AstraLux Checklist: Extended Version

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Updated after integration of Pleione and Asterope in a new single windows PC “Pleione” on February 2017.
Updated after the introduction of the xt22 Windows computer in the 2.2 SOR (M. Azzaro & A. Guijarro) on August 2021.

1 Afternoon Tasks

• Check that the raw data has been copied from apipe computer to your harddisk correctly.
Copy also the pipeline output files:

- cd /disk-a/ASTRALUX
- cp -rv AstraLux_output /media/<yourdiskname>/<yourpath>
- cp -rv AstraLux_header /media/<yourdiskname>/<yourpath>
- cp -rv AstraLux_calib /media/<yourdiskname>/<yourpath>

Instead of copying to an external harddisk you can also create your own directory under /disk-a/ASTRALUX, but do not forget to move the data from the pipeline machine at some point! Alternatively you may transfer the output data (typically <1 GB) per night via network to your laptop. Use secure FTP (sftp) for this purpose, logging in as astraobs@apipe

• Prepare next harddisk for raw data storage so you don’t have to do this in the morning.

- A hard-disk can be connected to a USB port of the machine xt22, in the 2.2m observing room.
- The copy can be launched at the end of the night from xt22, no need anymore to physically go to the telescope.
- Data are copied via a Windows program called MobaXterm. This is running all the time (whenever a window is opened, e.g. a Ultra3 terminal, that program is launched), so you should search among the minimized windows (check also “show hidden icons”) and get the MobaXterm window up as a first step. If you place the cursor on an icon and wait, it will tell you what it is.

- Once you have the MobaXterm window up, see the manual: “Archivos desde Apipe a USB externo”.

• Stop pipeline, clean pipeline and raw data directories on the pipeline machine apipe and on the Windows machine pleione. Make really sure that you have copied / saved all data! Restart pipeline.

- As user astraobs on apipe, execute kill_astralux at the shell prompt.
- In the Remote Desktop Window pleione, open Windows Explorer window (’My Computer’ icon. Go the drive S:\ and into the directory EMCCD1\AstraLux input. Delete all files you find there, and don’t forget to empty the Window trash bin afterwards!
- As user astraobs on apipe, clean the pipeline directories:
  - cd /disk-a/ASTRALUX
  - rm AstraLux output/*
  - rm AstraLux calib/*
  - rm AstraLux header/*
  - cd /disk-b/ASTRALUX
  - rm AstraLux input/*
- As user astraobs on apipe, execute start_remote_astralux at the shell prompt.

• Check for sufficient harddisk space on pipeline machine and Windows machine pleione.

- The drive S:\ should not be used for storage purposes! By clearing it in the previous step everything should be fine.
- As astraobs on apipe, type df -h at the shell prompt. You need at least 500 GB free space on /disk-b, 20 GB on /disk-a and 5 GB on the root partition.

• If you changed any filters, edit the filter list of the filter wheel GUI accordingly.

- On the Windows camera machine pleione, open the file C:\Astralux\iafilters.txt by double clicking on it in the Windows Explorer.

- This file contains the filter names for position A to H, one per line. Edit accordingly and be sure to press enter after the last line before saving.
- Close and restart the filter wheel GUI.

2 Evening Startup

• On xt22 in the control room, set up the remote connection to the camera, the telescope tools, and the pipeline. If still running, you should restart the pipeline and receiver, otherwise newly arriving files may not be processed! If this is not your fist night, most of it will probably already be running. However, here is the full startup sequence if you have to start from scratch:

- Awake xt22 (the dual-screen windows PC in the SOR).
- Click on the “Pleione” icon for remote connection. This opens the remote desktop connection to the Windows machine “pleione” in the dome. It automatically logs in as user (pw: astraLux).
- Start the filter-wheel GUI via the icon named “FILTER”. A log window and the actual control window (you will recognize it, it is the one with large, friendly buttons) pop up. Place the control GUI at the right side of the desktop.
- Start the camera software via the icon named “CAMERA”. A splash screen will appear for up to 15 seconds, then you should see the camera control software window. Resize it so that it fills the part of the desktop not occupied by the filter GUI (do not care about the filter log window, you will not need to see it).
- NEVER EVER START ANY OTHER SOFTWARE ON THE WINDOWS MACHINES DURING OBSERVATIONS!. Of course, during daytime you can do what you want, but: the real-time display and data transfer during observations need quite some resources, and any other software can heavily interfere. Don’t complain if your acquisition crashes because you started “just” the Windows explorer...
- Open a terminal window to ultra3 as obs22 with the proper icon.
- (Re)start the telescope command server with start_teleserver. Some output will appear, but the command line will not be blocked.
- Start the “paddle”, i.e. the GUI for fine-positioning the telescope with the icon “raqueta” on xt22.
- Start the dome control GUI with the proper icon: start_domec &

- Start the flat-field lamp GUI with the proper icon: ffl &
- Open a new remote session (as astraobs) to the machine apipe with the proper icon: apipe (ASTRAOBS)
- Start the whole holy suite of IDL programs with just one command: "start_remote_astralux". Simple, isn't it? Fill the remaining free desktop space of the right screen, and almost completely clutter the right screen. The free space left of the webcam window "CAHA NETEYES" is reserved for the dome control, move this window there so that you can see the red/green status display during the observations.

• Set CCD temperature to –75◦C. Wait until this value has been reached before starting any acquisitions. Will take <10 min.

- In the camera software, select Hardware -> Temperature.
- Switch Cooler to 'On', set temperature to –75◦C.
- Close cooler control window.

• Proceed with normal telescope and dome startup sequence while the camera cools down:

- Open the dome.
- Switch on the hydraulics first, then the telescope drives in the dome control software.
- Press 'Startup' in the telescope control software.
- Switch on 'Tracking', set the dome to 'Auto'.

• If possible: get sky-flats for all filters you intend to use. Otherwise get dome flats. Use the Flat-field configuration of the CCD.

- Load flat-field configuration: In the camera software, select File -> Configuration Files -> Load, choose Flatfield.cfg.
- Check that the CCD shutter is open (right most icon).
- Change to the SDSS z' filter.
- Start live display (video camera icon). Adjust exposure time until you get ≈ 5000 counts (remote control icon).
- Close shutter – you will need a dark frame first.
- In the acquisition setup (wrench icon), set the number of desired frames ('Kinetic series length') to 50.

- Set the name for the dark/bias acquisition in the spooling tab. Name it Sky_SDSSz_Flat_Bias (or Dome_SDSSz_Flat_Bias). While you can change Sky to something else if you want, **the rest of the filename is mandatory to allow correct pipeline processing**.
- Start acquisition (photocamera icon), this will now produce the master-dark for your flat-field.
- Open shutter.
- In the acquisition setup, remove the suffix Bias from the file name.
- Start acquisition. Now the pipeline will produce a master-flat if you did everything right.
- Change to the SDSS i' filter, repeat sequence, including the acquisition of a new dark cube.
  So do not forget to change the file names accordingly by replacing SDSSi with SDSSz.

• Load the Lucky Imaging configuration (LuckyImaging.cfg) afterwards, check that CCD shutter is open.
• Find focus or use focotel command from ultra3.

- Set telescope to an initial focus position according to this formula:

$$\text{Focus[mm]} = 23.31 - 0.09 \cdot \text{TDome}$$

- Here TDome is the dome temperature displayed by the Meteo Monitor. The above formula is valid for the SDSS filters.
- Point telescope to a star of 5–8 mag. Use the SDSS z' filter.
- Set electron gain to a medium value (e.g. 200).
- Start camera live display.
- Find object. Depending on the position on the sky, the pointing may be off by few 10 arcseconds. Use the paddle application on the left screen to apply offsets of ± 50"in RA and Dec, use the coordinate difference display of the telescope control to do that systematically.
- Adjust electron gain so that the greyscale cuts of the live display peak at ≈ 7000 ADU.
- Apply focus steps of ± 0.1 mm to find a rough focus, then use ± 0.05 and ± 0.025 to find the final best focus. If you are a first-time user of AstraLux, practice that! You will see that your own eyes are pretty good in determining the best focus position. Under bad seeing conditions

(>1”), you will probably not be able to see significant differences for steps smaller than 0.05mm, but this is alright. The atmospheric (de)focus term will be larger than the telescope defocus anyway.
  - If you use other filters than SDSS i’ and z’: do not forget to refocus!

3 Morning Shutdown

• Perform normal telescope, auto-guider, and dome shutdown.
  - Type quit in the auto-guider shell.
  - Press Shutdown in the telescope software.
  - When the telescope has stopped, switch off drives first, then hydraulics in the dome control software

• Set CCD cooler temperature to 0◦C. Do not switch off cooler.
  - Select Hardware -> Temperature in the camera software, set temperature to 0◦C, but leave ’Cooler’ at ’On’.

• Start copying the raw data directory to your external harddisk as user astraobs on apipe:
  - cd /disk-b/ASTRALUX
  - cp -rv AstraLux input /media/<yourdiskname>/<yourpath>

• Close unnecessary windows on the xt22 terminal! Do not leave e.g. a Firefox open!

4 Ending your observing run

• Check that you have copied all the data you need! There is no guarantee that backups will be kept on the mountain!