

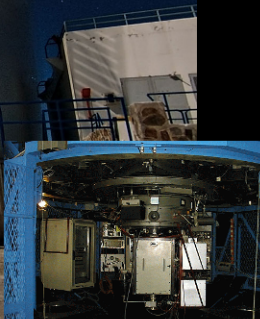
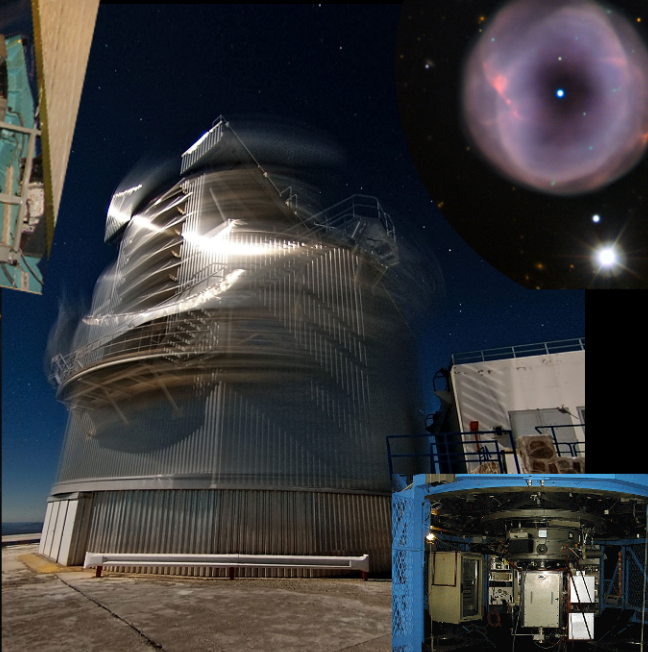
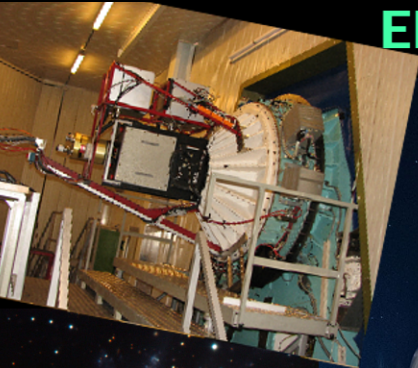


EFOSC: Observing and data reduction

Linda Schmidtobreick
European Southern Observatory, Chile

La Silla Observing School 10th- 21st February 2025

EFOOSC: An Overview



EFOSC2: An Overview

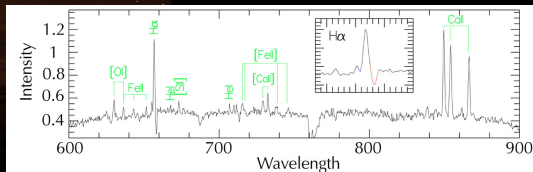
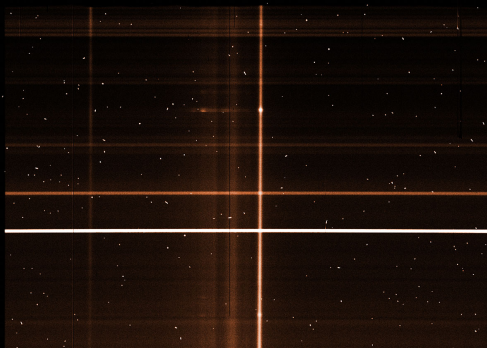
EFOSC2 observing modes

IMA	imaging
LSS	longslit spectroscopy
MOS	multi-object spectroscopy (masks)
IPOL	imaging polarimetry
SPOL	spectropolarimetry
COR	coronagraphy

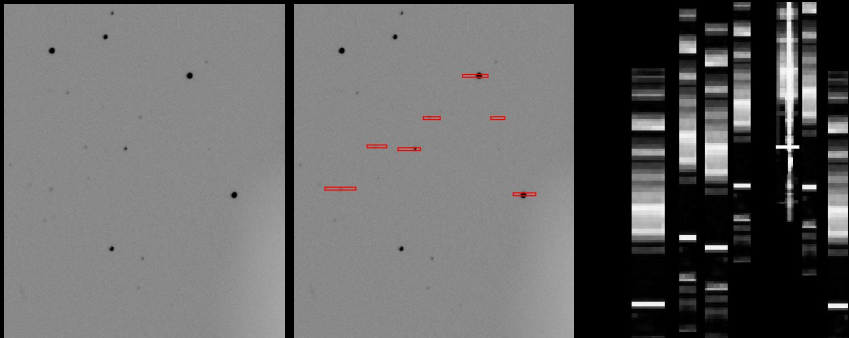
EFOSC2 observing modes: Imaging



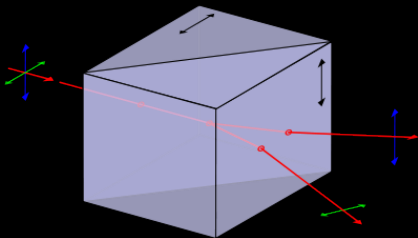
EFOSC2 observing modes: Spectroscopy



EFOSC2 observing modes: MOS

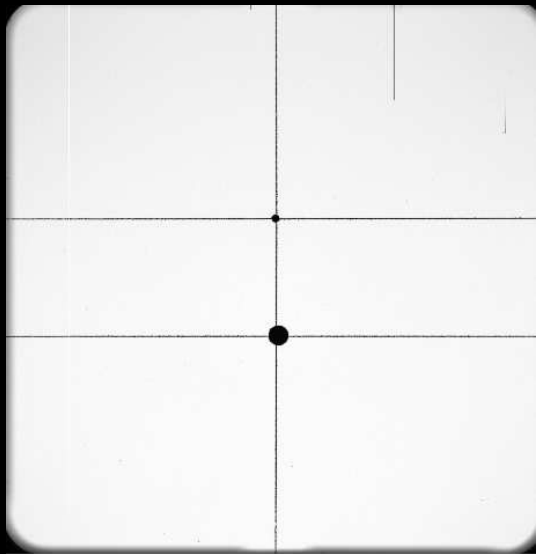


EFOSC2 observing modes: Polarimetry (IPOL and SPOL)



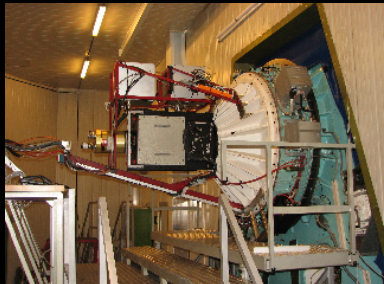
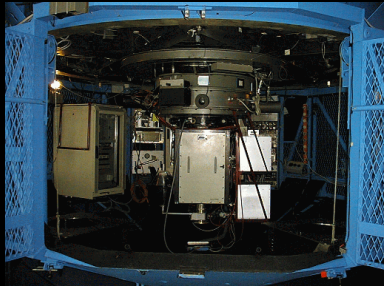
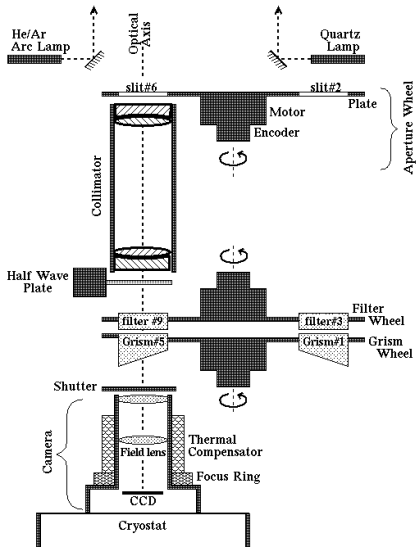
CHANL: 0	START: 1,0,1,0
FRAME: EFOSC_IwaPol066_0020,f1	END: 489,0,275,0
CUTS: 106,0,1083,18225	MIN,MAX: 106,0,1083,18225

EFOSC2 observing modes: Coronagraphy



EFOSC: An Overview

EFOSC 2 A schematic diagram of the instrument



Observing with EFOSC: Preparation

- Check the webpages:
<https://www.eso.org/sci/facilities/lasilla/instruments/efosc.html>
- Read the manual
- Use the Exposure Time Calculator
- Use P1 to propose your observations
- Once accepted, use P2LS to create your OBs
- At least one day before observing, fill the setup request

Observing with EFOSC: Preparation

www.eso.org/sci/facilities/lasilla/instrumenter/efosc.html

European Southern Observatory

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Science Users information > Observing Facilities > La Silla Facilities > La Silla Instrumentation > EFOSC2

18 Feb 2018

La Silla Facilities

- Emergency Procedures
- Call for Proposals
- La Silla News
- Contact Information
- La Silla Telescopes Overview
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 - Overview
 - News
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 - Manuals
 - Tools
 - Instrument Operations Team
 - Visitor Instructions
- HARPS
- SOFI
- Visitor Instrument
- Decommissioned Instruments
- Site Information and Logistics
- La Silla Astroclimatology
- La Silla Science Operations

EFOSC2 : ESO Faint Object Spectrograph and Camera

Summary

EFOSC2, or the ESO Faint Object Spectrograph and Camera (v.2) to give its full name, is a very versatile instrument for low resolution spectroscopy and imaging. The instrument has multi mode capability including normal/polarimetric imaging/spectroscopy (several submodes in each), multi-object spectroscopy and coronagraphy. One can easily switch between most modes, even during a single night, with little loss of observing time; this flexibility and the ease of operation make for a very efficient instrument capable of handling most observing programmes in an efficient manner.

Despite its multi mode capability the real forte of EFOSC2 is low resolution spectroscopy - it is a very efficient instrument in terms of both photons and time. A second feature of this instrument is the sensitivity of its CCD to UV photons.

Note that as of April 2008 EFOSC2 is mounted at the Nasmyth B focus of the NTT. These web pages give information about the characteristics of the instrument at the NTT. The old [EFOSC2 at ESO 3.6m](#) information is still available for reference. For a general description of the changes due to the change of telescope, see [Snodgrass et al. 2006, ESO Messenger 132, 18](#).

Publications based on data obtained with the EFOSC2 instrument should reference the following paper: [Buzzi et al. 1984, ESO Messenger 36, 9](#).

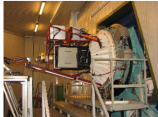
Contact Information

- All questions related to observations and proposal preparation should be addressed to the [La Silla Science Operations](#).
- Please [send us](#) your comments, suggestions and report errors and inaccurate statements in the web pages and manuals.

Content of these pages

The following items are available on all the EFOSC pages, using the bar on the left.

- [Overview](#): a short description of the instrument
- [News](#): list of changes affecting the instrument and/or its pages.
- [Instrument Description](#): all the important parameters of the instrument



Observing with EFOSC: Preparation



EFOSC2 Exposure Time Calculator

Optical Spectroscopy Mode [Version 6.0.0](#)

[Description](#) [FAQ](#)

Target Input Flux Distribution

<input checked="" type="radio"/> Template Spectrum	ADV (Pickles) ▾	Redshift z = 0.00	Target Magnitude and Mag.System: ▽ ▾ = 15.00 <input checked="" type="radio"/> Vega <input type="radio"/> AB <i>Magnitudes are given per arcsec² for extended sources</i>
<input type="radio"/> MARCS Stellar Model	Teff=4000 log(g)=-0.5 [Fe/H]= 0 N=1 ▾		
<input type="radio"/> Upload Spectrum	Select: <input type="text"/>		
<input type="radio"/> Blackbody	Temperature: 11000.0 K		
<input type="radio"/> Power Law	Index: 0.00 $F(\lambda) \propto \lambda^{\text{index}}$		
<input type="radio"/> Emission Line	Lambda: 550.000 nm Flux: 50.000 10^{-16} ergs/s/cm ² (per arcsec ² for extended sources) FWHM: 1.00 nm		

Spatial Distribution: Point Source Extended Source

Observing with EFOSC: Preparation



EFOSC2 Exposure Time Calculator

Optical Spectroscopy Mode [Version 6.0.0](#)

[Description](#)

[FAQ](#)

Sky Conditions

Moon FLI: Airmass:

Almanac

PWV: mm *Probability > 95% of realising the PWV \leq 30.0 mm*

Seeing/Image Quality:

Turbulence Category:

IQ: arcsec FWHM at the airmass and reference wavelength

Instrumental Setup


Slit width:

Grism:

Detector: CCD#40 Readout mode: Binning: (spectral) \times (spatial)

Polarimetry Mode: No polarimetry Linear polarisation

Observing with EFOSC: Preparation



EFOSC2 Exposure Time Calculator

Optical Spectroscopy Mode [Version 6.0.0](#) [Description](#) [FAQ](#)

Results

S/N:

* Exposure Time: s

Plots: Toggle All / No Plots

- Observed Object+Sky Spectrum
- Observed Object Spectrum
- Sky Radiance Spectrum in physical units (ph/s/m2/micron/arcsec2)
- Observed Sky Spectrum
- Sky Transmission spectrum
- Total Efficiency and Wavelength Range
- Signal-to-noise
- Input spectrum in physical units
- 2D simulated image

Observing with EFOSC: Preparation



EFOSC2 Exposure Time Calculator

Optical Spectroscopy Mode **Version 6.0.0**

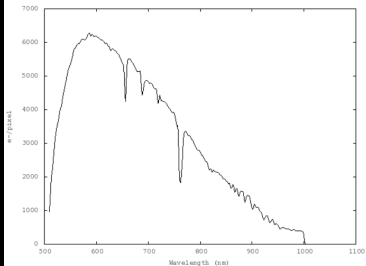
[Description](#)

[FAQ](#)

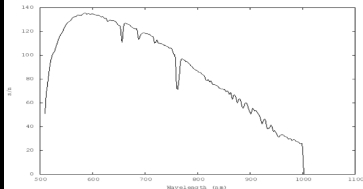
Wavelength Range	:	510.000 - 1100.000 nm
Central wavelength	:	670.000 nm
Dispersion	:	1.320 nm/pixel
Plate scale	:	0.260 "/pixel
Image Quality FWHM	:	2.745 pixels <i>(to be used for OB constraint set)</i>
Efficiency at central wavelength (with extinction)	:	22.195 %
Efficiency at central wavelength (no extinction)	:	24.021 %
Total object counts at central wavelength	:	16175.530 e-
Sky background level at central wavelength	:	15.674 e-/pixel
Max. intensity at central wavelength (object+sky)	:	5387.187 e-
AD converter saturation	:	65196 e-
Detector read-out noise level	:	8.500 e-/pixel
Detector dark current	:	1.000 e-/pixel/hour
PSF extension (*)	:	5 pixels
Signal to Noise (*) at central wavelength	:	125.489
Exposure Time (1 exposure)	:	100.000 seconds

(*) The signal to noise is calculated over 1 pixel along the dispersion and the nearest integer of $2 * \text{fwhm}(\text{image quality}) / \text{plate_scale} = 5$ pixels along the slit.

Total Spectrum (object+background) at central row



Signal to Noise spectrum



Observing with EFOSC: Preparation

The screenshot displays the EFOSC2 web interface for preparing an observation. The top navigation bar includes tabs for Phase 2 2.2.13, Details, Overview, Schedule, Execution Sequence, and Help. The current session is identified as '60.A-9709(D) - EFOSC2' with a user 'Lu Silla Observatory'.

The left sidebar shows a tree view of observation folders and individual observations. The main area is titled '60.A-9709(D) - EFOSC2' and shows the following configuration options:

- Check**, **Certify**, **Revise**, **Edit**, **Import/Export**, **Delete**, **Refresh OB**
- Obs. Description**, **Target**, **Constraint Set**, **Time Intervals**, **Finding Charts**, **Ephemeris**, **Target Visibility**
- Obs. Description: No name** (tpl size: normal, small, pflow; 1, 2, 3, 4, 5)
- Observing Description Name**: No name
- User Comments**
- Template Type**: acquisition
- Template**: EFOSC_img_acq_MOS
- Add Template** button

At the bottom of the sidebar, there are buttons for **OB**, **CB**, and **Fid**.

Observing with EFOSC: Preparation

Phase 2 7.1.18 | Details | Overview | Schedule | Execution Sequence | Help | UT: 13:27:35 - LST: 17:37:27 | La Silla Observatory

Check | Certify | Revise | Edit | Import/Export | Delete | Refresh OB

60.A-9709(D) - EFOSC2 - 1000030594 LaSilla-School-test | Exp. Time: 00:05:00 - Exec. Time: 00:10:02 (Partially Defined)

Observing Description Name: my-first-EFOSC-OB | User Comments:

EFOSC_img_acq_MoveToPixel #1 acquisition 1000026591	
CCD readout speed	fast
Exposure time	20
CCD X binning	2
CCD Y binning	2
X pixel coordinate	1100
Y pixel coordinate	1024
Rotator offset angle	0
Perform combined offset	T
Focus flag	F
Preset flag	T
Filter	R4642

EFOSC_img_obs_Image #2 science 1000026590	
CCD readout speed	normal
Exposure time	300
CCD windowing flag	F
First column of window	1
First row of window	1
Number of columns	2048
Number of rows	2048
CCD X binning	2
CCD Y binning	2
Number of Exposures	1
Filter	R4642
Starplate	Five
Observation type	OBJECT

60.A-9709(D) - EFOSC2 (28)

- Tests SW Upgrade
- Gallery (28)
- OT queues - do not exec (7)
- Test Technical Template (1)
- Dernefeld (1)
- 1000007347 - No Name
- 1500000482 - No Name
- 1500000485 - No Name
- 1500000488 - No Name
- 1500000491 - No Name
- 1500000494 - No Name
- 1500000497 - No Name
- 1500000500 - No Name
- Tech_night20191112 (1)
- Test_Chaira (1)
- 1000030582 - No Name
- 1000030585 - No Name
- 1000030588 - No Name
- 1000030591 - No Name
- 1000030594 - LaSilla-School-test

OB | CB | FID

60.A-9709(E) - SOFI (7)

60.A-9709(G) - HARPS (1)

Delete

Observing with EFOSC: Preparation

Check Certify Revise Edit - Import/Export - Delete Refresh OB Reveal in folder

60.A-9501(B) - EFOSC2 - OB 1000510129 No Name Exp. Time: 00:00:00 - Exec. Time: 00:00:00 (Partially Defined)

Obs. Description Target Constraint Set Time Intervals Ephemeris Target Visibility Finding Charts

Obs. Description: test tpl size: normal small tpl/row: 1 2 3 4 5

Observing Description Name: test User Comments:

EFOSC_img_acq_NarrowSlit #1 acquisition 1000344585

CCD readout speed	fast
Exposure time	20
CCD X binning	2
CCD Y binning	2
X pixel coordinate	1100
Rotator offset angle	0
Perform combined offset	T
Focus flag	F
Preset flag	T
Filter	R#642
Slit for Reference	Free

Delete

EFOSC_spec_obs_Spectrum #2 science 1000344586

CCD readout speed	normal
Exposure time	300
CCD windowing flag	F
First column of window	1
First row of window	1
Number of columns	2048
Number of rows	2048
CCD X binning	2
CCD Y binning	2
Number of Exposures	3
Filter	OG530
Grism	Gr#17
Starplate	slit#1.0
Observation type	OBJECT

Duplicate Delete

Observing with EFOSC: Preparation

The screenshot displays a software interface for observing with EFOSC. The top navigation bar includes 'Phase 2 23.13', 'Details', 'Overview', 'Schedule', 'Execution Sequence', 'Help', and a clock showing 'UT: 13:32:39 - LST: 17:42:32'. The user is identified as 'La Silla Observatory'.

The left sidebar shows a tree view of test objects under the folder '60.A-9709(D) - EFOSC2'. The objects listed are:

- Tests SW Upgrade
- Gallery
- OT queues - do not exec
- Test Technical Template
- Dennefeld
- 1000007347 - No Name
- 1500000482 - No Name
- 1500000485 - No Name
- 1500000488 - No Name
- 1500000491 - No Name
- 1500000404 - No Name
- 1500000497 - No Name
- 1500000500 - No Name
- Tech_right20191112
- Test_Chilara
- 1000030582 - No Name
- 1000030585 - No Name
- 1000030588 - No Name
- 1000030591 - No Name
- 1000030594 - LaSilla-School-test

At the bottom of the sidebar are buttons for 'OB', 'CB', and 'Fid'.

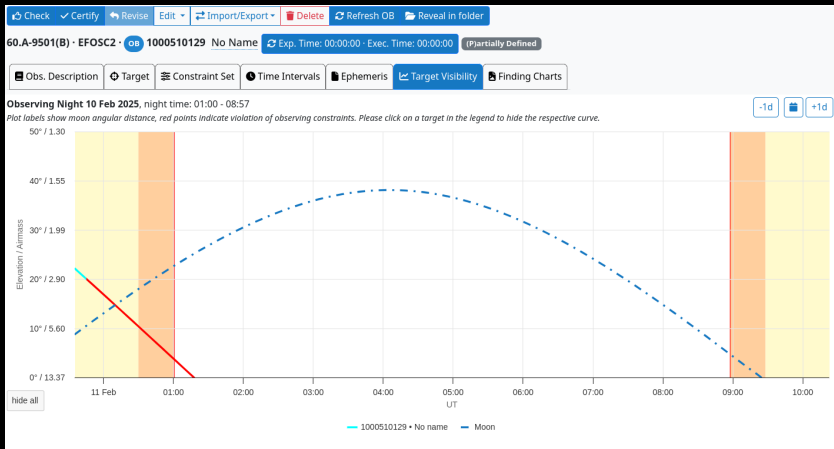
The main panel shows the details for the selected target '60.A-9709(D) - EFOSC2 - 1000030594 LaSilla-School-test'. The 'Target Name' is 'V RRR Pic'. The 'Exp. Time' is '00:06:00' and the 'Exec. Time' is '00:10:02'. The status is '(Partially Defined)'. The 'Target Visibility' is set to 'resolve'.

The main panel also displays various astronomical parameters:

Parameter	Value
Right Ascension	06:35:36.063
Declination	-62:38:24.293
Equinox	J2000
Epoch	2000
Proper Motion Right Ascension	0.0032990
Proper Motion Declination	-0.0034600
Differential Right Ascension	0
Differential Declination	0

Navigation icons are visible at the bottom right of the interface.

Observing with EFOSC: Preparation



Observing with EFOSC: Preparation

Check ✓ Certify ↻ Revise Edit ↻ Import/Export • Delete Refresh OB Reveal in folder

60.A-9501(B) · EFOSC2 · **OB** 1000510129 No Name Exp. Time: 00:00:00 · Exec. Time: 00:00:00 (Partially Defined)

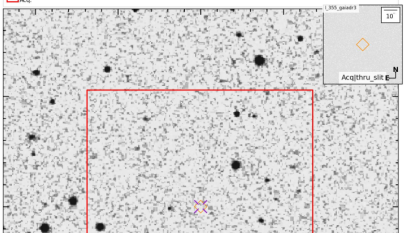
Obs. Description Target Constraint Set Time Intervals Ephemeris Target Visibility Finding Charts

Upload Finding Chart Generate Finding Chart Background image ⓘ

#1 p2fc_ob1000510129_1.jpg Delete

EFOSC2 Run ID: 60.A-9501(B) | Observing School | OB: No Name
Target: No name | 00:00:00.000 -00:00:00.000
Pos.Ang. = 90.0 deg.

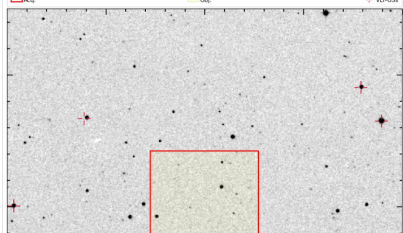
Band: 531 - 710 nm (DSS2RED)



#2 p2fc_ob1000510129_2.jpg Delete

EFOSC2 Run ID: 60.A-9501(B) | Observing School | OB: No Name
Target: No name | 00:00:00.000 -00:00:00.000

Band: 531 - 710 nm (DSS2RED)



Observing with EFOSC: Preparation

www.eso.org/sci/facilities/Astia/scops/brvefosc1.cgi

La Silla

La Silla - Science Operation Department

EFOSC Set-Up Form

[HOME](#) [INDEX](#) [SEARCH](#) [HELP](#) [NEWS](#)

Please use the following form to submit your set-up request for EFOSC2. If your setup is special and does not follow the standard setup form, please contact your support astronomer. Note that it is critical that you discuss the set-up with your support astronomer prior to submitting the form.

This set-up form has to be submitted at the latest at 07:00 local on the day you start observing. If you submit it later, it is likely that either your set-up will not be ready in time and/or that you will be waken up early in the morning. It is very helpful to submit this form as far in advance as possible, for forward planning of instrument set-ups. If you know the set up you will use in advance of your run, please submit it early (even before arrival at La Silla).

Please do not overfill this form: select only the optical elements you need. Conversely, it is better to fill in the form once with all the elements you will possibly need than to request changes to the set up during the run. Consider what you need carefully before you submit the form. Please note that changing grisms is particularly time consuming. This form is not performing any verification on the consistency of the set-up you request: be sure to check that you are not requesting duplicates or incompatible elements.

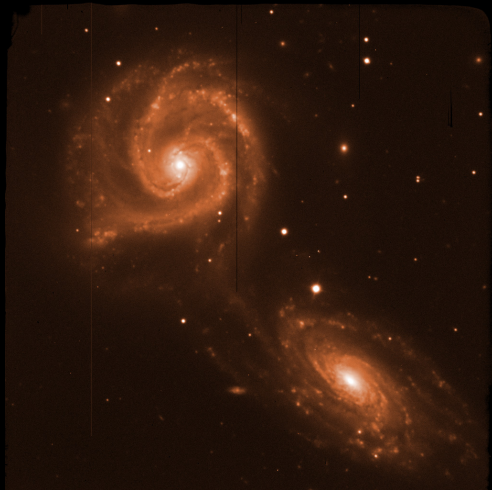
Observer: First name and name
Prog.Id: Format: 075.D-01234(A); see [schedule](#)
Date of Setup: -- First night of observations. Format: YYYY-MM-DD
P2PP Password: Required for identification

Slit Wheel	Filter Wheel	Grism Wheel	Polarimetry Retarder Plates
1 <input type="text"/>	1 <input type="text"/>	1 <input type="text"/>	1 <input type="text"/>
2 <input type="text"/>	2 <input type="text"/>	2 <input type="text"/>	
3 <input type="text"/>	3 <input type="text"/>	3 <input type="text"/>	
4 <input type="text"/>	4 <input type="text"/>	4 <input type="text"/>	
5 <input type="text"/>	5 <input type="text"/>	5 <input type="text"/>	
6 <input type="text"/>	6 <input type="text"/>	6 <input type="text"/>	
7 <input type="text"/>	7 <input type="text"/>	7 <input type="text"/>	
8 <input type="text"/>	8 <input type="text"/>	8 <input type="text"/>	
9 <input type="text"/>	9 <input type="text"/>	9 <input type="text"/>	
10 <input type="text"/>	10 <input type="text"/>	10 <input type="text"/>	
11 <input type="text"/>	11 <input type="text"/>	11 <input type="text"/>	
12 <input type="text"/>	12 <input type="text"/>	12 <input type="text"/>	

Additional Comments:
In case you selected a special optical element ("Special - see note"), please give the specifications here after.

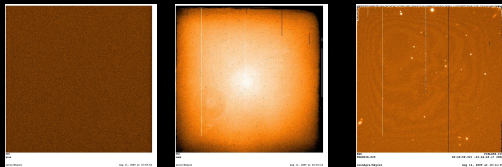
Submit

Observing with EFOSC: Imaging



- FoV: $4.1' \times 4.1'$
- 4 Bessel filters
- 4 Gunn filters
- 18 Narrow Band filters

Observing with EFOSC: Imaging

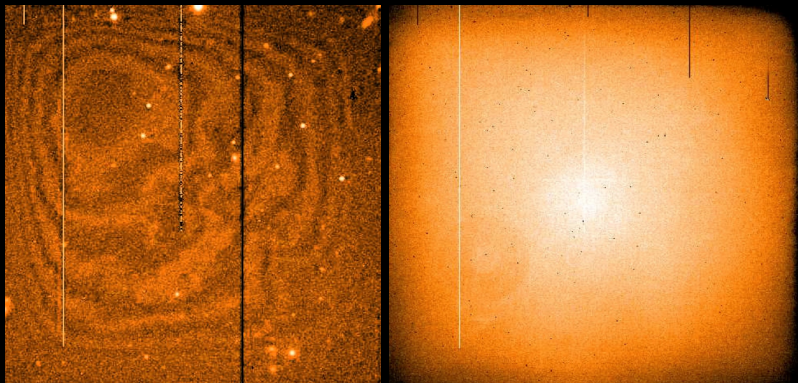


To calibrate, we might need:

- bias (day)
- flats (twilight)
- super-flat for fringes or sky-concentration (night)
- photometric standard stars (night)
- astrometric field (night)

Observing with EFOSC: Imaging

How to correct for fringing or sky concentration?



Observing with EFOSC: Imaging

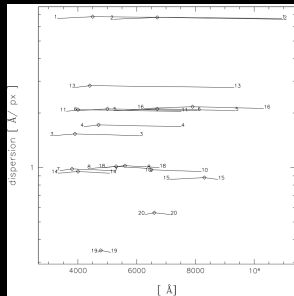
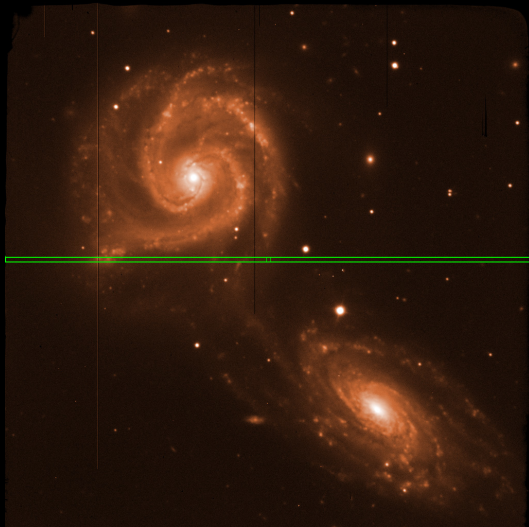
How to correct for fringing or sky concentration?

Fringing and sky concentration are **additive** patterns as they result from light getting scattered in the camera. They have to be **subtracted** from the images after the pattern has been scaled to the actual value in the image.

Note that also the flats show these features, so for proper flat-fielding, the structure has to be subtracted from the flat-image before dividing by the flat. → iteration

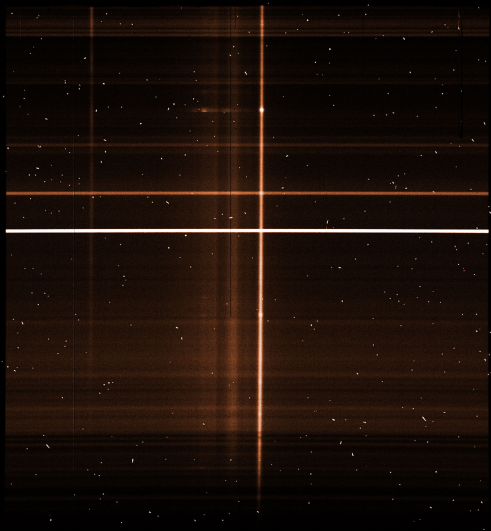
A fringe pattern is available on EFOSC page, it seems to be stable in shape. No analysis is done for sky concentration.

Observing with EFOSC: Spectroscopy



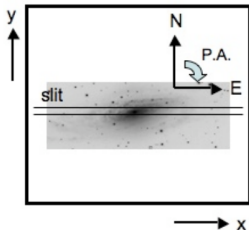
- 17 grisms
- 9 slit widths
- all slits also with offsets to change the wavelength range

Observing with EFOSC: Spectroscopy



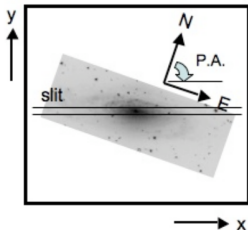
Observing with EFOSC: Spectroscopy

Rotator offset angle = $PA - 90^\circ$



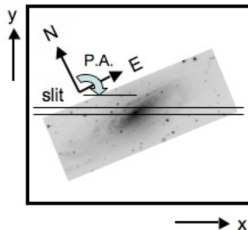
Default orientation

Rotator offset angle = 0°
Slit position angle = 90°



Rotated: negative offset

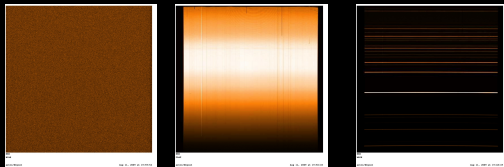
Rotator offset angle = -30°
Slit position angle = 60°



Rotated: positive offset

Rotator offset angle = 30°
Slit position angle = 120°

Observing with EFOSC: Spectroscopy

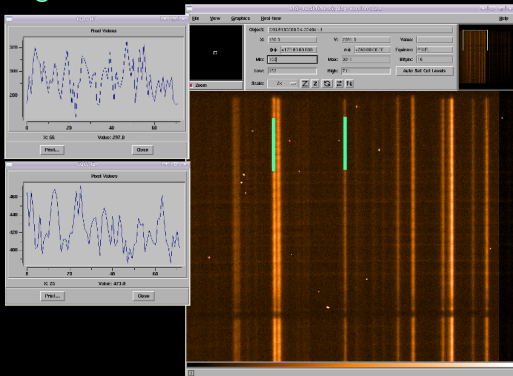


To calibrate, we might need:

- bias (day)
- flats (day)
- arcs lamps (day)
- flat for fringes (night)
- spectro-photometric standard stars (night)

Observing with EFOSC: Spectroscopy

Fringes:

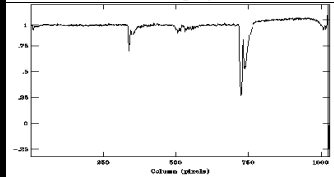
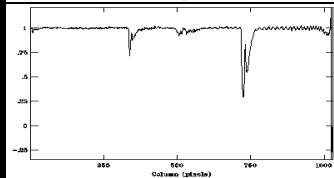
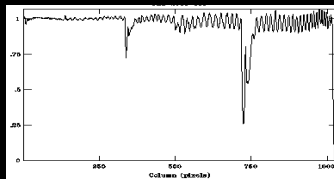
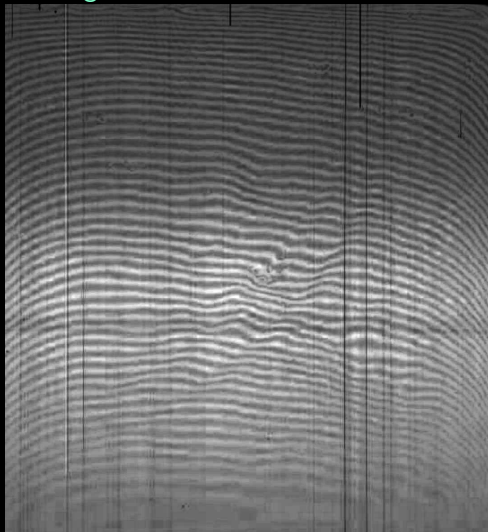


For optimal fringe correction, the flat should be taken close in time and at the same rotator angle as the observations.

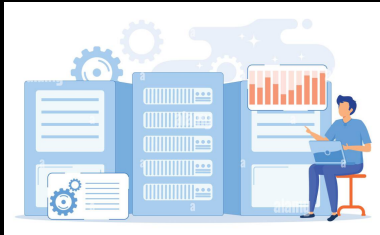
Spectroscopic fringes are **multiplicative** and thus part of the flat-field correction.

Observing with EFOSC: Spectroscopy

Fringes:



What comes after...



Data Reduction

Pipelines, EsoRex

EsoReflex

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results found.

EFOSC Workflow For IMG Data (v. 2.3.8)

This is a basic workflow to help with data organisation and execution of the pipeline. The workflow was generated without a review of the quality of the science products.

Workflow Instructions

To run this workflow on the demo data:

- Turn on highlighting. Choose "Tools" -> "Animate at Runtime" from top menu and set it to "1".
- Press the "Run" button OR ctrl-R to start the workflow.

To run on a different data set:

- Click on RAW_DATA_DIR and set as appropriate.
- All subdirectories of RAW_DATA_DIR will be searched for data.
- IMPORTANT:** END_PRODUCTS_DIR should not be a subdirectory of the RAW_DATA_DIR, otherwise it will be searched for raw data.
- Press the "Run" button OR ctrl-R to start the workflow.

The general concepts of Reflex are described in http://www.eso.org/sci/infocentre/info/pipelines/index.html#pipeline_table

Setup Directories

Input:

- RAW_DATA_DIR: \$HOME/reflex_data/
- RAW_DATA_DIR: /usr/share/efosc2016/efosc2016/

Only change CALL_DATA_DIR if you do NOT want to use the calibration data defined with the pointer.

- CALL_DATA_DIR: /usr/share/efosc2016/efosc2016/

Output:

- END_PRODUCTS_DIR: \$HOME/efosc2016_end/products

Working Directories:

- BOOKKEEPING_DIR: \$HOME/efosc_data/bookkeeping/efosc_imaging
- LOGS_DIR: \$HOME/efosc_data/efosc_imaging_logs/efosc_imaging
- TEMP_PRODUCTS_DIR: \$HOME/efosc_data/efosc_imaging_temp/products/efosc_imaging
- BOOKKEEPING_DIR: \$HOME/efosc_data/bookkeeping/efosc_imaging

Global Parameters

RecipeFailureMode: Ask ■ = actor with interactive option

Global parameter for the behaviour when a recipe fails. 'Ask' means that each time a recipe fails, the choice to continue or stop will be presented. 'Continue' means that the workflow will ignore errors and continue. 'Stop' means the workflow will stop.

RecipeDir: /ask

Change 'RecipeDir' to 'stop' to ensure BOOKKEEPING_DIR, TEMP_PRODUCTS_DIR and LOGS_DIR each time the workflow is run (Ask/Mode will not work anymore).

HTS_VIEWER: tv

Program to use for the inspection of input/output products. Use full path name if it is not in the standard path.

InteractorInteractivity: false

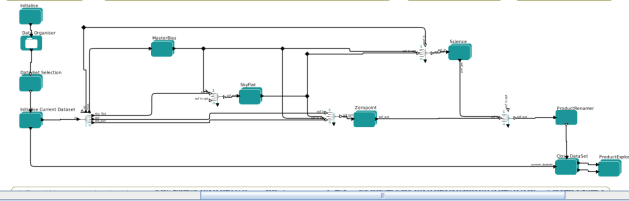
Set to 'false' to disable interactive GUIs for the whole workflow. Each interactive actor can specify its own setting, which overrides the choice given here. This workflow has no interactive actors.

SelectDefaultMethod: Interactive

Specify how solutions for processing are selected ('ASK' = never tried before, 'Reduced' = successfully run before, 'Skip' = unsuccessfully run before), or set to 'Interactive' for interactive selection.

ProductDisplayMode: Triggered

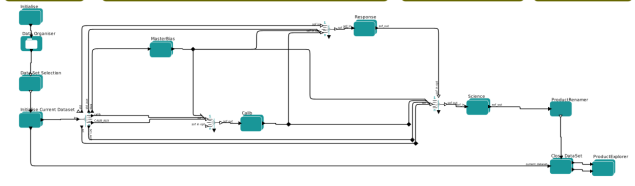
Specify when you want to see the ProductDisplay GUI ('Triggered' = show it after all data sets have been reduced, 'Enabled' = show it after each dataset, 'Disabled' = never show it)



EFOSC Workflow For MOS Data (v. 2.3.8)

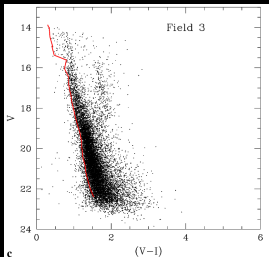
This is a basic workflow to help with data organisation and execution of the pipeline. The workflow was generated with a review of the quality of the science products.

Workflow Instructions	Setup Directories	Global Parameters
<p>To run this workflow on the demo data:</p> <ul style="list-style-type: none"> - Turn on highlighting. Choose "Tools" > "Select at Runtime" from top menu and set B to "1". - Press the "Run" button OR ctrl-R to start the workflow. <p>To run on a different data set:</p> <ul style="list-style-type: none"> - Click on RAW_DATA_DIR and set as appropriate. All subdirectories of RAW_DATA_DIR will be searched for data. - If desired, change END_PRODUCTS_DIR. IMPORTANT: END_PRODUCTS_DIR should not be a subdirectory of the RAW_DATA_DIR, otherwise it will be searched for raw data. - Press the "Run" button OR ctrl-R to start the workflow. <p>The general concepts of Reflex are described in Action, Activities, SWS, OBS. Please credit this paper in publications on research that used Reflex.</p> <p>Workflow tutorial and Para pipeline manual can be found here: http://www.eso.org/sci/software/pipelines/index.html#pipelines_table</p>	<p>Input:</p> <ul style="list-style-type: none"> ● ROOT_DATA_DIR: \$HOME/reflex/data/ ● RAW_DATA_DIR: /usr/share/eso/pipelines/efosc/ ● CALIB_DATA_DIR: /usr/share/eso/pipelines/efosc/ ● END_PRODUCTS_DIR: /usr/share/eso/pipelines/efosc/ <p>Only change CALIB_DATA_DIR if you do NOT want to use the calibration data collected with the pipeline.</p> <p>Output:</p> <ul style="list-style-type: none"> ● END_PRODUCTS_DIR: /usr/share/eso/pipelines/efosc/ <p>Working Directories:</p> <ul style="list-style-type: none"> ● BOOKKEEPING_DIR: /usr/share/eso/pipelines/efosc/ ● LOGS_DIR: /usr/share/eso/pipelines/efosc/ ● TMP_PRODUCTS_DIR: /usr/share/eso/pipelines/efosc/ ● END_PRODUCTS_DIR: /usr/share/eso/pipelines/efosc/ 	<p>● RecipeFallback: Ask Global parameter for the behaviour when a recipe fails. 'Ask' means that each time a recipe fails, the choice to continue or stop will be presented. 'Continue' means that the workflow will ignore errors and continue. 'Stop' means the workflow will stop.</p> <p>● Freeform: false Change "Freeform" to "true" to enable BOOKKEEPING_DIR, TMP_PRODUCTS_DIR and LOGS_DIR each time the workflow is run (Data Mode will not work anymore). Program to use for the inspection of input/output products. Use full path name if it is not in the standard path.</p> <p>● HTX_WORK: 1s Set to "false" to disable interactive GUIs for the whole workflow. Each interactive action can specify its own setting which overwrites the choice given here. This workflow has no interactive actions.</p> <p>● GlobalInteractivity: false Specify how datasets for processing are selected (SWP: "best" = never first before, "BestCOF" = successfully run before, "false" = unsuccessfully run before), or set to "Interaction" for interactive selection.</p> <p>● StopOnError: true Specify when you want to see the ProductExplorer GUI. "Trigger" = show it after all data sets have been reduced. "true" = show it after each dataset. "Disabled" = never show it.</p>

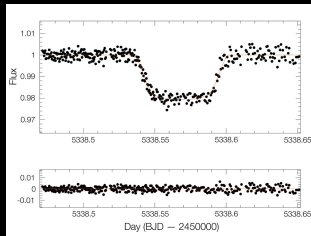


Workflow and data organisation: please do not change. ● \$HOME: /tmp/2017-08-22T18:33:24 ● \$EODIR: /usr/share/efosc/flow ● END_PRODUCTS_DIR: /usr/share/eso/pipelines/efosc/2017-08-22T18:33:24 ● \$HOME_SELECTED_DATASETS: /

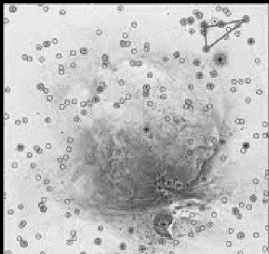
Imaging



photometry



differential photometry

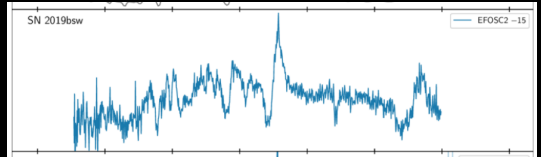
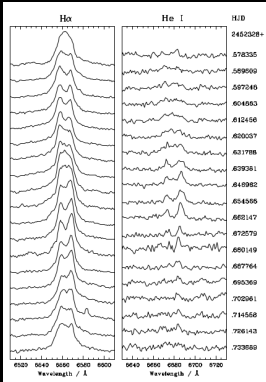


astrometry

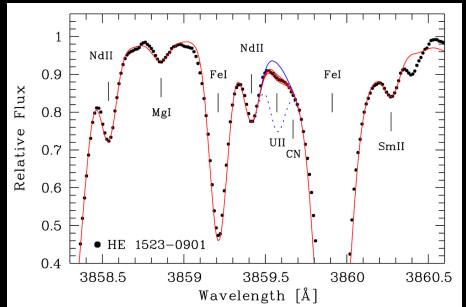


images

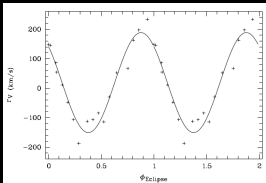
Spectroscopy



classification



abundances



radial velocities

The image features two prominent spiral galaxies, one in the upper right and one in the lower left, set against a dark cosmic background filled with numerous stars. The galaxies have bright yellowish-white cores and blueish-purple spiral arms. The text 'Happy Observing!' is centered in a bright green, bold, italicized font.

Happy Observing!