Instructions to observe in the 1.23m with the ==ASI461== camera

(AG Oct 2023 updated/translated VP and GB April 2024)

CLOSING WEATHER: https://www.caha.es/observing-mainmenu-148/weatherng
1.2 Small dome in the weather page is red or have crossed
98% Humidity,   Wind 18 m/s

If connecting from outside CAHA, wrigel19.caha.es must be used with individual USER of each observer.

For on site observations: switch on the PC (double monitor PC) in the library. User: bibuser, pass: ********

- **CAMERA SETUP**

On the bibuser PC double click on the icon "cmos1.caha.es" (if the icon is not there, use a Remote Desktop) User: obs12, pass: ********

Open sharpCap (there are several capture programs, this is just an example)

- o Choose the Cameras —> ZWO ASI461MMPro
- o Open the Camera Controls Panel and below is the Thermal Controls: turn it ON and then lower the temperature in steps of 5-10 degrees until reaching a value of 30-35 degrees less than the ambient temperature (if it is 15ºC, set -15ºC). The important thing in this camera is that the power is no more than 90% for a long time.
- o To select the directory where the files will be saved:
   file —> sharpcap settings —> filenames folders option (the Z: disk is mounted in the ftp so if this option is selected, the files can be downloaded from ftp.
- o Type the path to the folder in the field "Save captured files to:" Set the observer name: file —> sharpcap settings —>Saving
- o To save the files path and observer name click Apply
- o On the right side Camera Controls Panel:
   Capture profiles: can be left blank. It is useful in case you want to record the configuration decided with some parameters and load it later quickly by loading the corresponding file.
- o Capture format and area:
   Color Space: MONO 16
   Capture area: 11656x8750 pixels (~15.3x11.5 arcmin)
   Binning: 4 is a good value.
   Output format: FITS
- o Camera controls:
   Exposure (set exposure time in s)
   Quick Picks: By default it is blank and "Auto" is not checked.
   Gain: 200 is a good value for long exposures. (100 unity gain)
   Frame Rate Limit: Maximum (can be left as is).
   Flip: None (it's fine like this)
   Turbo USB: 100 (it can be left like this. It helps to avoid downtime between

images, but for long exposures there is no problem).
High Speed Mode: ON
Hardware binning: OFF
Exposure/Gain Shift: 0.00
- o Image controls:
Brightness: 50 (that value is fine)
Timestamp frames: OFF (for FITS files it can be left like this)

- **TELESCOPE SETUP**

On the bibuser PC double click on the icon "wastro12 8 bit" (if the icon is not there, use a Remote Desktop) User: observer, pass: ********

- o Double click on the desktop icon "tecs12([TECS])" MobaXterm (User: tecs, pass: ********)
- o A terminal window pops up, on it type "start"
- o A small GUI pops up, where press "start gui" (when it becomes green) If the "start gui" is not green or does not work according to expectations, you will have to restart tecs by pressing "start tecs" (it takes some time...)
- o The telescope GUI appears.
- o In the TCS gui press Observe and make a test that the telescope moves:
  - ▪ Click on Hydraulics and wait until they turn green
  - ▪ Click on Drives and wait until they turn green
  - ▪ Start Tracking -at this point the RA Dec values should stay constant.
  - ▪ Open the dome: Dome -> open slit
  - ▪ Set Dome Auto
  - ▪ Note, the mirror petals are blocked in an open position
- o Check if the focus value is close to 55.4. This focus value corresponds to a measurement taken at 13ºC in *R* band. If the focus value is far away (more than 2) from 55.4 then set this value in the Settings -> FOCUS

- **FILTERWHEEL**
  - o On wastro 12 PC double-click on the desktop icon "ULTRA2" MobaXterm (User: obs12, pass: ********)
  - o A terminal window pops up, on it type "ia123" and you get the filter GUI.
                                        NEVER CLOSE IT!!!!!!

- **FLAT FIELD LAMP GUI** ---optional
  - o On wastro 12 PC double-click on the desktop icon "ULTRA2" MobaXterm (User: obs12, pass: ********)
  - o A terminal window pops up, on it type "ffl" and you get the Flat field lamp GUI.

- **AUTOGUIDER** ---optional
  - On the wastro12 PC double click on the icon "ag12" (user ag, passw ********)
  - The AG control window pops up.
  - Click on the AutoGuider icon
  - Choose your telescope ->OK
  - Open from the View menu the Full Frame, Stages, Console, Plots
  - DO NOT USE THE AG OUTSIDE THE VALUES -100 or 100 or otherwise you will vignette the detector.

- **WEBCAMS**
  - https://neteye.caha.es/T12 con user o12, passwd ****

- **CALIBRATION IMAGES**
  - Take bias frames
    - Set "Dark/BLANK" filter from the ia123 gui by right click on the "filter-select"
    - In SharpCap select Imaging mode "BIAS"
    - Set target name: "bias"
    - Set exp time 0s
    - Make sure it is dark in the dome
    - Start exposure by using the Start Capture button where one can select the number of repetitions
  - Flat fields <mark>only if someone is supporting the observation from on site</mark>:
    - Move telescope to flat field position no lower than EL 20
    - Move the dome on a way that it will be flat section visible for the telescope
    - Turn on ffl
    - Choose the correct filter both in ia123 and the SHARPCAP simulator
    - Check the exposure time using "Live View" mode in which the images won't be saved to the disk. Stop "Live View" when the correct exposure was reached
    - Take flat images (set exp time, target name and imaging mode)
  - Take darks
    - In case the exposure time for the observations is known the darks can be taken otherwise they need to be taken in the morning with the same exposure time as the science frames
    - Follow steps used for taking bias frames but in SharpCap select Imaging mode "DARKS"
  - Images can be taken also by using the Quick Capture mode which continuously takes images until stop capture.

- **ADD TAGETS TO CATALOGUE**
  - Double-click on the "tecs12([TECS])" MobaXterm (User: tecs, pass: ********)
  - Navigate to cd /disk-a/tecs/CATALOGUE
  - Create a new catalogue file "emacs catalogue_name.cat"
  - Paste your formatted target list there:
    #Header_Object_name | RA | Dec | eq. | Comment
    M81 | 09:55:33.1 | +69:03:55 | 2000.0 | Whatever
  - SAVE modifications
  - In TCS GUI : Abs. Pos -> Select catalogue-> Choose your catalogue->Apply -> Window shows up with your targets and coordinates

- **START DATA TRANSFER:**
  - Start FileZilla application on cmos1 PC
  - Choose the folder where the files are located
  - Log in to the ftp server :
    - Server: ftp.caha .es
    - User: remote;
    - Pass: ********)
  - Right click on the folder where the files are and press "Subir"

AFTER SUNSET

- TAKE SKY FLATS
  - Point to a blank field: www.caha.es/pedraz/SSS/blankfields.txt Choose one of the fields above alt 60
  - Move to object: in TCS GUI: Abs.Position-> enter blank field Coordinates (space separated RA Dec values and Epoch: 2000)
  - Set filter in the ia123 GUI
  - Set filter in the SHARPCAP simulator
  - Start Live View to decide the exposure time
  - Start Capture to take one image of the desire exposure time
  - Increase the exposure time (approx 1.5 multiplier after sunset)
  - Take another image and repeat
- SET TELESCOPE FOCUS
  - Point to a bright start
  - Set exposure time no longer than 30s
  - SHARPCAP : start LIVE View   exposure
  - SHARPCAP: Tools —> Focus assistant —> FWHM measurement (move the star in the box)
  - Adjust focus value from TCS -> Settings -> focus, recommended highest step size 0.1
    - 🥚 Increase Focus
    - 🥚 Decrease focus
- TAKE SCIENCE IMAGE
  - Point to the object:

- If you use TCS catalogue than double click on the target name -> EXEC
- Abs.Position-> enter Coordinates (space separated RA Dec values and Epoch: 2000)
- Dithering can be done by using the Dif. Pos window->Clear -> Set the desired "Differential Positioning" -> Press the Arrows (In the RA Dec windows it will be shown the direction the telescope moved and by how much)
  - Set filter in the ia123 GUI
  - Set filter in the SHARPCAP Simulator (the filter chosen here will be displayed in a fits header)
  - Set target name
  - Set Exposure time
  - Different modes to take exposure
    - Start Capture = Snapshot for an image (series can also be taken)
    - "Quick capture" takes images until "Stop Capture"
    - "Live View" is an unsaved image, it just shows it.

END OF NIGHT

- **Set the CCD temperature to 0°C (preferably as high as it was in the afternoon), but in steps of about 10 degrees. Turn the COOLER OFF.**
- When the set temperature is achieved, close the camera GUI.
- Turn off Drives
- Turn off Hydraulics
- Close dome slit
- Put TCS in Idle
- Quit ia123 GUI
- Quit ffl GUI
- Mak sure all your files are on the FTP server

CHARACTERISTICS:

- 11656x8750 pixels of 3.76 microns, with a field of 15.3 x 11.5 arcmin (they are 44x33 mm and 100Mpx), it barely vignets in the corners with 50 mm filters.
- Using 4x4 binning, a "superpixel" then corresponds to 0.315"7px above the sky .
- can take 50 fps