INSTITUTO DE ASTROFISICA DE CANARIAS

GREGOR: GRIS Observing Manual

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1. Introduction

GRIS has gone through different upgrades in the last years. It is now the combination of TIP-II and the spectrograph.
This manual is intended to help the observer using GRIS in the two most frequent instrument modes: simple spectroscopy and spectro-polarimetry. A new Integral Field Unit (IFU) has been commissioned for GRIS in 2018. Its operation is also described in this manual.
Table 1 shows the IFU upgrades respect to the single slit. Figure 1 shows the single slit field of view (FOV) with the slit-scan unit and the IFU with the FOV-scan system. The red box represents the area covered by the image slicer (the main component of the IFU). The maximum FOV for the IFU is 60" times 60", although smaller FOV is recommended for better operation.

	New
GRIS with the slit	**GRIS with the IFU (image-slicer)**
Slit: Slice length: < 64 arcsec Slice width: 0.26 arcsec	Number of slices: 8 Slice width: 0.375 arcsec (100 µm) Total field of view: 6 arcsec × 3 arcsec
Slit Scan Moves in one direction Maximum field of view: 64 arcsec × 60 arcsec	2D Field of view Scan Moves in 2 directions. Maximum field of view: 60 arcsec × 60 arcsec
Double sampling mode: half slit width	Double sampling mode: half slice width (50 µm). See Figure 1
Pixel scale: 0.13 arcsec	Same
Slit-jaw camera	Same
Spectropolarimetric modes	Same
Detector: 1k × 1k	Same
Wavelength: 1 – 1.7 µm	Same
Wavelength range examples:	
18 Å at 10830 Å	Same
40 Å at 15650 Å	Same
Full Well: 16000 ADU (1 accumulation)	Same

Table 1: Specifications of the IFU, compared to the slit.

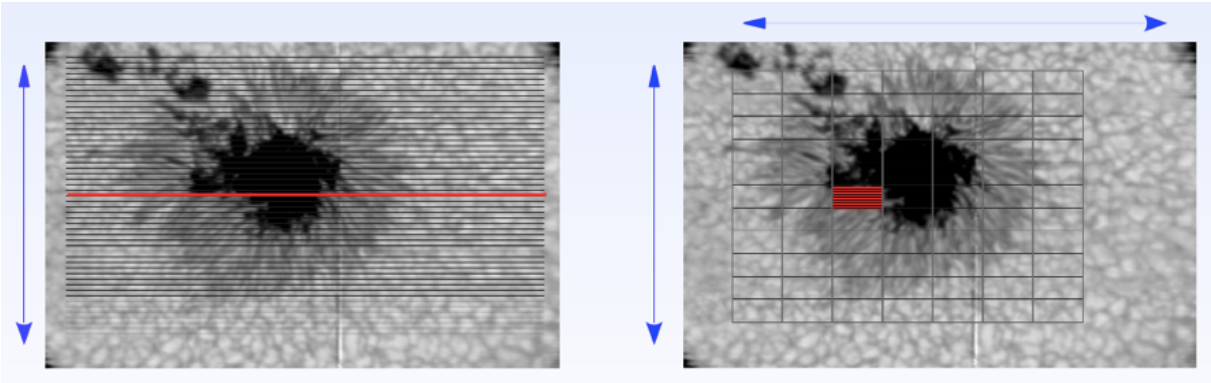


Figure 1: Slit scan (left) compared to the 2D FOV-Scan (right). The image-slicer is represented by the red rectangle.

2. Setup

GRIS has six setups:

1. Single slit spectroscopy
2. Single slit spectro-polarimetry at 10830 Å
3. Single slit spectro-polarimetry at 15650 Å
4. IFU spectroscopy
5. IFU spectro-polarimetry at 10830 Å
6. IFU spectro-polarimetry at 15650 Å

The polarimeter can also work at other wavelength ranges.
The change from simple spectroscopic to spectro-polarimetric mode can be done by the observer (with help from the telescope assistant) in a couple of minutes and requires moving the polarimeter manually and a change in the POLAR program. See the Appendix.
The other setups cannot work simultaneously and the change from one to another has to be done by the GRIS team. The setup changes require recalibration and can take a couple of hours for changing the wavelength and one day for changing from single slit to IFU or the opposite.

3. GRIS control programs

The control programs for GRIS are:

- POLAR .- Controls the detector and the observing modes: scan, flatfield, calibration, etc. It runs on the PC called Ulises4.
- POLEA .- Controls the polarimetric calibration unit. It runs on the PC called Ulises3. Most observers do not need it.
- PEGASO .- Controls the spectrograph mirrors, focus and grating angle. It runs on the PC called Ulises3.

Starting the programs
Start TigerVNC at the observer's computer. The IP address is 161.72.22.41:3. Ask the telescope assistant for the password (it is written on the whiteboard or in the checklist document). TigerVNC will open the GRIS window that runs on the PC Ulises4.
If POLEA, PEGASO or POLAR are not running in the GRIS window start them in the following manner:
Look for the terminal connected to Ulises3. If it is not open, execute `ssh -l tip ulises3`
In the terminal connected to Ulises3 run `polea &` and `pegaso &`
In another terminal, connected to Ulises4, in the directory `/scratch/tip/` create a directory with the date (`YYYYMMDD`) and create a subdirectory called `level0`
Important ! Be sure that the Telescope control system is runing, the AO GUI (specific for GRIS) is open and inside the AO Run menu and that the specific derotator GUI (specific for GRIS) is open, before starting POLAR.
Move into `level0` and run `polar` (do not use the `&`)
In case that the `scratch` disk is full move to `scratch1`

4. Log file

In order to properly identify the observation files, a text log file MUST be created and called `YYYYMMDD.txt` in the directory you have created (`/scratch/tip/YYYYMMDD/`) with annotations about the setup and any other information that can help to analyse the data: nonstandard setup, clouds, errors, etc.
The `YYYYMMDD.txt` file has to be similar to the sample file found in
`/scratch/tip/examples/20160819.txt`
The format of the file is not required to be identical. Refeer also to the document Manual for the GRIS archive (`http://archive.leibniz-kis.de/pub/gris/readme/archive_manual.pdf`).

5. Single slit mode

The long slit is mounted in the old slit-scan unit. The slitscanner GUI needs to be running prior to running POLAR. It can be started in the instrument control system. This GUI can also be used to move the slit manually. POLAR takes the control while doing the scan.
The POLAR window is shown in Figure 2.

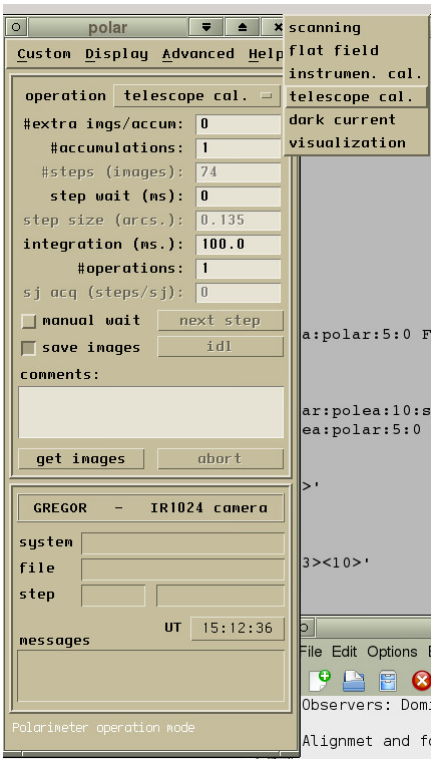


Figure 2: POLAR main window with the parameters for a calibration and the `operation` submenu (right).

The main commands in the POLAR window are:

- operation : submenu with the available observing modes:
  - scanning : science observing mode.
  - flat field : to get flat field calibration data.
  - instrument cal.: not used.
  - telescope cal.: to get polarimetric calibration data.
  - dark current : not used.
  - visualization : to take an image without saving images. No scan is done. It has the option to open the image in IDL for a preview.
- # extraimg/accum : number of extra images. Normally set to 0.
- # accumulations : number of images to be accumulated.
- # scanning steps : number of scanning steps.

- step wait (ms) : waiting time between steps. Normally set to 0.
- step size (arcs.) : size of the scanning steps. Set to 0.135 for the single slit in double sampling mode.
- integration (ms) : Integration time for each accumulation. Normally set to 100 ms for 10830 Å and 30 ms for 15650 Å
- # operations : number of scans. Set 1 unless you want repetitions.
- sj acq (steps/sj) : relation between the number of steps and Slit-jaw images to be saved.
- manual wait : manual wait between each step. When activated, the next step is triggered by the button next step .
- save images : click to have the images saved to the disk. It is useful to unclick for making tests.
- idl : only active for visualisation mode. It calls IDL with the last images taken as input variables. POLAR waits for the user to close the IDL before continuing with the steps. To use IDL, POLAR has to be run without the `&`.
- comments : space to enter text comments about the observation.
- get images : starts the image acquisition. At the end of the scan, a popup window will ask for comments and the type of object observed (quiet Sun, spot, filament, etc.) in a submenu.
- abort : used to pause or to abort the image acquisition. The images are however saved to the hard disk.

At the end of the scan, a popup window will appear asking for comments and the type of object, in the case of `scanning`. A *b*eep will sound if you do not specify the object type.

The Display adjustments are described in the appendix.

5.1. Typical single slit observation sequence

OBSERVATIONS (SCANNING in slit mode):

- Use 10 accumulations
- Use exposure time of 100ms for 10830 Å and 30 ms for 15650 Å
- Number of steps depending on your field of view (typically 100)
- Number of operations = 1 unless you want repetitions
- Sj acq (steps/sj) = 1 to have one Slit-jaw image saved for each step
- TELESCOPE: the derotator must be IN and TRACKING

- Remember to update the `YYYYMMDD.txt` file
- At the end, select the type of object in the popup window

FLAT FIELD with the slit:

- Check that there are no clouds
- Use 10 accumulations
- Use the SAME exposure time as for observations
- Number of steps = 50 (for 100 ms exposure time) OR 100 steps (for 30 ms exposure time)
- Number of operations = 1
- TELESCOPE: Stop the AO (`No correction` mode)
- TELESCOPE: must be in the flat-field mode (100 arcsec/s)
- TELESCOPE: the derotator must be IN, tracking or stopped
- Recommendation: the time between flats and observations must be less than 1.5 hours
- Remember to update the `YYYYMMDD.txt` file

TELESCOPE CALIBRATION (For spectropolarimetry with the slit only)

- Check that there are no clouds
- Use 10 accumulations
- Use the SAME exposure time as for observations
- Number of steps is set automatically to 74
- Number of operations = 1
- TELESCOPE: Stop the AO (`No correction` mode). And deselect the box of `M11 pupil control`
- TELESCOPE: take the calibration at solar disk center
- TELESCOPE: the derotator must be IN and STOPPED.
- TELESCOPE: the Beam tracker must be stopped.
- Remember to update the `YYYYMMDD.txt` file
- At the end of the calibration remember to update the value of Number of steps
- TELESCOPE: at the end of the calibration restart the Beam tracker and the Derotator (with 'rel' not checked to go back to the previous orientation)

6. IFU mode

The IFU has a FOV-scan system that is controlled in a very similar manner as the slit-scan unit. The difference is that it has movements in 2 axes. There is a GUI called "IFU" in the Instrument Control System (ICS) that needs to be running prior to running POLAR. This GUI can also be used to move the IFU window manually across the field of view. See the appendix. POLAR takes the control while doing the scan.
To understand the IFU geometrics and the orientation of the slits seen in the spectra see the Appendix.
The POLAR window is shown in Figure 3.

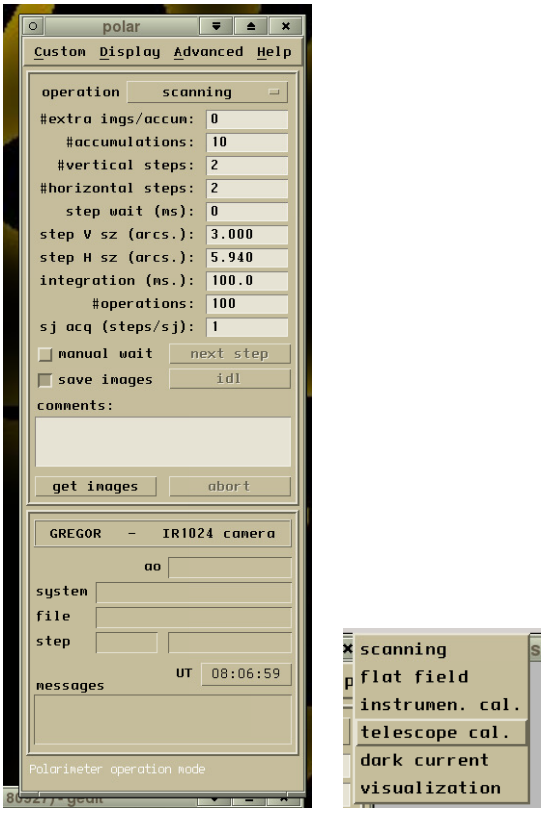


Figure 3: POLAR main window with the parameters for a scan and `operation` submenu (right)

The main commands in the POLAR window are:

- operation : submenu with the available observing modes:
  - scanning : science observing mode.
  - flat field : to get flat field calibration data.
  - instrument cal.: not used.
  - telescope cal.: to get polarimetric calibration data.
  - dark current : not used.
  - visualization : to take an image without saving images. No scan is done. It has the option to open the image in IDL for a preview.

- # extraimg/accum : number of extra images. Normally set to 0.
- # accumulations : number of images to be accumulated.
- # Vertical steps : number of scanning steps in the vertical direction. For example = 2, for a square FOV. Values lower than 4 are recommended.
- # Horizontal steps : number of scanning steps in the horizontal direction. For example = 1, for a square FOV. Values lower than 4 are recommended.
- step wait (ms) : waiting time between steps. Normally set to 0.
- step V size (arcs.) : size of the scanning vertical steps. Set 3.0 for the IFU.
- step H size (arcs.) : size of the scanning horizontal steps. Set 5.940 for the IFU.
- integration (ms) : Integration time for each accumulation. Normally set to 100 ms for 10830 Å and 30 ms for 15650 Å
- # operations : number of scans. Set 1 unless you want repetitions.
- sj acq (steps/sj) : relation between the number of steps and Slit-jaw images to be saved.
- manual wait : manual wait between each step. When activated, the next step is triggered by the button next step .
- save images : save the images to the disk. It is useful to unclick for making tests.
- idl : only active for visualisation mode. It calls IDL with the last images taken as input variables. POLAR waits for the user to close the IDL before continuing with the steps. To use IDL, POLAR has to be run without the `&`.
- comments : space to enter text comments about the observation.
- get images : starts the image acquisition. At the end of the scan, a popup window will ask for comments and the type of object observed (quiet Sun, spot, filament, etc.) in a submenu.
- abort : used to pause or to abort the image acquisition. The images are however saved to the hard disk.

The POLAR window also shows some information. The most useful lines are:

- file : filename. Use this name for the log in the `YYYYMMDD.txt` file.
- step : current step. The total number of steps are given by:

  ```
  nac * sampling * nv * nh
  ```

  where,

  `nac =` accumulations

  `sampling =` 1 for single, 2 for double sampling (only for IFU)

  `nv =` Number of Vertical steps

  `nh =` Number of Horizontal steps (only for IFU)

- UT : UT time. Use this value for the log in the `YYYYMMDD.txt` file.
- messages : error messages. See the Appendix.

At the end of the scan, a popup window will appear asking for comments and the type of object, in the case of `scanning`. A *b*eep will sound if you do not specify the object type.

The Display adjustments are described in the appendix.

6.1. Typical IFU observation sequence

OBSERVATIONS (SCANNING in IFU mode):

- Use 10 accumulations
- Use integration time of 100 ms for 10830 Å and 30 ms for 15650 Å
- Number of Vertical steps depending on your field of view (for example = 2)
- Number of Horizontal steps depending on your field of view (for example = 1)
- Number of operations = 1 unless you want repetitions
- Sj acq (steps/sj) = 1 to have one Slit-jaw image saved for each step.
- TELESCOPE: the derotator must be IN and TRACKING
- Remember to update the `YYYYMMDD.txt` file
- At the end, select the type of object in the popup window.

FLAT FIELD with the IFU:

- Check that there are no clouds
- Use 10 accumulations
- Use the SAME exposure time than for observations.
- Number of Vertical steps = 50 (for 100 ms exposure time) OR 100 steps (for 30 ms exposure time). It does not move the scan unit.
- Number of operations = 1
- TELESCOPE: Stop the AO (`No correction` mode)
- TELESCOPE: must be in flat-field mode (100arcsec/s)
- TELESCOPE: the derotator must be IN, tracking or stopped
- Recommendation: the time between flats and observations should be less than 1.5 hours

- Remember to update the `YYYYMMDD.txt` file

TELESCOPE CALIBRATION (For spectropolarimetry with the IFU only)

- Check that there are no clouds
- Use 10 accumulations
- Use the SAME exposure time as for observations
- Number of steps is set automatically to 74
- Number of operations = 1
- TELESCOPE: Stop the AO (`No correction` mode). And deselect the box of `M11 pupil control`
- TELESCOPE: take the calibration at the solar disk center
- TELESCOPE: the derotator must be IN and STOPPED
- TELESCOPE: the beam tracker must be stopped
- Remember to update the `YYYYMMDD.txt` file
- At the end of the calibration remember to update the value of Number of steps.
- TELESCOPE: at the end of the calibration restart the Beam tracker and the Derotator (with 'rel' not checked to go back to the previous orientation)

6.2. Scan pattern and time

Currently it is recommended to scan in RasterV mode, starting in the center. It is the default option. Figure 4 shows its pattern. The position before starting the scan is at the geometrical center of the full scan. Other modes and patterns will be available in the future.

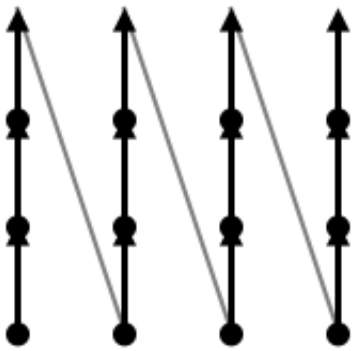


Figure 4: 4 x 4 scan in RasterV mode

The scan time is given by:
`T_scan=[[4 * nac *(t_int + t_readout)+ t_mov]* sampling * nv * nh]+(t_mov * nv * nh)`
where,
`nac =` accumulations
`t_int =` Integration time
`t_readout =` 30 ms
`t_mov =` 900 ms approx.
`sampling = 1` for single, 2 for double sampling
`nv =` Number of Vertical steps
`nh =` Number of Horizontal steps
A difference of 1 or 2 s respect to the real value is possible.

For example, a 3x3 scan, 10 accs. and 100 ms, would take:
`T_scan= [ [4 * 10 * (0.1 + 0.03) + 0.9] * 2 * 3 * 3 ] + (0.9 * 3 * 3) =` 117.9 s

7. Data reduction

The basic reduction pipeline can be run by following these lines:

Create an IDL file `calDDmonthYY.pro` (e.g. `cal23may18.pro`) in the `YYYYMMDD` directory to reduce all your data at once. An example of this pro is:

`pro cal25sep18`
`lambda=10830. ;lambda=15650. ;` *observing wavelength in A*
`fileff=['25sep18.000','25sep18.002'] ;` *Flatfield files. One or two flatfields can be used. If two, one should have been before/after the science data.*
`filecal='25sep18.003' ;` *P*olarimetric calibration file, from the TELESCOPE CALIBRATION mode.
`map='25sep18.001' ;` *s*cience scan data. Note that several sub-maps (i.e, 25sep18.001-nn) may exist. The reduction routine only needs the common filename and looks for the submaps file (stored in the `level0` directory.)
`gris_v7,map,fileff,filecal,lambda=lambda`
`fileff=['25sep18.002', '25sep18.006'] ;` *Flatfield files for the following map, if different*
`map='25sep18.004' ;` *science data.*
`gris_v7,map,fileff,filecal,lambda=lambda`
`;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;`
`;` *Repeat the commands above for all maps you want to be reduced*
`return`
`end`

The reduced data are stored in the directory `level1` which is automatically created, if it does not exist.
This pipeline works for the spectropolarimetric mode with both, the long-slit or the IFU data. The latter is presently under verification. Contact M. Collados if you need it.

For the reduction of spectroscopic data, the `calDDMMMYY.pro` looks exactly the same as above, without the `filecal` definition. The main routine is called `gris_sp` :
`gris_sp,map,fileff,filecal,lambda=lambda`

If the IDL reduction pipeline stops at `FLATFIELDING +DEMODULATING + MERGING BEAMS` `"La imagen debe estar comprendida entre 1 y 0 ...."` . Check that the cal script is correct. If every file definition is OK then check the size of the images in level0 directrory. Probably there is one partial file (`-00n`) with a very small size. Polar created the file but it has no images. Simply rename the image to empty `.00n-00n` so that the pipeline does not take it into account. Rerun the IDL script, comenting the lines that were already processed.

8. Data archive and downloading your data

Copy all the good data from the `YYYYMMDD` directory to the `/gris_archive/` directory using `rsync -rav`

For example, at the directory `/scratch/tip/` do :
`rsync -rav 20170426 /gris_archive/.` Note that there is no space between the "/" and the "."

You can download your data from this `/gris_archive/` directory, which is the same than `/instruments`. Refeer also to the document Manual for the GRIS archive (`http://archive.leibniz-kis.de/pub/gris/readme/archive_manual.pdf`). Note that the path for `/gris_archive/` has changed.

The Slit-Jaw images are saved automatically in the GREGOR file storage (see the configuration in section 6.1). These images are in the directories `/instruments/gsjc/gsjc1/` and `/instruments/gsjc/gsjc2/` for camera 1 and 2, respectively. They can be downloaded directly from there. Please be careful to not delete them!.

9. Reading your data

You can find the pipeline and the GRIS reading procedures at:
`https://owncloud.iac.es/index.php/s/vvzjjoqmS9A1Lb3`
You can read your IFU data using:
`im=readifu('level1/27may19.000')`
where,
`im(lambda,x,y,stokes,time)`
You can read your slit data using:
`mapas, 'level1/03oct19.000'`

Beware that Ulises4 does not have a big RAM, please use another computer to read big maps/scans.
The resolution element after the reconstruction is 0.135" x 0.135" for the slit and 0.135" x 0.1875" for the IFU with double sampling.

A. APPENDIX

A.1. Display adjustments

The menu Display in POLAR allows to change the image displayed and the display scale.

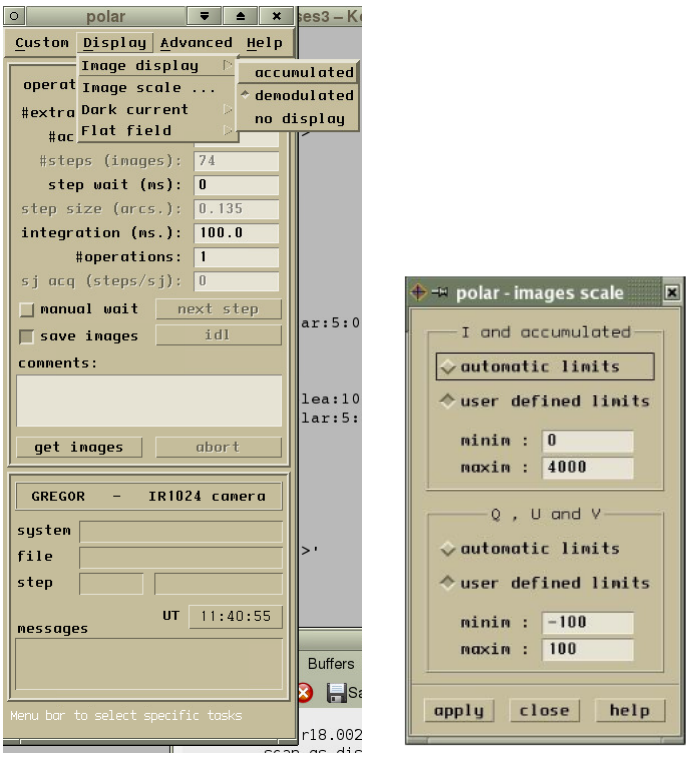


Figure 5: POLAR display submenu and Image scale window (right).

Three options are available:

- accumulated : shows the result of the accumulated images.
- demodulated : The four Stokes I, Q, U, V are displayed.
- no display : used only to speed up the program. The display is not updated.

The Image scale window has two sections, the upper one for accumulated images and Stokes I. The lower section is for Stokes Q, U and V. Each section contains two modes: the auto scaled mode where the minimum and maximums are fixed by the system and the manual mode where the desired minimum and maximum can be set. The manual mode is recommended.

A.2. IFU GUI

The IFU GUI is typically controlled by the telescope assistant. It controls manually the Vertical (X) and Horizontal (Y) position of the FOV-scan system. The IFU mask is seen as the rectangular window (without image) in the Slit-Jaw images.
The X and Y position numbers are given in motor steps. 1000 motor steps are equal to 1.8 arcsec.
The FM1 Z value is an automatic compensation and the FM1 focus is the focus of the Slit-Jaw camera. Please do not touch them!
Vertical (X) and Horizontal (Y) positions can be returned to the center by clicking the button : `Set Mid` .
In order to have the compensation and focus computed automatically the box `Rel Z/F compensation` MUST be clicked. It is in the OBS tab.
The current values are written in the `YYYYMMDD.txt` file. If not, ask the support for the updated values.

Figure 6: IFU GUI in the `AXES` tab

In the morning, before the observations the Telescope Assistant or the observer should initialize the positions, by pressing `Set Mid` in the `AXES` tab. See Figure 7.

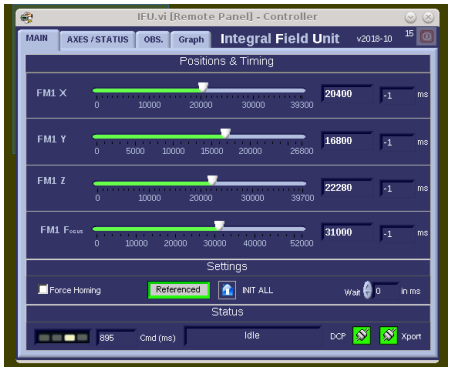
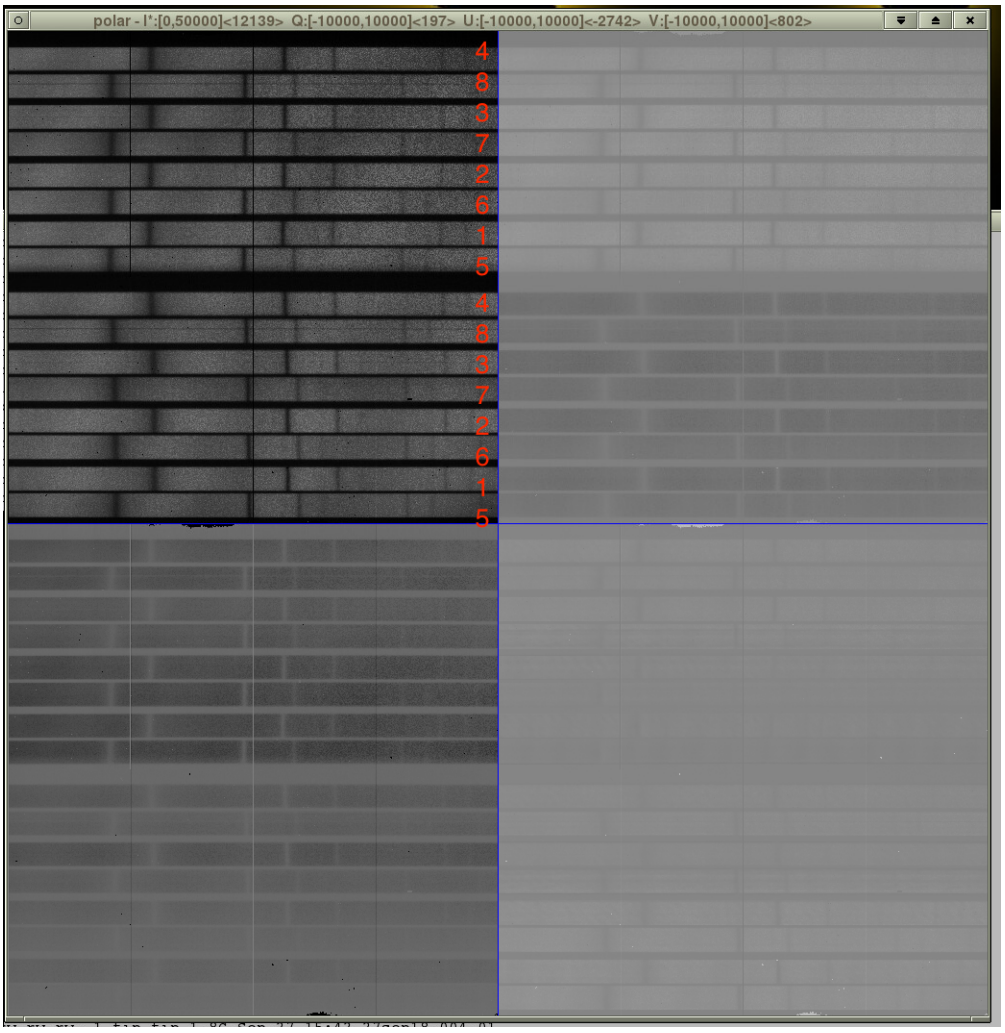


Figure 7: IFU GUI in the `MAIN` tab for referencing only.

A.3. IFU geometrics

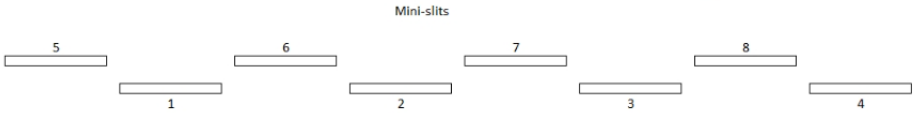
The spectra seen in the display are not ordered linearly. The image slicer behind the window is shown in the red rectangle of the following figure:

And it is seen in the display (for spectropolarimetry) with the order marked by the red numbers:



The spectra have an offset between two consecutive rows due to the optical configuration of the

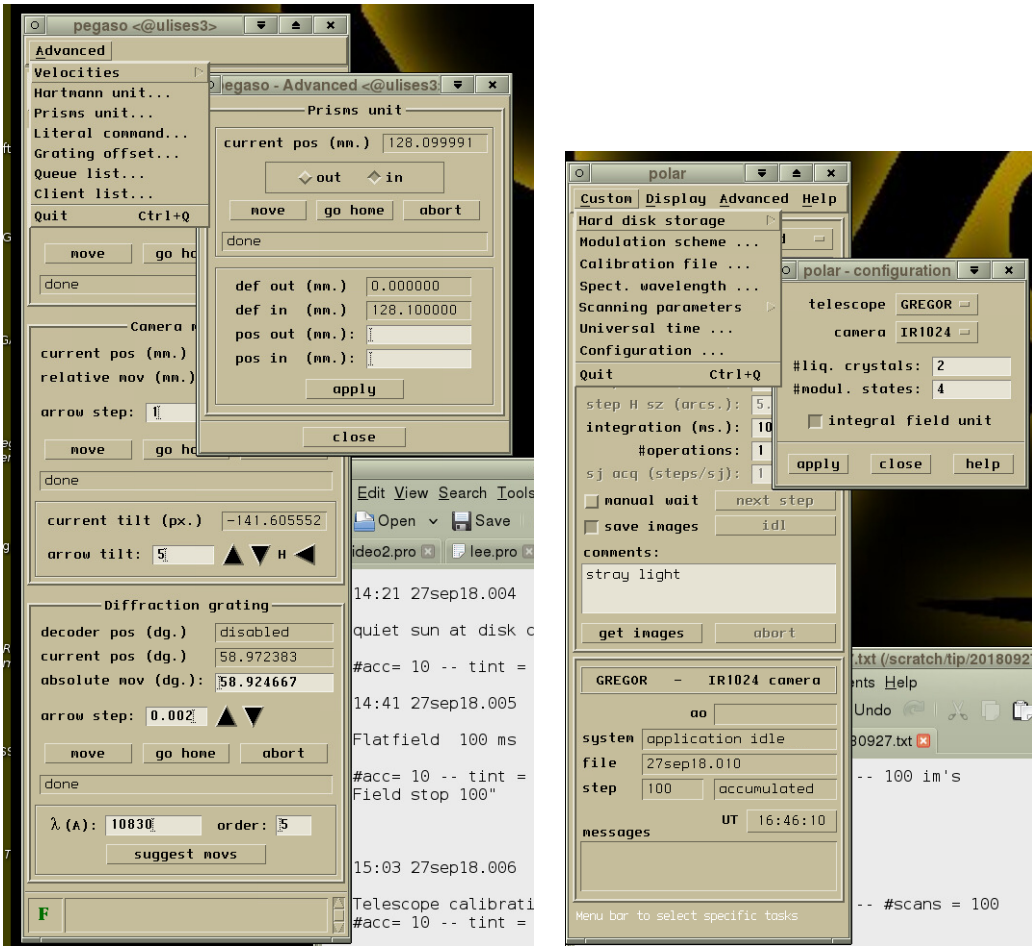
IFU output minislits (in two rows):



A.4. Changing from simple spectroscopy to spectro-polarimetry

The change from simple spectroscopy to spectro-polarimetric mode can be done by the observer (with help from the telescope assistant). It requires moving the polarimeter manually and changing a parameter in the POLAR program.
Steps to change from spectroscopy to spectro-polarimetry :

1. In PEGASO menu `ADVANCED` go to `Prisms unit`, click the `IN` box and the `MOVE` button. Click `close`.



2. In POLAR menu `Custom` go to `Configuration` and select:

   For spectroscopy : liq. crystals: 0, modul. states: 1

   For spectro-polarimetry : liq. crystals: 2, modul. states: 4

   Click `apply` and `close`.

3. Close and reopen POLAR

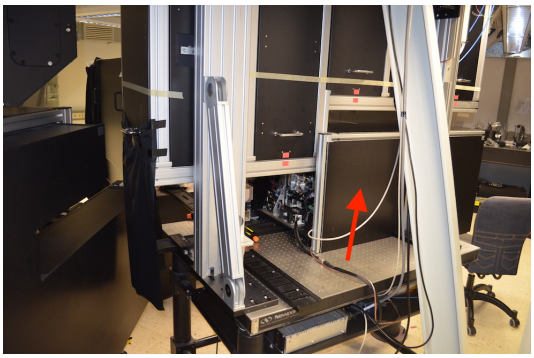
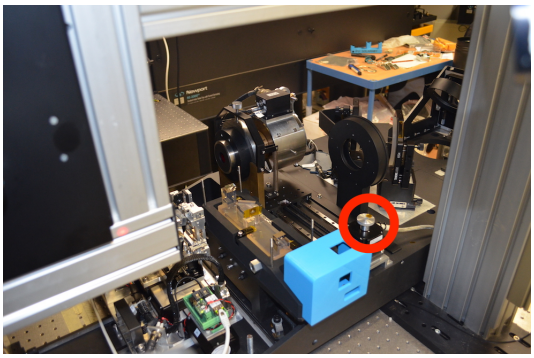
4. Change focus: in PEGASO move Colimator mirror relative mov. (mm): -4.5 to go from simple spectroscopy to spectro-polarimetric mode. Do it positive when changing from spectro-polarimetric to spectroscopy mode.

5. Move the polarimeter manually, with help from the telescope assistant. Open the black panel shown in the following picture and rotate the knob marked by the red circle until the polarimeter is in the position.

   For spectroscopy : far from the knob

   For spectro-polarimetry : closer to the knob

   Do not touch anything else.

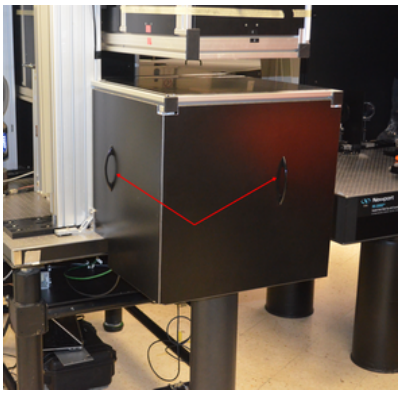
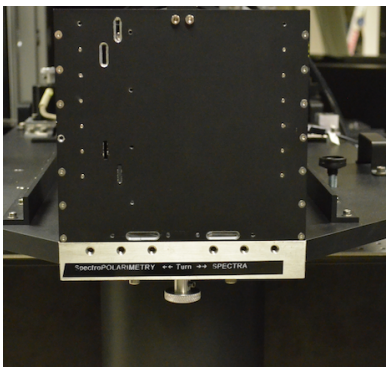



6. Move the folding mirror FM1 manually, with help from the telescope assistant. Open the black panel shown in the following picture and rotate softly the knob marked by the red circle following the directions written in the label.

   For spectroscopy : rotate softly CW to the end

   For spectro-polarimetry : rotate softly CCW to the end

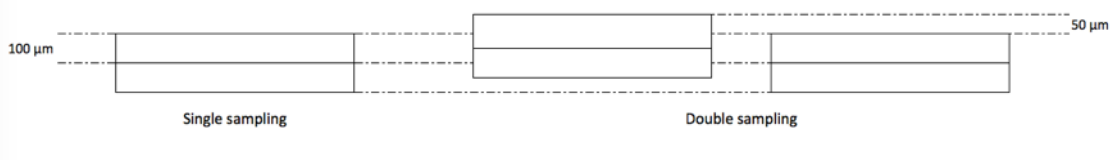
   Do not touch anything else.

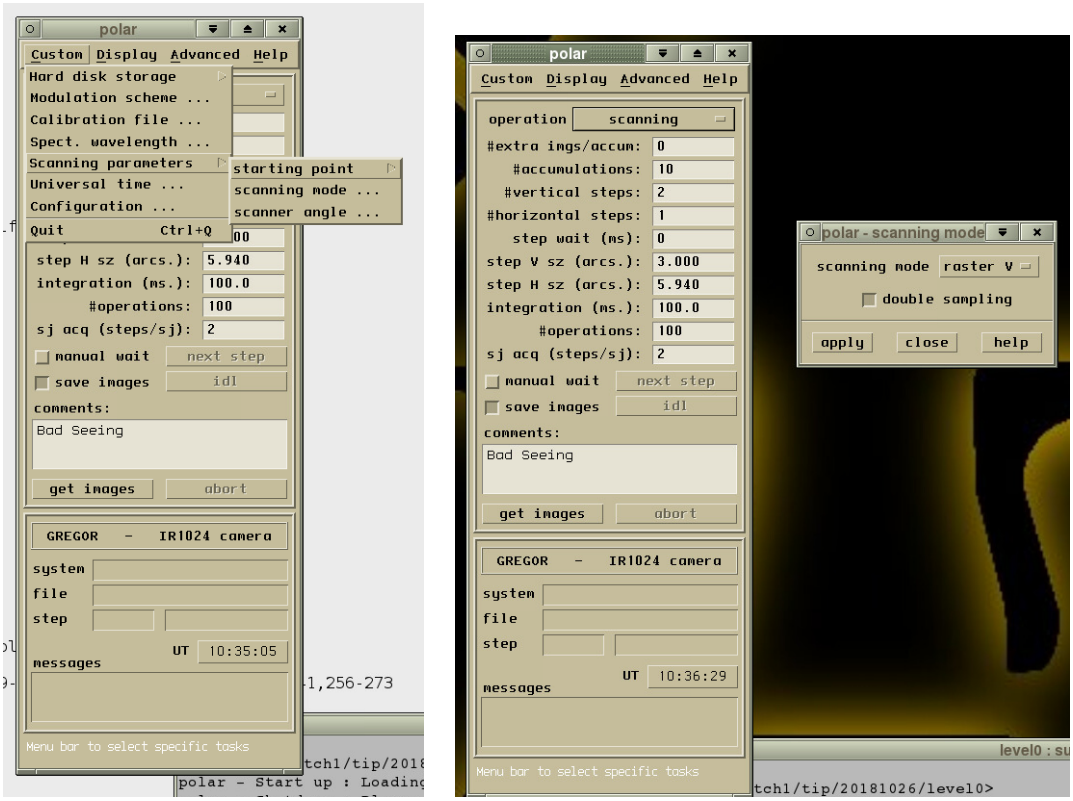
7. Close the the black panels.

A.5. Double sampling and simple sampling (only for IFU)

GRIS should work in double sampling scanning when the IFU mode is selected. The following figure illustrates how it improves the spatial resolution for 50 μm with 100 μm (0.375 arcsec.) slices. It improves the spatial resolution to the double (half of the slit width or equivalent in the IFU). Remember:
Slit width: 0.26"
IFU slice width: 0.375"



If the seeing is not good, the observation can be sped up by keeping the original spatial resolution: single sampling.
To change from single to double sampling or viceversa, go to the POLAR menu `Custom` go to `Scanning parameters`, then `Scanning mode` and click `double sampling`. Do not change anything else. Click `apply` and `close`.



A.6. FAQ

Q- What is the signal to noise level and expected polarimetric sensitivity for typical exposure and accumulations (e.g. 30 ms exposure and 10 accumulations) in GRIS and GRIS IFU?

A- The experience is that we can achieve about 5x10e-4 using 10 accumulations and 100 ms for HeI (10830) and 30 ms for FeI (15650).

Q- If we are observing science data with 20 or 30 accumulations, should we also take flats with the same accumulations as in the observing run or is 10 accumulations enough?

A- There is no need to have the same number of accumulations for science, flat-field and calibration data. The pipeline can handle that. What is critical is the integration time. That number should be the same for all types of data.

Q- By error we took flats with 50 operations (1 vertical step) instead of 1 operations (50 vertical steps). Is there any problem?.

A- The two measurements are exactly the same in flatfield mode. There is no difference between them, the pipeline should run with both.

Q- We got a science scan and flats with GRIS but unfortunately dust came very quickly before we could get telescope calibration data. We had to close the telescope the rest of the day. Is it possible to use the telescope calibration from the previous/following day to avoid losing the data ?

A- This question does not have a unique answer. It depends on the stability of the optical beam at F4 and of the instrument itself. Sometimes, the calibration of the day before/after can be used and other times not.

Q- As we are observing disk center with IFU (not scanning a spot or so), can we observe without derotator?

A- Yes and no, it depends whether you are exactly pointing to the center. The IFU FoV (6"x3") is very small, then you can easily go out of the FoV. Even if not, you will need to rotate the images to correct the angle and you will lose part of the FoV.

A.7. Troubleshooting

Errors, error messages in POLAR, causes and solutions :

- `Error: Telescope communication` or similar : The telescope control system has to be running. If it was already running, just restart the `get images`. If not, close POLAR and restart it.
- `Error: AO communication` or similar : The AO GUI has to be running and the AO run Menu opened before starting POLAR.
- `Error: unable to get derotator position (nacc 2)` : Wrong derotator GUI started in the ICS. Ask the assistant if in doubt.
- `Error: Telescope socket timeout` : Something that goes through the telescope communication system (DCP) is not responding, for example the instrumental calibration. Other possible cause: wrong configuration mode in POLAR, Menu [Custom][Configuration]. Click the box for the Integral Field Unit, unclick for the single slit. Click `apply` and `close`.
- `Error: Acquisition not synchronized` : communication error with the frame-grabber. It happens frequently (we have not found the origin). Just re-start the acquisition.
- `Error: Image obtained without event (133)` communication error with the frame-grabber. It should only happen randomly. Just re-start the acquisition.
- `Can not set integration time`. It should only happen randomly. Just re-start the acquisition.
- VNC Tiger crashes : Sometimes it happens when using the mouse wheel in this window. Restart the window as descibed in section 3.
- Error in IDL ruing the reduction pipeline. It stops at `FLATFIELDING +DEMODULATING ...` . See Section 7, Data reduction.