1.15

It is clear that something is affecting the AdSec...Probably the wind. The front anemometer is broken, and the rear is giving low readings. Perhaps the real wind is higher than we think. We decide to go to the next field.

22:14 at 1645.5+3821. 1 GWS already acquired. John Hill estimates that the real wind was in the neighbourhood of 14m/s at the previous target. Got the second one. Also in seven minutes! Great!

22:17 - Seeing variable 1.45 - 1.1.

22:24 - s1.0

22:28 - AdSec rip...

22:32 - s1.0 still recovering from AdSec failure.

22:39 - s1.05 Acquired all stars (only 2 HWS, due to collision for central one). G20.

22:45 - s1.1 Fabio closes TT

23:22 - Struggling with de-correlated TT between Ground and HWS and high winds aloft (Alta: 40 m/s). This causes the frequent offloads. Suggestion is to seek a more symmetric GWS star distribution. Going to 1708.3+0523.

23:42 - James Riedl has arrived, and we have discussed strategy re: IR camera. Fabio has acquired all 3 GWS stars. One is 11.5 mag...optimizing centering. Tom notes that there are continuous significant negative guide offsets in Elevation (ca -0.4 arcsec each time).

23:50 - Micah and Fabio are working on the GWS centering. We are being negatively affected by the continuous drift of the bias of one GWS CCD channel.

LOTS OF STUFF, INCLUDING SOME DEBUGGING ON THE TELESCOPE (re-connecting Mil connectors) while the rest of the team solved a slope upload problem...needed to restart BCU

02:20 - 1759.4+0448 Fabio acquires 3 GWS in 12 min. Great!

02:25 - For the very first time, Carmelo has closed the loop with entirely synthetic interaction matrix! (Thomas: how cool is that?) 10 modes...20 modes...25 modes...30 modes. Very stable. Seeing 1.0 This is producing very nice images on the PCam...

02:30 40 modes GWS...Fabio is trying to close the HWS. Now 50 modes...60 modes 🌟...70 modes (!!)

02:45 - Carmelo did not create synthetic IM's for all angles so he had to stop and revert to the calibrated matrices. With these (and with basically identical seeing conditions), he could only get to 40 modes.

Maria took some PCam frames. Number 0 is open loop (some at the end of the sequence may be bad). Number 1 is closed loop, 70 modes synthetic IM. (Number 2 is closed loop with standard IM and 40 modes but this may not have been saved).

4:08 - Number 2 is open loop on M71. s1.0.

4:50 - We tested that blind pointing works for DX (all the transformations to put targets on the Autoguider). We used 2005.0+3547_N6671. It works !

Summary

Overall, a frustrating day, since we worked so hard to get the cryostat cold, and then we had the detector problem a few hours before starting observing. On the plus side, the GWS acquisitions have been uniformly efficient and effective (around 3-4 minutes

per star). Also, we demonstrated closed loop operation with a purely synthetic interaction matrix for the first time. Carmelo managed to close 70 modes (!!) with the GWS. Immediately thereafter, and with essentially identical seeing, he could close only 40 with our conventional, calibrated IM. That is a real milestone, since it seems to indicate that we don't need extensive (4 day) calibration campaigns. It will also make Thomas insufferably smug. Of course, since we did not have a science channel, we cannot be certain of the relative performance. At the very end of the night, we verified that the blind pointing method works on DX. This was also very important, since there is a long series of transformations needed to make this work.

Postscript

After another discussion with Peter, we decided to initiate warmup of the cryostat. This will allow us to check warm readouts (an important diagnostic), and potentially re-cool in time for Sunday night.

7:42 - Start warmup script

7:45 - Switch off cooler on Level 6

7:52 - Both detectors at 81K - switch on heater.

Posted: 2019-05-23 00:10 (Updated: 2019-05-25 01:50)

Author: [herbst](#)

Categories: [News Com-8](#)

[Comments \(0\)](#)

Com-8 Day 3 - 22 May 2019

Daytime activities

At ~08:50 AM, both Fabio and Moritz turned off the pump. Pressure was 0.015×10^{-3} mBar and immediately start going up after the turn off (0.155×10^{-3} mBar at the time this was posted - 08:57 AM). Cooler temperatures seemingly unaffected - keeps going down (right now temp of Science detector at 256 K). After turning off the pump we removed our locks and the telescope work team began procedures to install the retroreflector on the DX.

At 11:15 am the fiber for the GWS DX calibrations was installed. Fabio and Moritz locked in elevation. Cooling continues. Science detector at 241 K. DX GWS and HWS calibrations begin.

James and Fabio did a quick **very** approximate estimate of the rate of Temperature decrease of the detector unit and compared it with the graph at page 28 of the cooling down procedure document. We estimate that in about 6h, the rate was of only ~5K per hour, while the Figure in the document show a rate of ~16K per hour. Our cooling speed seems to be ~3x lower than what is documented. James is speculating if it could be related to helium pressure or the "venting" event.

The team continued DX calibration with the retro-reflector. Carmelo reports that the synthetic interaction matrix works well for all modes.

The cooler continues to operate, but as noted above, there was a troubling increase in pressure when the pumps were turned off, and the cool-down rate is slower than normal. The internet came back (finally), and Thomas was able to remotely diagnose that the Stirling fan speed was at 3000, not the usual 6000. He adjusted it accordingly, and it appears that the cool rate may be somewhat faster now.

At ca. 14:20, Tom put the cryostat back on the turbo-pump. The initial pressure was ~1E-3, but it went down by a factor of 10 in a few minutes. We believe that there will be a battle going on here between cryo-pumping and the leak. The winner will determine whether we can work this run. Nevertheless, we need to address the leak situation and keep an eye on the pressure, ice buildup, etc.

At 15:00, Mariah, Florian, and Micah arrived. The winds remain high, but the prospects are good for later tonight and the next few days.

15:45 - Tom did a walk-around to check on things. With the turbo-pump and (apparently) faster cooling, the pressure has dropped into the few x E-6 range. Let's hope that cryo-pumping wins. He could not check the Stirling, as the door on Level 4 was locked due to a tour.

At 17:10, Maria, Moritz, and Tom went up to Level 6 to remove the Ocean Optics source and to switch off the pumps. Immediately after the turbo-pump passed ~300Hz (slowing down from 660), the pressure began to rise, stabilizing at a few E-4. The pressure then dropped for perhaps a minute before slowing, stabilizing, and then slowly rising. We will definitely have to keep an eye on this.

Handover was at 17:22, one minute late.

18:00 - The temperature in the cryostat continues to drop and the pressure has stabilized at 1.6E-4. This is higher than normal,

but seems relatively constant. The detector is currently at 170K and dropping 10K per hour.

Dinner was a Fabiolous shrimp and fish creation accompanied by asparagus, broccoli and potatoes.

We monitored the temperature and pressure until ca. 03:00. Both continued to drop in a satisfying and reassuring way. At 23:30 Werner contacted us and said that everything looked nominal. Way to go, cryo-pumping!

Posted: 2019-05-22 17:59 (Updated: 2019-05-23 11:20)

Author: [santos](#)

Categories: [News Com-8](#)
[Comments \(0\)](#)

Com-8 Day 2 - 21 May 2019

Daytime Activities

The team met at 07:00 to begin work. An hour earlier, James had checked on the turbo pump and noted another fault. He restarted and the pressure was $1.3E-3$ when we switched off to go to horizon for various activities, including RR installation. Look at the end of the previous blog post for more info.

At 8:30, we are at horizon for cleaning the MODS field lens and RR installation. The network is back for the moment, although the predicted high winds may take it out again.

I typed in a few paragraphs of subsequent events, but wind knocked out our network and the text apparently is lost. This should not happen with a modern wiki system...

Bullets:

We started cool down following Thomas' checklist. All normal until we opened the valve on the buffer tank for the Stirling cooler.

Before opening, Stirling at 15.8 bar (normal). Gauge near buffer tank 14 bar (a bit low)

After opening, Stirling still at 15.8 bar. Gauge near buffer tank essentially zero

There is apparently a valve (solenoid?) separating the Stirling volume from the buffer tank until needed.

It seems that the buffer tank was empty! Perhaps due to "venting event" reported by James

We will refill the buffer tank and proceed with cool down

11:30 - James is in an OC meeting and cannot escape. Pressure $0.8E-3$ not yet cooling.

Tom & Moritz installed the Ocean Optics source, and Carmelo & Fabio found the spot. Good!

11:30 - Carmelo is tweaking the image quality on the PCam prior to moving to a SE to calibrate.

12:50 - Still waiting for the meeting to end.

13:15 - Complete power failure on site (UPS things seem fine). Lasted about 1-2 minutes before the generator came on.

15:20 - James and Tom refilled the Stirling buffer tank, and all pressures and cooling flow rates seem normal. Unfortunately, we cannot start the cooler. Here are the symptoms:

If you turn on the main power switch to the cooler (the switch on the wall) with the front panel switch at "Off", the cooler will start up when you move the front panel switch to "Remote". It will do this without doing anything on level 6 (i.e. without touching any of the "Cooler On" stuff in B-SX). Weird.

If you move the front panel switch to "Remote" before turning on the wall switch, the system comes up normally, but does not react in any way to the buttons in the B-SX cabinet...it just doesn't start.

In both these cases, the Stirling electronics cabinet switch (on the side of the cabinet) was set to on before beginning.

We are stuck.

Handover was shifted from 17:20 to 16:30 due to several observatory activities. Just before giving up the telescope, Tom and James did a test in which they cycled the power on the B-SX cabinet. The hope was that this would clear up the issue of non-responsiveness of the "Cooler On" button. Unfortunately, there was no change.

Nighttime Activities

At 00:00, James and Tom met to await support from Heidelberg. Starting at 01:20, there were multiple discussions and visits to Level 4 and the telescope chamber. We eventually got the Stirling cooler started at 03:00.

There were 2 residual problems:

1. The remote signal cable from Level 6 was disconnected by Jay to allow removal of the Stirling components for shipment to the Netherlands. The lower right side panel, which hosts this cable, was leaned against the wall with the connectors hidden, and it was not obvious that it was any different than other panels. On re-integration of the repaired unit, this cable was never reconnected.
2. The procedure for resetting the Stirling was also not obvious. We had high hopes of success when we first re-connected the remote cable, but the standard startup procedure did not work. After consultation with Heidelberg, we tried the following (transcribed from an e-mail):

Start condition: power of cooler is on Step 1: reset PLC

Step 2: power off main power (red switch)

Step 3: switch "remote" switch from "remote" to "off"

Step 4: wait 5 sec

Step 5: Switch main power on

Step 6: wait 5 minutes

Step 7: Switch "remote" switch from 'off' to 'remote'

Step 8: on level 6, press 'cooler on' button at interlock unit

This worked, and just after 3:00 AM, we noted with satisfaction that a normal-looking cooldown had started. James then went to bed, leaving Tom to monitor the cooldown until the others wake up.

Tom followed the various temperatures and pressures with Zabbix, going up to Level 4 and 6 every half hour to check that things are Ok (particularly, that we don't get another turbo pump fault). He also looked for error lamps, alarms, ice buildup, etc.

3:30 - All normal on levels 4 and 6

4:05 - All normal Cryostat pressure 2.9E-4

4:35 - All normal pressure 2.1E-4

5:05 - All normal P 1.5E-4

5:25 - Total power failure (see notes below)

6:00 - Power restored

6:15 - LN back online, :45cooling, reasonable values

6:45 - Handover to Fabio. All normal

At 05:25, the power went out again. Since we were already on the backup generation system after yesterday's grid outage, this could be a long one. Tom immediately went upstairs to check on things. The Stirling cooler was off, but the electronics (on UPS) were on and showing the usual "Stand-by remote control" message. On Level 6, the roughing pump and turbo pump were both running. Since they might have been on (rapidly diminishing) UPS power, Tom switched off the pumping.

The power came back at 06:00. Mike Irwin reported that there was a generator glitch, and that this triggered the breaker for the lower floors of the building. The upper floors were not affected (beyond the glitch). Tom restarted the turbo-pump and when he went to B-SX to switch on the cooler, he noted that it was already on. He then checked Level 4, and indeed, the Stirling cooler was running (and still displaying the enigmatic "Stand-by remote control" message). A check of Zabbix in the control room showed that indeed the cooler had restarted by itself after Mike reset the breaker.

After consultation with Thomas, Tom stopped and restarted the software ramp for the detector cooldown, since the ramp and the actual temperature had gotten well out of sync.

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Author: [herbst](#)

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Com-8 Day 1 - 20 May 2019

Hi Guys,

We are having some difficulties. Please read the blog (reproduced below) and advise us what to do.

We will be staying up late awaiting your response.

You can e-mail me or Jame Riedl, or call my cell phone at +49 174 313 5013 (the internet and regular telephones are dead...we are relying on the Verizon 4G repeater for outside communication).

Thanks, Tom

Blog post follows:

The first four members of the Com-8 team, Carmelo, Fabio, Moritz, and Tom, arrived at the summit at ~13:30. The weather conditions for unloading were terrible: high wind, blowing snow, and low temperatures.

While the others stowed the groceries, Tom discussed the progress and status of the Stirling cooler with James Riedl. Later in the day (ca. 17:00), James, Tom, and Moritz locked out the telescope in both Elevation and Azimuth and started pumping the cryostat.

NOTE: The pressure at startup was $\sim 1E-1$, whereas a week before, James had left it at $\sim 3E-3$. This amount of pressure rise seems high, so we will await advice from Werner and Peter before proceeding with the cooldown (we are still pumping, however).

We are also hampered by the lack of telephone and internet...high winds have apparently dislodged the microwave antenna, and our only link to the outside world is through the Verizon 4G repeater. We have heard that the comms company will address this tomorrow morning, but the prediction of continued high winds for the next four days is making us nervous (they will need a cherry picker to re-align it, and this is incompatible with high winds).

In fact, we need some online data to do our DX calibrations, which we hoped to begin tomorrow morning. Carmelo recognized the problem and went down with Bonnie at 15:00 so that he could reconstruct and generate the needed info from Safford before coming up with the day crew tomorrow. As a result, there will be only three Com-8 team members on the summit overnight.

At about 18:00, we decided to do a quick operational check of LN systems (all the motors, etc.). To do this Tom and Moritz brought LN out of hibernation.

NOTE: The siren for the C-SX cabinet went off when we switched on. None of the others were triggered. As a precaution, we checked the glycol flow rates and they were:

```

on DX:
ccd:          1.0
ROE NIRCS:    0.2
CABINET F:    3.5
CABINET C:    3.0
CABINET B:    1.0

on SX:
ccd:          1.0
ROE NIRCS:    0.2
CABINET F:    3.0
CABINET C:    2.0
CABINET B:    2.7

```

Note that we had significant difficulty reading these values. The gauges are far less than ideal in this respect. Also, I could not easily find the correct target values on Trac. I suggest a "How-to" on adjusting the coolant flow (with reference values).

We were concerned about potential overheating during the operational tests, and it was impossible to access Zabbix (I think we need to have access to both the wider internet and the LN network for this, and this is impossible with the Verizon repeater). We therefore opened the cabinet doors for the duration of the testing (ca. 20 min) and Tom did not notice any obvious warmth when he opened the cabinets (B-DX was perhaps very slightly warmer, but this cabinet was never fully asleep).

At 19:00, Fabio declared the tests complete and Tom went up to Level 6 to re-hibernate LN and close the cabinet doors.

NOTE: When switching the B-DX cabinet to hibernate (basically putting the Exchanger fan to Off and the Cabinet fan to hand), an alarm which was apparently internal to the cabinet went off for a few seconds. It sounded like an old-style touch-tone telephone sound. There were no obvious other warnings or indications. After 10 minutes of thought, Tom decided to double check all of modules in B-DX. He discovered that the turbo pump had shut off showing "309: Act rotspd 0 Hz * **Error E075**"

Checking the Pfeiffer website (product TCM 1601) indicates that this error is:

"Radial bearing current Y different" (not very helpful or informative)

We were unable to restart the turbo pump or indeed change screens in the display. It appears frozen. Note also that in the ~15 minutes of this event, the pressure rose from 9.4 to 9.9E-3.

We need guidance on how to proceed.

After discussion with the team in Heidelberg, we decided to switch off the turbo pump controller and then switch it back on again (we were assured that this would not open any valves). We pressed the F3-Unit Off button to switch off.

Note: You must press and hold F3-Unit Off until the display goes dark. A brief press (as for the other buttons) will not work!

After a few seconds, we pressed the "Unit On" button (below the display on the left), and it came back to life without an error. The turbo pump spun up to about 90% but no further. We then noticed that the display said Valve: Closed and that the roughing pump had switched off.

Pressing "F1 - Pumps On" started the roughing pump. We heard the "clack" of the valve, and then the turbo spun up to 100% and the pressure started dropping again.

We also pushed the valve in firmly on the interface volume between the cryostat and He lines. James detected no movement or change.

Finally, we adjusted the glycol flow rates according to Ticket 1420, Comment 9.

At ~2:00 AM, James went up to check and noted that there had been another turbo fault. This time, it is error 089 (Rotor vibrations). He restarted the turbo pump as before, noting that the pressure was 6.8 E-3 during the fault and was 3 E-3 with the turbo running again.

After a final discussion with Heidelberg, Tom and James went to bed at ca. 2:30 AM.

Note added next day: At 6:00 AM, James noted that the turbo pump was in fault mode again. This time, the error was again 089 (Rotor vibrations) and the pressure was 1.0E-2. He restarted the pump, and it ran fine until ca. 8:15, when Tom and James went up to Level 6 to wake LN from hibernation and turn off the pump (we needed to go to horizon for the RR, among other things). The pressure was 1.3E-3 when we switched off.

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Author: [herbst](#)

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