A quick guide to HIDES-F on the 188-cm at Okayama Astronomical Observatory – 2-nd edition –

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April 16, 2015

Contents

Edition History:
October 2010: generation of basic document (Beck, Kambe)
July 2014: modified for the new telescope system and improved control softwares (Kambe) minor update in January, 2015 (Kambe)

Preface

This manual is written for those who have learned how to use the HIDES-F at least once but want to remind it very quickly. New beginners should read the HIDES-F's operation manual, its home pages, and related manuals (mostly in Japanese) carefully before observations.

1 Computer Facilities and How to Prepare

1.1 Servers and their assigned functions

bizen (via remote desktop) telescope control PC, everything related to telescope and dome (pointing, dome control, focus, mirror cover, ...).
Located in the telescope control room.

coude (via ssh) controller of HIDES-F and quick-look.
Located in the instrument assembly room (Kumitate-Chosei Shitsu).

hides5 (via ssh) controller for Messia V CCD detectors.
Located in the coudé outer room.

fbrag (via ssh) CCD control for autoguider.
Mounted on the Cassegrain unit.

1.2 Available terminal computers and their possible usages

In an observing room, we typically have three terminal computers and six monitors for the telescope and HIDES-F operations. Roles for them may be

PC1-M1 telescope and dome control (remote desktop of bizen)

PC1-M2 guide telescope's view mounted on the 188-cm (wfv-n)
monitor telescope and dome through webcams (from 'oaocam1 ' to 'oaocam5'; click on the webcam-output to repoint the cameras)

PC2-M1 instrument control and set-up, data-aquisition (via ssh to coude/hides5)

PC2-M2 focusing and auto-guiding (via ssh to fbrag)

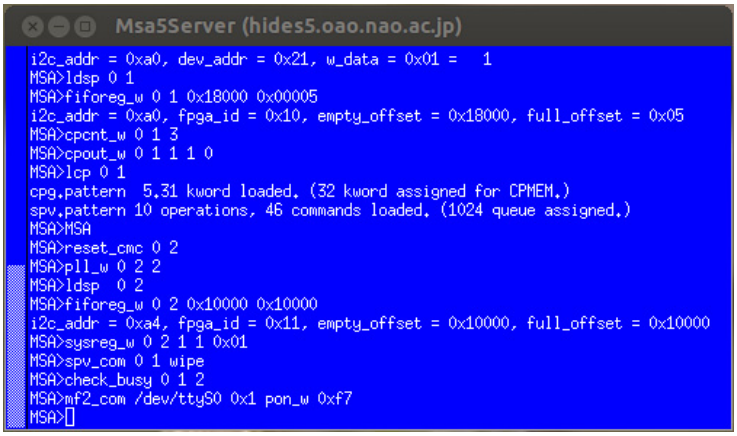
PC3-M1 for quick-look (via ssh to coude, iraf and ds9 is used)

PC3-M2 display OAO skymonitor images
display other weather infos

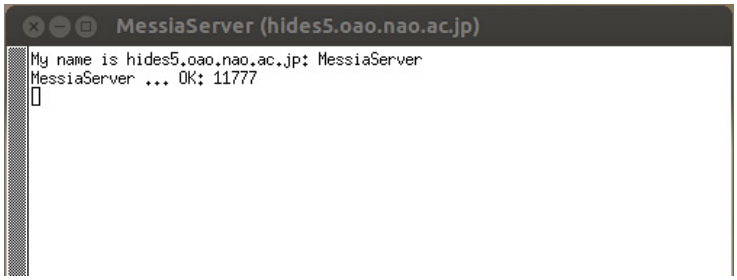
1.3 Setting up GUIs

Nota Bene[1]**:** Items marked with ∘ are only necessary if terminal windows are closed. If they are kept open at the end of the night, only the action items, marked with • have to be executed. Commands which have to be typed into the terminals are indicated as > `command syntax` and have to be confirmed with enter.

[1]Throughout the document, well meant advices are marked as **'Nota Bene'** (i.e. ∼keep in mind).



(a) contorl server status log window



(b) communication server window

Figure 1: Messia V CCD windows

... before setting up GUIs for HIDES-F

'Nota Bene': If night is close, preparation of dome and telescope in section 5.1 can be done here.

- (then, back in the observing room...) check if the telescope control software (ncont74) is running on one of termial computer monitors.
  If the 'Telescope_and_Dome_Controller GUI' main window (Fig. 6) is displayed, it is okay.

... open a new terminal window (for CCD):

- > `ssh -Y hides@hides5`
- > `passwd` (means standard password. Can be found in the observing room)

- > `./MessiaStartAll`
  A blue and then two white windows will appear on the display. If the CCD initialization process is finished, one of the white window will disapper.

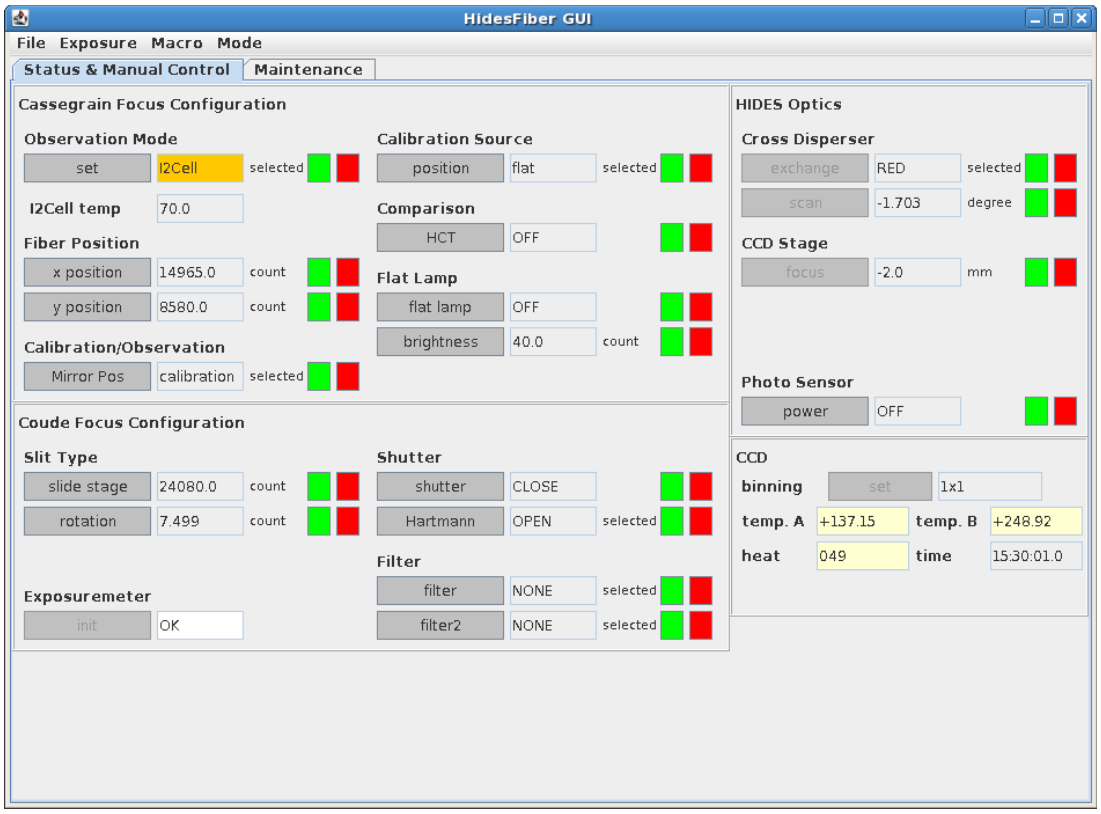


Figure 2: 'HidesFiber GUI' main window (on obs74-1)

Check if there is any error messages (something like 'does not respond') on the blue window (Fig. 1a).

... open a new terminal window (for HIDES-F itself):

- > `ssh -Y hides@coude`
- > `pwd`
- > `cd hidesfiber`
- > `./HidesFiberMain`
  This will launch up the 'HidesFiber GUI' main window (Fig. 2).

... open two new terminal windows (for guiding):

- > `ssh -Y hides@fbrag`
- > `pwd`

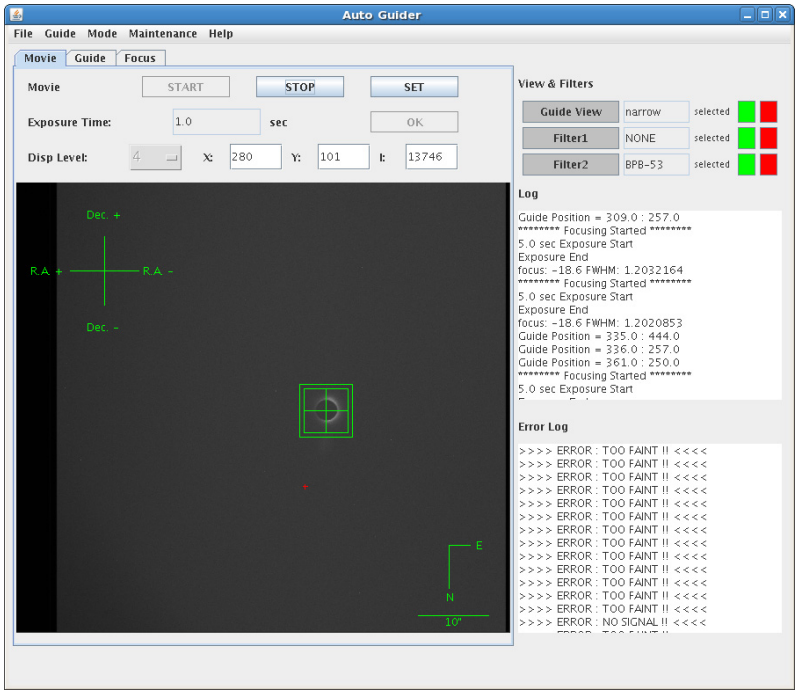


Figure 3: pointing the telescope

- > `cd ALTACAMD`
- > `./altad -p`
  It will print `wait` until the `./AutoGudierMain`-command (next step) has been sent.
  If the response 'wait' does not appear, contact the observatory staff.
- > `ssh -Y hides@fbrag`
- > `pwd`
- > `cd U260`
- > `./altaobs.pl -t 5`
  This will set the CCD operation temperature to be 5 °C (in winter, the value can be 0 °C).
- > `cd ~/autoguider`

- > `./AutoGuiderMain`
  After that the 'AutoGuider GUI' will popup.

1.4 Trouble shooting

- if you get an error message while intializing the Messia CCD, check if it is powered on.

2 Preparing Observations

2.1 Preparing dome and telescope

- (on the second floor) if not yet done, follow the list of action items given in section 5.1 to start up the dome and the telescope.
- (in the observing room) open the dome slit and mirror covers, following the steps in section 5.2.

2.2 Additional preparations in HIDES-F GUIs

- check 'temp A' and 'heat' in 'HidesFiber GUI'. If their background is red, contact to the observatory staffs.
- check 'xposition' and 'yposition' values in 'HidesFiber GUI'. If they are not around (24070, 8580), it is not HE-mode. Please contact tothe observatory staffs.
- in 'HidesFiber GUI' (Fig. 2) set 'observation mode'.
  (The following options are available: 'normal' (just slit), 'I2Cell' (iodine) and 'cover')
- select and 'OK'
- popup an exposure control GUI ('Set & Go'; Fig. 4) by choosing, 'HidesFiber GUI' $->$ 'Exposure' Drop-down menu $->$ 'Set & Go'

2.3 Focus the telescope

- pointing the telescope to an appropriate star, following the steps in section 3.1.
- click 'START ' in the 'movie' tab of 'AutoGuider GUI' (Fig. 3).
- move the star next to (but not in) the green-box in the 'narrow'-field view.
  A single-click on the stellar position will bring the star to the center of the green guding box.
- 'STOP' the movie mode.
- do a left mouse button click on the star to select the focus target.
  Green box will shift.
- change to the 'focus' tab in 'AutoGuider GUI' (Fig. 5)
- use either 'EXPOSE' or 'START' to measure the current FWHM of the star's image.
- to expose once, click 'EXPOSE'.

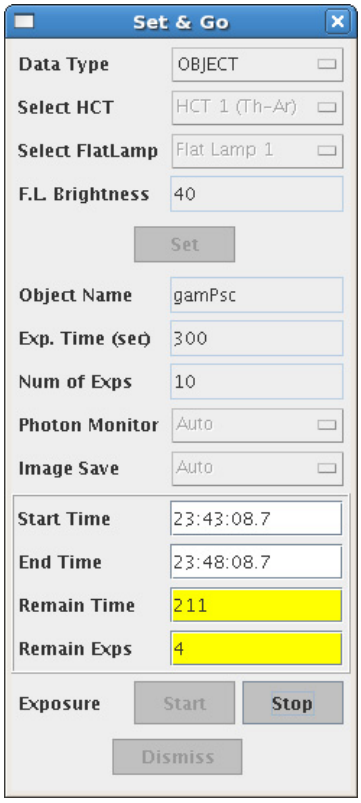


Figure 4: Exposure (sequence) control GUI ('Set & Go' in 'HidesFiber GUI')

- if you want make multiple exposures with changing telescope focus, set Init, Intv, Step, Repeat values and then click 'START'.
  You can stop the sequence by clicking 'STOP'. When stellar position shifts from the center during the sequence, click the stellar position for re-centering. The 'CLEAR' button will dismisses all measured values and clears the plot.

- Once you determine the focus value, set it from the 'Telescope' window (Fig. 8) .

Nota bene: Focus range is approximately from -18 mm (in summer) to -22 mm (in winter).

Nota bene: If the target is too bright, no value for the current FWHM will be calculated. Choose a different neutral density filter from the AutoGuider GUI (upper right). The insertion of a broad band filter may also useful (see section 3.2 in detail.)

in case of using of the Iodine cell:

- when I_2 is inserted into the optical path, decrease telescope focus by 0.4 (e.g. from -20.0 to -20.4).

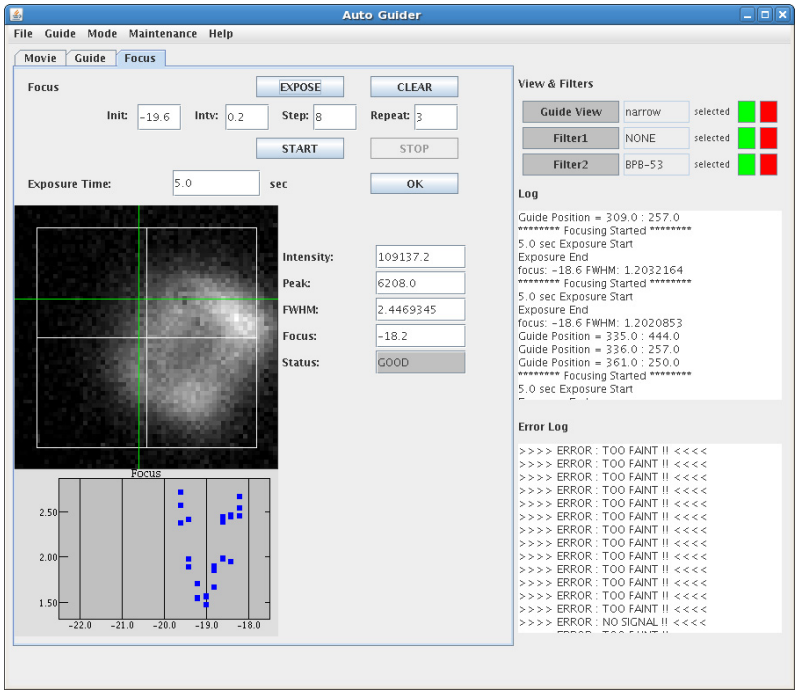


Figure 5: Focus procedure with several exposures taken for the same focus settings

2.4 Calibration frames

taking wavelength calbration data ...

- in 'Set & Go' choose 'comparison' as data type and click 'set'.
- when in 'HidesFiber GUI' 'HCT' is displayed as ON (yellow field) the setup is ready
- check if I_2-cell is removed (no orange field saying 'I2Cell' is then displayed)
- take 1 exposure with 5 seconds

taking flat-fieldening reference data ...

- change data type to INSTFLAT for flatfields and 'set'.
  (HidesFiber: flat lamp on and yellow)
- take 30 exposures of 1 second each.
  They will be used to check the noise of the fiber

Nota bene: Flat-fieldening data taken with conventional HIDES slit may be useful for flat-field correction.

taking bias data ...

- change data type to BIAS for bias and 'set'.
- take 10 exposures.
  They can be used to check CCDs. If the CCD temperature is high, hot pixels in the centeral CCD is very strong.

check order alignment and count level

- `quick_show` #thar-frame
- For typical I_2Cell observations, zoom into the center panel of the 3 CCDs and place the mouse curser on the middle of the three peaks of the PSF. If the position is close to 1190 $\pm$ 1 px this is okay.

- `quick_show` #flat-frame
- `implot` #flat-frame_2
- if the level of the left-most order of the central CCD is around 7,000-8,000 counts it is okay.
  The 'Brightness' may be increased slightly ($\sim$ 50) from its default value (40). If it is still too low, contact to the observatory staff

- inspect count level or frames
- `quick_o hd004712 ov004712`
  (for overscan correction. ADU correction and removal of the overscan region ...)

3 Data Aquisition

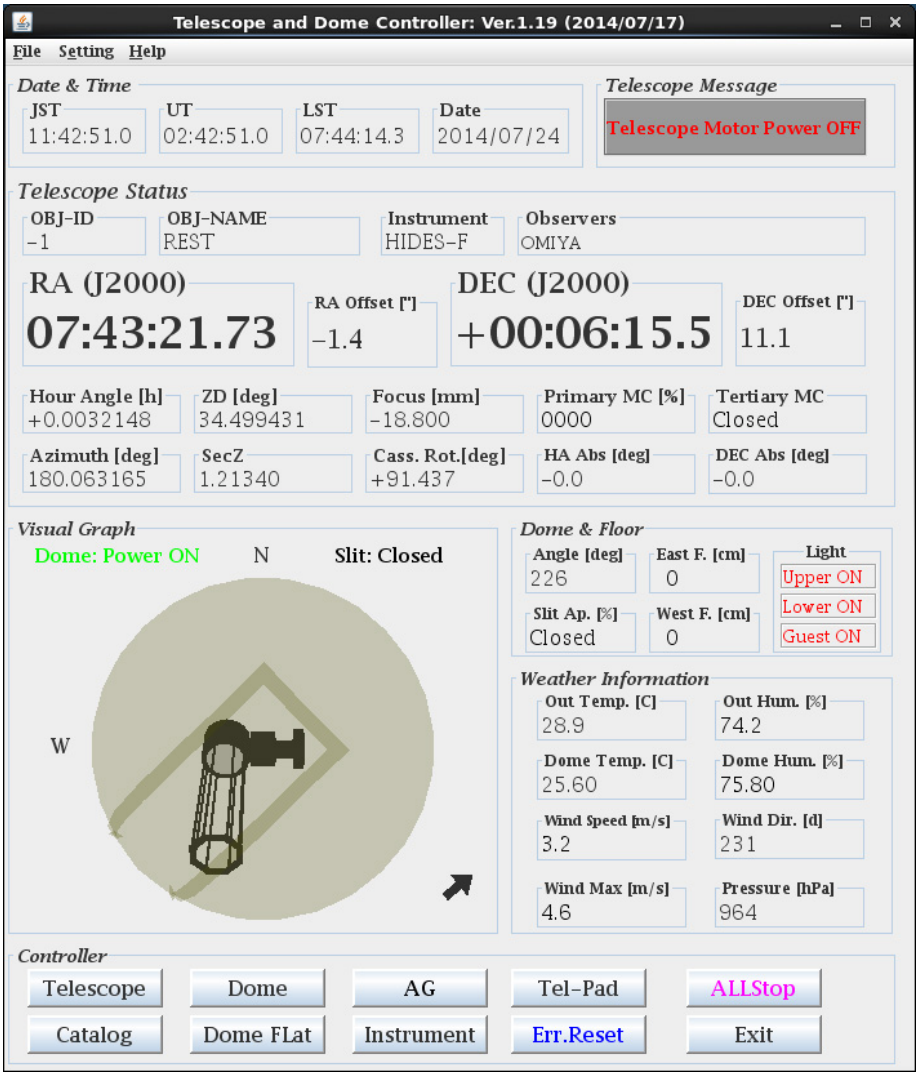


Figure 6: The 'Telescope_and_Dome_Controller GUI' main window for the 188 cm Telescope

3.1 Loading target catalogue & pointing the telescope

- (on bizen) set Dome Rotation 'Auto' on in the 'Dome' window (Fig. 9).
  - click 'Instrumet' in the 'Telescope_and_Dome_Controller GUI' to pop up 'Instruments' window (Fig. 7, select 'HIDES-F'), and then 'dismiss'.

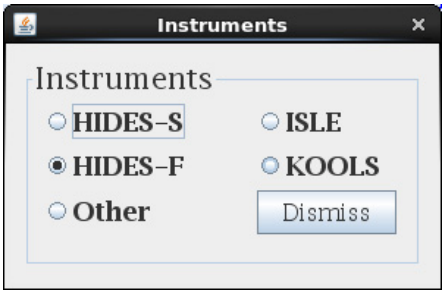


Figure 7: Instrument select window

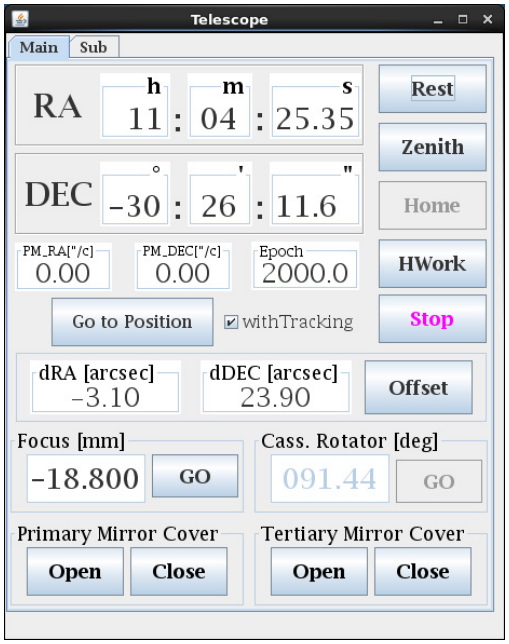


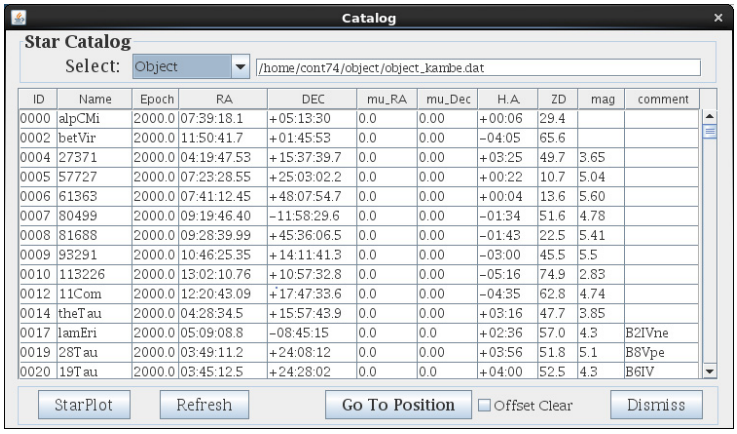
Figure 8: Telescope GUI for mirror covers, focus, manual positioning and etc.

- in the 'Telescope_and_Dome_Controller GUI', click 'Catalogue' to popup the 'Catalog' window (Fig. 10), then select 'User Defined' and enter path provided by collaborator
- 'Refresh' & 'Star Plot' , then 'Star Plot' window will popup (Fig. 11)

- either select a target star in the list or in the map (object name will be displayed in the Object text field in the 'Star Plot' window), and then click 'go to position'.
- keep checking telescope and dome while pointing.
- in the 'AutoGuider GUI', change to 'movie' tab and 'START' to see if star is visible.

Nota bene: if star is not found, follow the procedure listed in section 3.4

Figure 9: GUI for dome orientation and dome slit



ID	Name	Epoch	RA	DEC	mu_RA	mu_Dec	H.A.	ZD	mag	comment
0000	alpCMi	2000.0	07:39:18.1	+05:13:30	0.0	0.00	+00:06	29.4		
0002	betVir	2000.0	11:50:41.7	+01:45:53	0.0	0.00	-04:05	65.6		
0004	27371	2000.0	04:19:47.53	+15:37:39.7	0.0	0.00	+03:25	49.7	3.65	
0005	57727	2000.0	07:23:28.55	+25:03:02.2	0.0	0.00	+00:22	10.7	5.04	
0006	61363	2000.0	07:41:12.45	+48:07:54.7	0.0	0.00	+00:04	13.6	5.60	
0007	80499	2000.0	09:19:46.40	-11:58:29.6	0.0	0.00	-01:34	51.6	4.78	
0008	81688	2000.0	09:28:39.99	+45:36:06.5	0.0	0.00	-01:43	22.5	5.41	
0009	93291	2000.0	10:46:25.35	+14:11:41.3	0.0	0.00	-03:00	45.5	5.5	
0010	113226	2000.0	13:02:10.76	+10:57:32.8	0.0	0.00	-05:16	74.9	2.83	
0012	11Com	2000.0	12:20:43.09	+17:47:33.6	0.0	0.00	-04:35	62.8	4.74	
0014	theTau	2000.0	04:28:34.5	+15:57:43.9	0.0	0.00	+03:16	47.7	3.85	
0017	lamEri	2000.0	05:09:08.8	-08:45:15	0.0	0.0	+02:36	57.0	4.3	B2IVne
0019	28Tau	2000.0	03:49:11.2	+24:08:12	0.0	0.00	+03:56	51.8	5.1	B8Vpe
0020	19Tau	2000.0	03:45:12.5	+24:28:02	0.0	0.0	+04:00	52.5	4.3	B6IV

Figure 10: 'Catalog' window. Target stars read into 'Telescope_and_Dome_COntroller GUI'. Only currently visible targets are displayed.

Nota bene: choosing the 'Offset Clear' option on in the 'Catalog' windows will not use the offset information in the last pointing (currently we are not sure which options gave better telescope pointing result...).

3.2 Guiding

- in the 'movie' tab, 'START' the movie, do a left mouse button click on the stellar position for fine adjustment of telescope pointing (this will bring the stellar image into the green guide box). Then, 'STOP' the movie.
- go to 'guide' tab in 'AutoGuider GUI' and click 'START'. (reinitialize for each new pointing)
- if the white cross does not mark the center of the fiber, click 'STOP' and do a left mouse click on the apperent center of the fiber-hole and click 'START' again. Guiding will then update the new position with the next exposure.

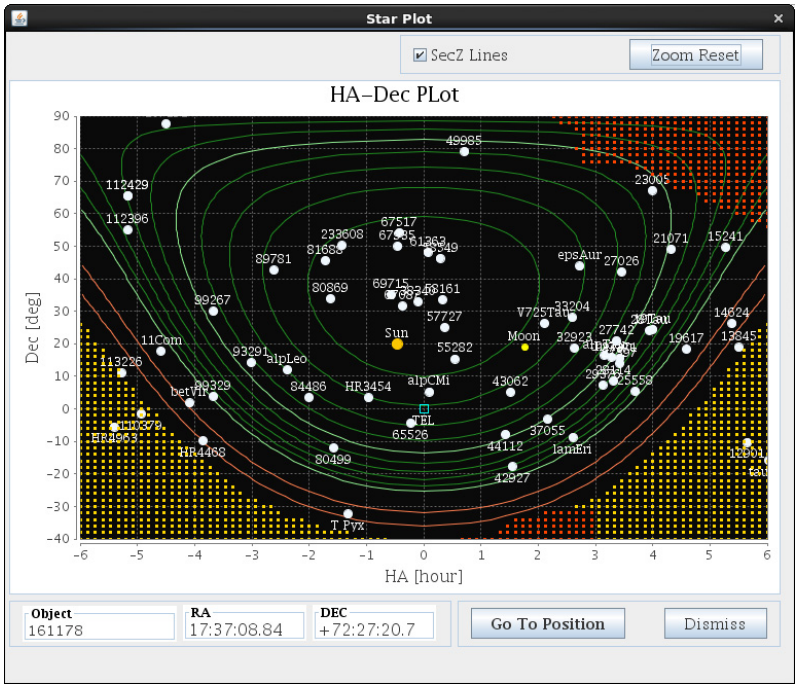


Figure 11: 'Star Plot' window: color legend: red lines: (outer) sec z=3 or z$\sim$ 71°, (inner) sec z=2.5 or z$\sim$ 66°, thick green lines: (outer) sec z=2 or z$\sim$ 60°, (inner) sec z=1.5 or z$\sim$ 48°, red and yellow areas: no pointing possible

- guiding is using the wings of the PSF for centering the star on the fiber. Use neutral density filters (ND1, ND2, ND3 or NONE) to avoid saturation and reflections.
  There is no ADC installed. If you want to select a certain wavelength range to guide on choose a color filter: BPB45(λ_0=450nm; IR leak), BPB53 (530nm), BPB60 (600nm).

Nota bene: use the flux level (from psf-wings) to get an estimate of the weather conditions.

Nota bene: if auto-guiding frequently fails, select 'noguide' from the 'Mode' menu. Then, do guide manually from TelPad dialog in the telescope GUI.

3.3 Exposure (Sequence)

- if yet, popup the 'Set & Go' window by choosing, 'HidesFiber GUI' $->$ 'Exposure' Dropdown menu $->$ 'Set & Go'
- in 'Set & Go' select the object type, edit exposure time and number of consecutive exposures
- if you use photon monitor, intialize the exposure meter in 'HidesFiber GUI'.
- it will take about 10 seconds and a 'Photon Monitor' window (Fig. 13) will popup.

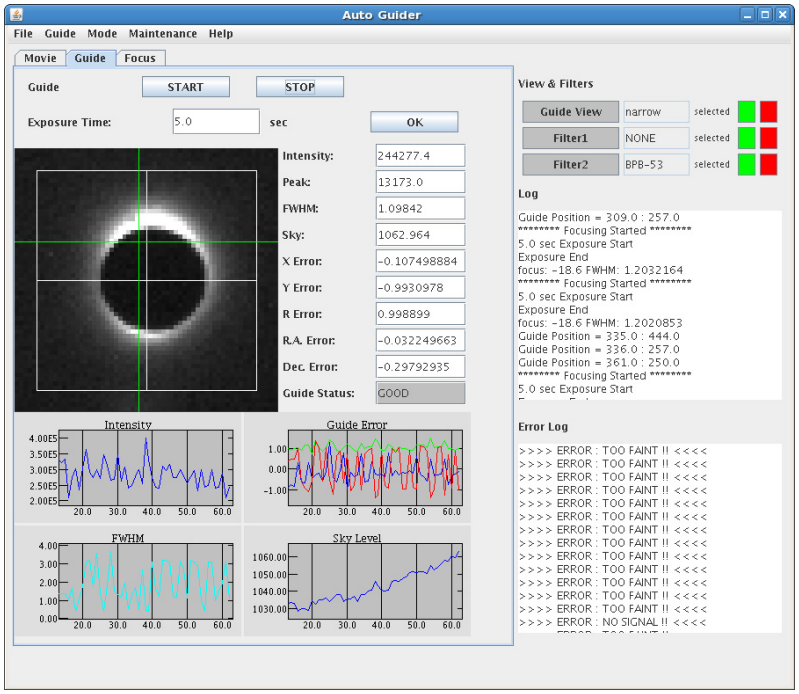


Figure 12: Auto guider user interface

- set 'photon monitor' to 'Auto' in 'Set&Go'
  (the photon monitor will give you an estimate of the current flux level and will help you to compute the effective midpoint of the exposure; in exchange of 10 % light loss....)
- to save CCD images in sequantial numbers, set 'Image Save' to 'Auto'.
- start by clicking 'Start'.

Nota bene: Exposuremeter can be also used manually in between exposures to check the brightness of the star. To do so, click 'shutter' open in the 'HidesFiber GUI' and then in the'Photon Monitor' window, 'PMT' 'on' and click 'Start'. Do not forget to 'Stop' exposure and 'close' the shutter, when starting the next exposure.
NEVER put 'PMT' on under strong illumination lights.

Nota bene: if you have to stop an exposure-sequence, do it just while readout to prevent the next one. otherwise multiple exposures will start and something messy will happen. If you have to abort an exposure while integration, ask observatory staff to restart the CCD controller software.

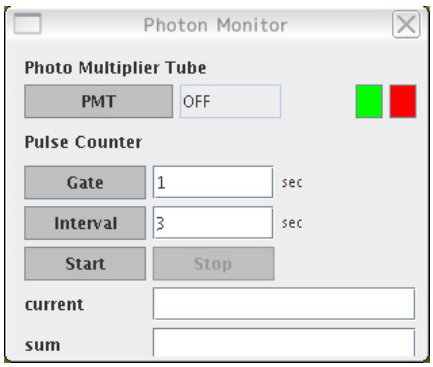


Figure 13: Exposuremeter (photo monitor) user interface

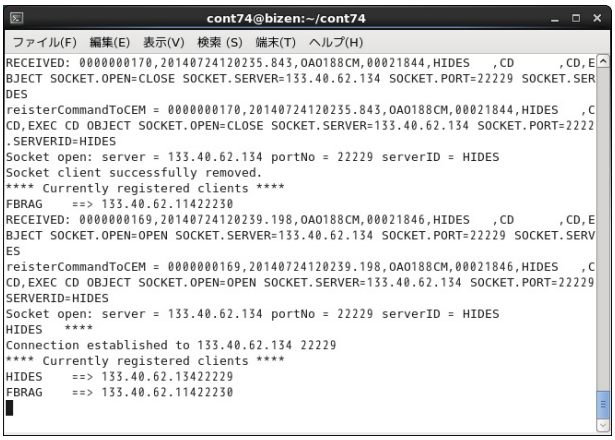


Figure 14: a window where ncont74 is launched

3.4 Troubleshooting

there's no star ...

- check the guide telescope (wfv-n) image to see if star is visible there.
- If not, check if dome slit is opened.
  Note that the guider telescope view is sometimes obstructed by the dome slit.
- if you are sure that the telescope pointing is good, check telescope mirrors
- also, check the filters and set the display level to higher value in 'AutoGuider GUI'.
- if still not, change to 'wide' field view. If you see star, move it near the red '+' mark ((x,y)=(330,330), about one finger below the original green marker; this position corresponds to the guide position in the 'narrow' field view), by just doing a left-mouse button click on the stellar position, then back to 'narrow' field view.
- if still not there, ...uum, contact to observatory staffs.

no telescope responce ....

- check if 'HidesFiber GUI' is communicated with 'Telescope_and_Dome_Controller GUI' by checking the terminal in which the latter is started (Fig. 14).

AutoGuider hang up ? (now it should be rare case...)

- if the autoguider on 'fbrag' apparently hang up, contact to the observatory staff. [or kill server (altad) and GUI; go to dome, disconnect power-supply cable from camera and USB from the computer.] First connect the cable of the guiding the power-supply of the CCD and wait for confirmation via the red light blinking. Then connect USB cable (to the right lower left plug!)]

- when the ethernet connection to 'fbrag' is lost, consult the observatory staff

4 After Observations - End of the Night -

- don't forget to pull a calibration lamp off
- close telescope mirror covers and dome slit, following the steps in section 5.2.
- set 'observation mode' (in 'HidesFiber GUI') to 'cover'
- close 'HidesFiber GUI' and 'AutoGuider GUI' via exit (File $->$ Exit; not with upper right x)
- also send the command `./MessiaEndAll` in the same window where the MessiaStartAll command was sent. The CCD softwares should be shutdown everynight.
- shutdown telescope and dome, following the steps in section 5.3
- backup data, following the steps in section 6

5 Dome and Telescope

- to operate dome functions from the TelescopeDomeControl GUI, you need to choose 'manual'-mode on one of the dome control touch panels in the telescope room.

5.1 Starting up dome and telescope

- in the telecope control room (Bouenkyo Seigyo shitsu), put the telescope's motor drive power-supply button on, then wait until all the buttons turn to green ... (do not touch telescope controller button; it should be kept on all the time.)
- put dome power-suupply button on at the dome control panel in the telescope control room.
- in the telescope room, turn off the 3 air-conditioners and a dehumidifier (unless humidity is high)
- on one of dome control touch panels, make sure to select 'observing mode' ('Kansoku mode)'
  The button will trun to yellow. Without this mode, dome cannot be controlled from GUIs.
- turn off lights in the visitor-aquarium and dome (upper), using one of touch panels or manual switches at the south-west wall in the telescope room
  (the lights can be controlled later from the Dome Control window in TelescopeDomeControl GUI).

5.2 Open/close the dome and mirror covers

- in the 'Telescope_and_Dome_Controller GUI', click 'Err. Reset' once
- click 'Telescope in the 'Telescope_and_Dome_Controller GUI' to popup the 'Telescope' window (Fig. 8)
- from the 'Telescope' window send telescope to 'Rest' position
  Before moving the slit, at least make sure that the mirror covers are closed and that the telescope's zenith angle is larger than 35°.
- to open/close the dome slit:
  (on bizen) in the 'Telescope_and_Dome_Controller GUI', select 'Dome' to popup the 'Dome' window (Fig. 9).
- click 'Open' (or 'Close') for dome slit.
- opening/closing will take 10 minutes.

Nota bene: Observers should only use the 'Telescope_and_Dome_Control GUI' (but not any of touch panels on the 2nd floor) to move the dome slit. Note that the 100 % does not mean it is fully opened, but it should be enough (so, don't worry).

Nota bene: If the circuit brakers for the trolley are off, "Dome: F044 error" may appear on the 'Telescope_and_Dome_Control GUI'.

- from 'Telescope' window (on bizen; Fig. 8), open/close the miror covers: 'Primnary Mirror Cover' and 'Tertiary Mirror Cover'
- turn off (or on) dome illumination (lower) lights from the 'Dome' window.

5.3 Closing down and end of night

- if not yet done, move the telescope to the 'Rest' posiiton from the 'Telescope' window (Fig. 6)
- rotate the dome to its rest position (180°) from the 'Dome' window.

on the 2nd floor:

- turn off CCD-detector manually (in the coudé-room)
- turn on the 3 air-conditioners and the dehumidifier
- power off telescope motor drive and dome power-suppy button (in telescope control room)
- for day-time visitors: turn on lights in the visiter-aquarium and dome illumination (both upper & lower)

5.4 Troubleshooting: dome rotation and slit

check audio-visually: i.e., if no movement is visible on the screen and no (loud) noise is coming through the speakers, the dome rotation/slit is not moving in this case.

- if you hear any unusually large moise, stop operations and contract to the observatory staff
- check 'manual' ('Shudou') or 'observation' ('Kansoku') mode on the touch panels. Also, check the Auto Dome status in the 'Telescope_and_Dome_controller GUI' (upper left corner in the view graph).

6 Data Backup

After the exposures, data are written in quick-look directory. C opy the data to the backup directory (disk) at the end of the night. We also recommend to do so from time to time during the night using the workstation obs74-3. The original files should also be moved to a temporally archive space at the end of each night.

- `ssh -Y hides@coude`
- pwd
- `cd quicklook`
- `mkdir /backups#/obsdata/20140725_test_observation/`
  The '#' is the number of the backup disk.
- `rsync -aHvc hd* /backups#/obsdata/20140725_test_observation/`

at the end of night,

- `mkdir /Hides/20140725_test_observation/`
- `cd  ~/quicklook`
- `mv hd*.fits /Hides/20140725_test_observation/`

7 Weather Limits

- maximum humidity: 95% for outside humidity; 90% for mirror humidity
- maximum wind: 15 m/s

In case of (expected) rain: send the dome (via the 'Dome controll') to - 40°. This will avoid too much rain dropping onto the telescope.