

# AstraLux Checklist: Extended Version (five pages)

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## 1 Afternoon Tasks

- Check that the raw data has been copied to your harddisk correctly.

Copy 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.
  - Go (physically) to the pipeline machine `apipe` on the first floor of the dome building.
  - Log in locally (left screen/keyboard) as `astraobs` if not already / still logged in.
  - Click once on the 'My Computer' icon. A window should open up showing you all connected physical, logical, and network drives on the right side. External USB harddisks will appear at the end of this list.
  - If you want to unmount a disk, open the popup menu by clicking once with the right mouse button on the drive name in this list. Select 'Safely remove'.
  - Check in a terminal window with `df -h` that this disk does really not appear anymore in the drive list.
  - Disconnect disk.
  - Connect new disk. If you are prompted for any actions like executing an autorun file found on your drive, select always 'No' or 'Cancel'.
  - The drive should now be listed in the 'My Computer' window. If you do a `df -h` in a terminal, the full mount path (usually starting with `/media/` should appear at the end of the list.
- 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 (the camera window), minimise the camera screen (pinned window bar at the top of the screen, left icon). This should bring you back to the desktop of the first Windows machine, `pleione`. You'll see that you are on the right desktop if there is the icon for the connection to `asterope` and no icons for camera or filter wheel software.
  - Open a Windows explorer window ('My Computer' icon. Go the drive `S:\` and into the directory `AstraLux_input`. Delete all files you find there, and don't forget to empty the Window trash bin afterwards!

- As user `astraoobs` 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 `astraoobs` on `apipe`, execute `start_astralux` at the shell prompt.
- Check for sufficient hddisk 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 `astraoobs` 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 `asterope`, open the file `C:\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 first night, most of it will probably already be running. However, here is the full startup sequence if you have to start from scratch:
  - Log in locally at `xt22` (the dual-head system in the SOR) with the `obs2b` account
  - On the **left** screen:
    - \* Click on the blue screen symbol in the menu bar – it is the one named “Pleione (AstraLux)”. This opens the remote desktop connection to the Windows machine “pleione” in the dome. Log in as user. Place the remote desktop window in the upper left part of the screen.
    - \* On the remote desktop of `pleione`, double-click the icon named “ASTEROPE”. This opens again a remote desktop connection, this time to the camera control computer at the mirror cell. Again log in as user.
    - \* On the desktop of `asterope`, start the filter-wheel GUI via the icon named “FILTER”. A log window and the actual control window (you will recognise it, it is the one with large, friendly buttons) pop up. Place the control GUI at the right side of `asterope`’s 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. Log in to ultra3 as obs22 with:

```
ssh -X obs22@ultra3
```

- \* (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:

```
/disk-a/staff/CONTROL_PADDLE22/start_raqueta22 &
```

Move the appearing GUI into the upper right corner of the screen. Minimise the terminal window.

– On the **right** screen:

- \* Open a terminal window, log in again to ultra3 as obs22:

```
ssh -X obs22@ultra3
```

- \* Start the dome control GUI:

```
start_domec &
```

- \* Start the flat-field lamp GUI:

```
ffl &
```

- \* Open a new tab in this terminal window (icon in the lower left corner), log in to the AstraLux pipeline machine `apipe` as `astraobs`:

```
ssh -X astraobs@apipe
```

- \* Start the whole holy suite of IDL programs with just one command:

```
start_astralux
```

Simple, isn't it? This should now magically fill the remaining free desktop space of the left 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  $-75^{\circ}\text{C}$ . Wait until this value has been reached before starting any acquisitions. Will take  $<10$  min.

- In the camera software, select Hardware  $\rightarrow$  Temperature.

- Switch Cooler to 'On', set temperature to  $-75^{\circ}\text{C}$ .

- Close cooler control window.

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

- Open dome.

- Switch on hydraulics first, then telescope drives in the dome control software.

- Press 'Startup' in the telescope control software.

- Switch on 'Tracking', set 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  $\rightarrow$  Configuration Files  $\rightarrow$  Load, choose `Flatfield.cfg`.

- Check that the CCD shutter is open.

- Change to the SDSS  $z'$  filter.
- Start live display. Adjust exposure time until you get  $\approx 5000$  counts.
- Close shutter – you will need a dark frame first.
- In the acquisition setup, set the number of desired frames ('Kinetic series length') to 50.
- Set the spool-file name for the dark/bias acquisition. Name it Sky\_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, this will now produce the master-dark for your flat-field.
- Open shutter.
- In the acquisition setup, remove the suffix `_Bias` from the spool-file name.
- Start acquisition. Now the pipeline will produce a master-flat if you did anything right.
- Change to the SDSS  $i'$  filter, repeat sequence, including the acquisition of a new dark cube. So not forget to change the filenames accordingly by replacing SDSSi with SDSSz.
- Load load the Lucky Imaging configuration (`LuckyImaging.cfg`) afterwards, check that CCD shutter is open.
- Find focus.
  - Set telescope to an initial focus position according to this formula:

$$\text{alrightFocus}[mm] = 23.31 - 0.09 \cdot T_{Dome} \quad (1)$$

Here  $T_{Dome}$  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  $\pm 50''$  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  $\approx 7000$  ADU.
- Apply focus steps of  $\pm 0.1$  mm to find a rough focus, then use  $\pm 0.05$  and  $\pm 0.025$  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 0.05 mm, 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 hddisk 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!