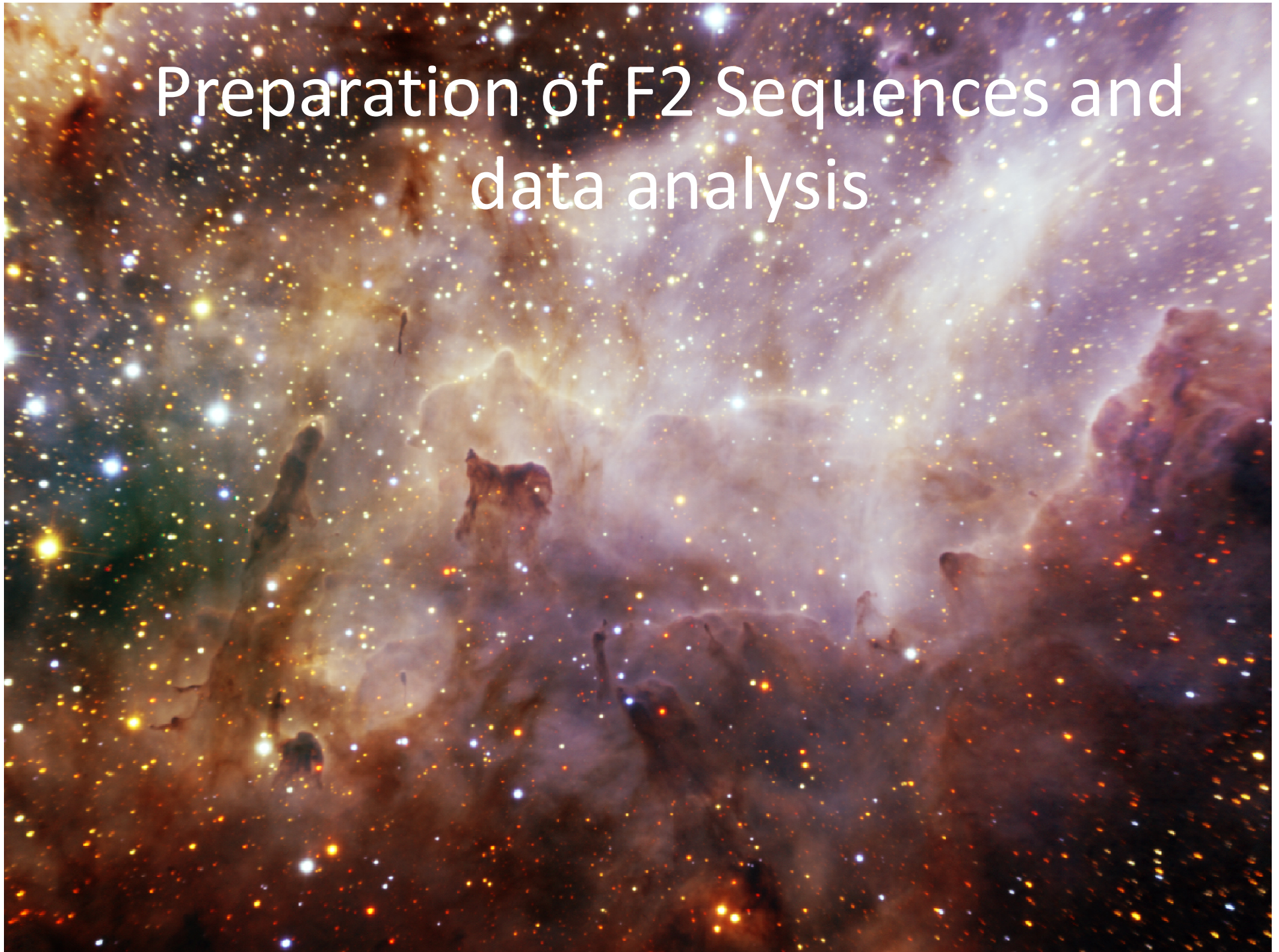


Preparation of F2 Sequences and data analysis



Please use the templates and libraries in the OT for the latest

Science Program Editor - [GS-Flamingos2-library] Flamingos2 OT library - version 2014-Jul-28 - Gemini (Gemini South)

File Edit View Go Tools Help

Open Prev Back Forward Next Cut Copy Paste Plot Image Libraries Apply Reapply Queue Conflict Sync

Gemini Science Program

Program information taken from the Phase 1 proposal.

Program Title: Flamingos2 OT library - version 2014-Jul-28

Program Reference: GS-Flamingos2-library (Queue, Band 1)

TOO Status: None ☒ Notify PI ☒ Active ☐ Completed

Principal Investigator / Contact

First Name: Last Name: Support: None Phone: PI / PC Email: NGO Contact Email: Contact Sci. Email:

Observing Time

| Planned | | Used | | Allocated | Remaining |
|----------|----------|----------|----------|-----------|-----------|
| Exec | PI | Program | Partner | | |
| 00:00:00 | 00:00:00 | 00:00:00 | 00:00:00 | 00:00:00 | 00:00:00 |

File Attachment Sync History

| Name | Size | Last Modified (UTC) | Description | NGO Check? |
|------|------|---------------------|-------------|------------|
|------|------|---------------------|-------------|------------|

Show

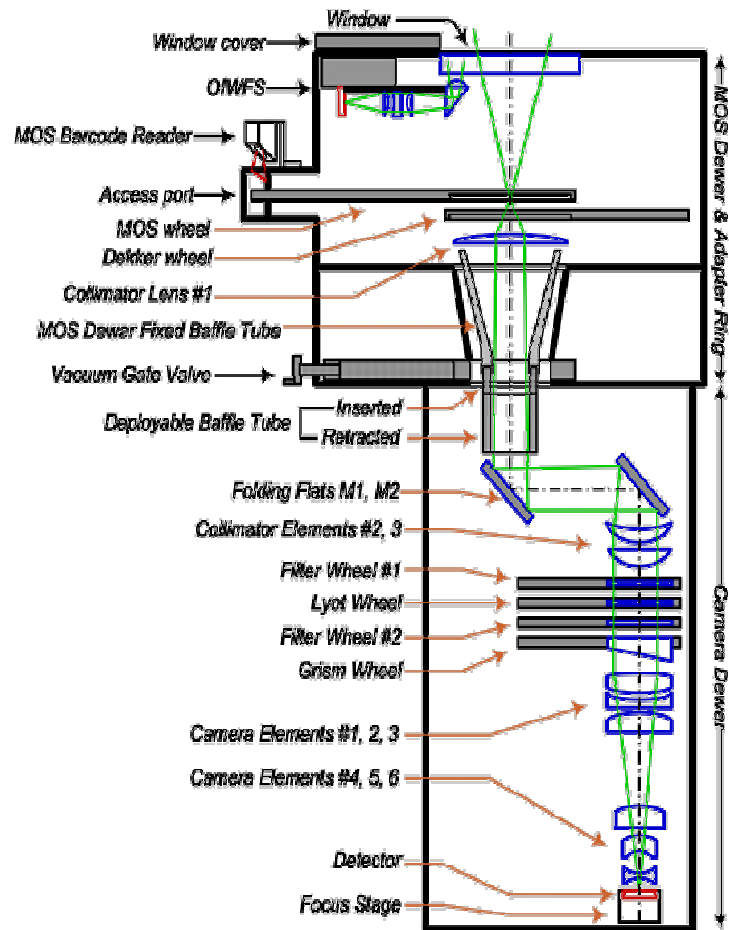
+

Describe Mark Checked

Flamingos2 OT library - version 2014-Jul-28

- History
- Imaging Templates
 - F2 Imaging Notes
 - Darks are now taken weekly
 - [3] Sparse Field Imaging
 - [4] Crowded Field / Extended Object Imaging
 - [5] Flats
- Long-slit Templates
 - F2 Long-Slit Notes
 - Darks are now taken weekly
 - [6] Telluric Acquisition
 - [7] Telluric Observation
 - [8] Acquisition (H<12 w/o sky sub)
 - [9] Acquisition (H>12 w/ sky sub)
 - [12] Telluric Acquisition
 - [13] Telluric Observation
 - [31] Sparse Field Spectroscopy
 - [32] Extended Object Spectroscopy
- MOS Templates
 - EXAMPLE: Sparse Field Imaging
 - EXAMPLE: Extended Object Imaging
 - EXAMPLE: Long-Slit Spectroscopy

To know what happens to F2 look at the ISD



FLAMINGOS-2 ISD

Preparing Acquiring Reading Out

GCAL

Cover Closed

OIWS NOT_FOLLOWING

MOS 2-pbx_grid

Decker Open

Gate Valve Undefined

Baffle Undefined

Filter1 Ks_G0804

Lyot f/16_G5830

Filter2 Open

Disperser Open

Detector

Focus Undefined

Overall Status

FLAMINGOS-2 Health: **GOOD**

DHS State: **CONNECTED**

State: **RUNNING**

Action State: **IDLE**

Observe Setup

Data Label: S20130811S0045

Observe State: **IDLE**

Reads: 1

Exposure Time: 5

Time Left: 0

Progress: 260%

Temperatures & Pressures

| | |
|------------------------------|----------|
| MOS Dewar Temp (K): | 101.21 |
| MOS Dewar Press (Torr): | 4.76e-08 |
| Detector Dewar Temp (K): | 89.26 |
| Detector Dewar Press (Torr): | 1.49e-07 |
| Detector Temp (K): | 80.00 |
| Heater Power (%): | 67.5 |

Temperature Status: **STABLE**

Commands

DHS:

Error Messages

System Status:

Command Status:

Connection Status:

Focus Status:

OIWS Base INDEXED OIWS Pickoff INDEXED

FLAMINGOS-2 Win

Window Cover Commands

FLAMINGOS

MOS Masks

mos1: GS2011BQ601-01

mos2: GS2011BQ601-02

mos3: GS2011SQ600-02

mos4: GS2011BQ601-03

mos5: GS2011BQ601-04

mos6: GS2011BQ601-01a

mos7: GS2011BQ601-02a

mos8: TestMask08

Circ1: 30500007

Circ2: 30500008

slit1: 30500001

slit2: 30500002

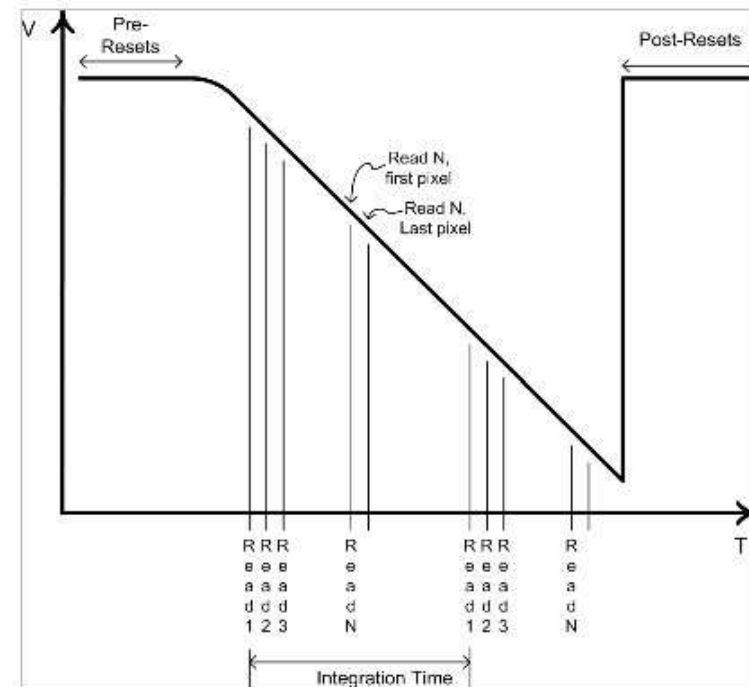
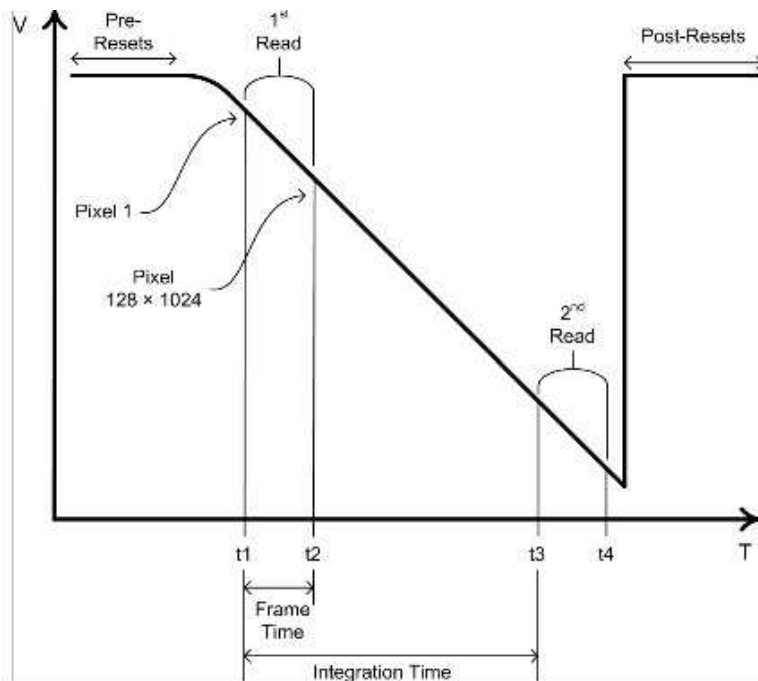
slit3: 30500003

slit4: 30500004

slit5: 30500005

slit6: 30500006

Correlated Double Sampling is how Near-IR arrays are typically read



Images MEF has:

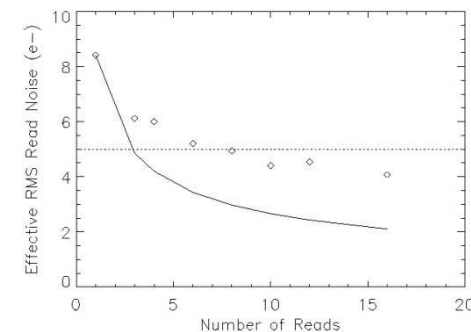
[0] has the generic info.

[1] has the data:

$CDS = \text{First_read} - \text{Second_read}$

or

$MDS = \text{Sum of First_Reads} - \text{Sum Second_Reads}$



F2 OT includes three types of preset readouts

Flamingos2 Instrument

The Flamingos2 instrument is configured with this component.

Focal Plane Unit: ☐ MOS pre-imaging

Filter: Pos Angle: deg E of N

Lyot Wheel: ☐ Allow $\pm 180^\circ$ change for guide star selection

Disperser: Exp Time: sec

Read Mode | ISS Port

☐ Bright Object
☐ Medium Object
☒ Faint Object

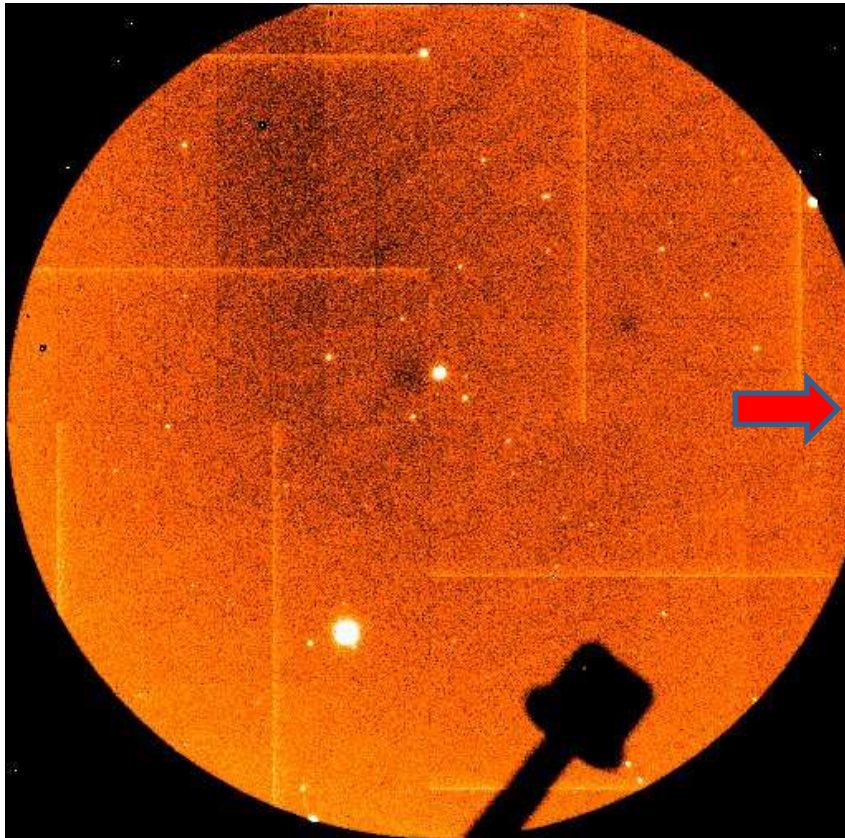
Reads: 8
Read Noise: <5.0 e- @ 77K
Exposure Time: > 85 sec (recommended) 12.0 sec (min)

Pixel Scale: 0.18 arcsec/pixel
Science FOV: 0.36 x 264 arcsec (Spectroscopy)

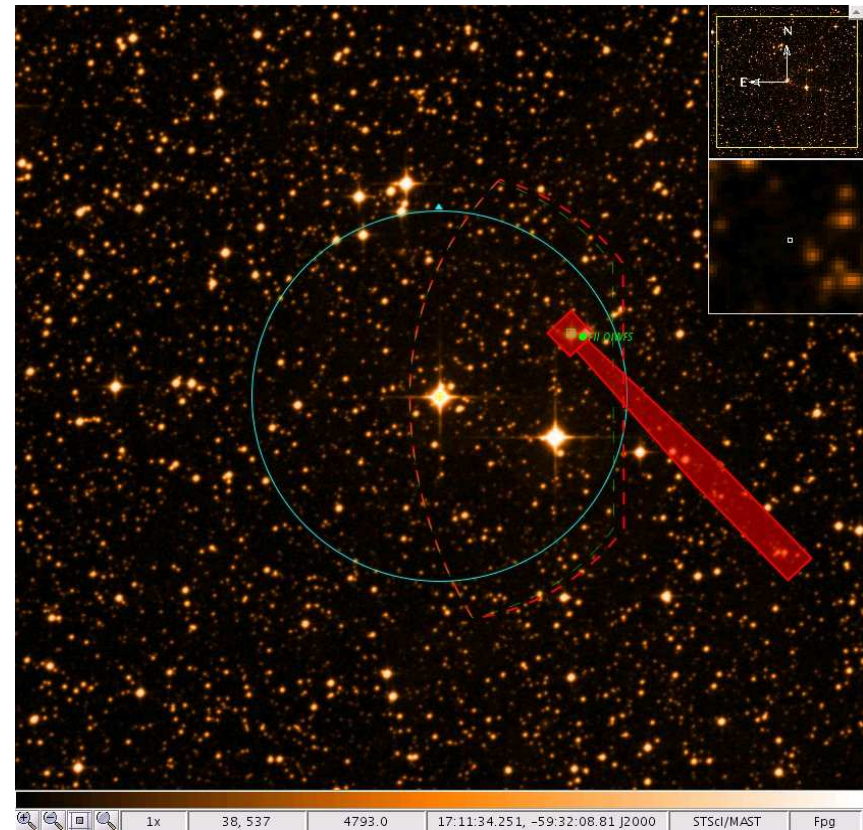
Bright Object CDS
Medium Object CMS=4
Faint Object CMS=8

This is how an F2 image of the sky looks like

PA = 0 degrees



-->ndisplay 23 sub-



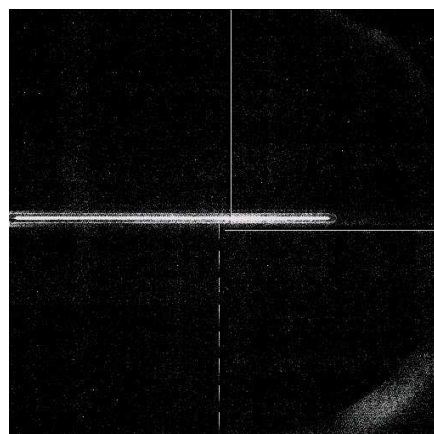
FOV has 6 arcmin diameter

Please remember that the longslits have two special properties.

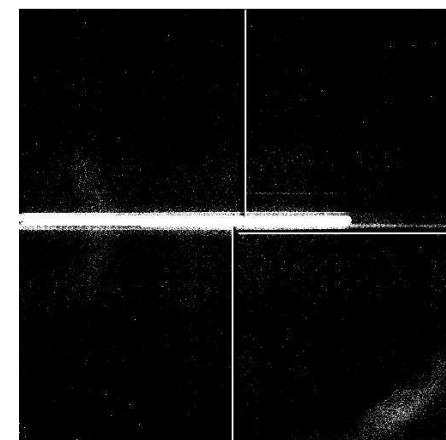
- They are all horizontal.
- They are not centered on the optical axis or the detector. They are asymmetric (90" N and 150" S).



1-pix slit



2-pix slit



8-pix slit

Most Acquisitions will put the science object in the **center of the field of view**. It will **not** be at the **center of the slit**.

There are Two Types of Long Slit Acquisitions

The diagram illustrates two types of Long Slit Acquisitions, each with a corresponding 'Base Sequence Component' window. A tree view on the left shows the acquisition structure, with 'Sequence' components highlighted in green and blue. Red arrows point from these 'Sequence' components to their respective 'Base Sequence Component' windows. Green and blue arrows labeled 'GACQ' point to specific elements in the sequence tables.

Top Acquisition (H < 12 w/o sky sub)

Base Sequence Component
This component contains the sequence of operations that generates the observation science data.

Title: Sequence

Obs Id: GS-F2-RECOM13-RUN-3-214

| Step | Time | RA | Dec | Object | Filter | Exposure |
|--------|-------|-------|------|----------------|--------|----------|
| step 1 | 0.00 | 0.00 | 0.00 | OBJECT H_G0803 | | 10.0s |
| step 2 | 10.00 | 0.00 | 0.00 | OBJECT H_G0803 | | 10.0s |
| step 3 | 0.00 | 10.00 | 0.00 | OBJECT H_G0803 | | 10.0s |
| step 4 | 0.00 | 0.00 | 0.00 | OBJECT H_G0803 | | 10.0s |
| step 5 | 0.00 | 0.00 | 0.00 | OBJECT H_G0803 | | 10.0s |
| step 6 | 0.00 | 0.00 | 0.00 | OBJECT H_G0803 | | 10.0s |

Bottom Acquisition (H > 12 w/ sky sub)

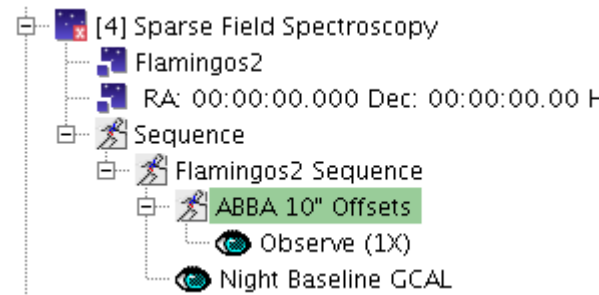
Base Sequence Component
This component contains the sequence of operations that generates the observation science data.

Title: Sequence

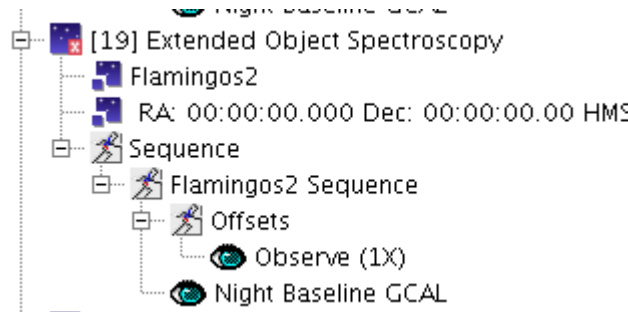
Obs Id: GS-F2-RECOM13-RUN-3-322

| Step | Time | RA | Dec | Object | Filter | Exposure |
|--------|-------|-------|------|----------------|--------|----------|
| step 1 | 0.00 | 10.00 | 0.00 | OBJECT J_G0802 | | 90.0s |
| step 2 | 0.00 | 0.00 | 0.00 | OBJECT J_G0802 | | 90.0s |
| step 3 | 10.00 | 0.00 | 0.00 | OBJECT J_G0802 | | 10.0s |
| step 4 | 0.00 | 10.00 | 0.00 | OBJECT J_G0802 | | 90.0s |
| step 5 | 0.00 | 0.00 | 0.00 | OBJECT J_G0802 | | 90.0s |
| step 6 | 0.00 | 0.00 | 0.00 | OBJECT J_G0802 | | 90.0s |
| step 7 | 0.00 | 0.00 | 0.00 | OBJECT J_G0802 | | 90.0s |

Sky subtraction is a **must** in near-IR

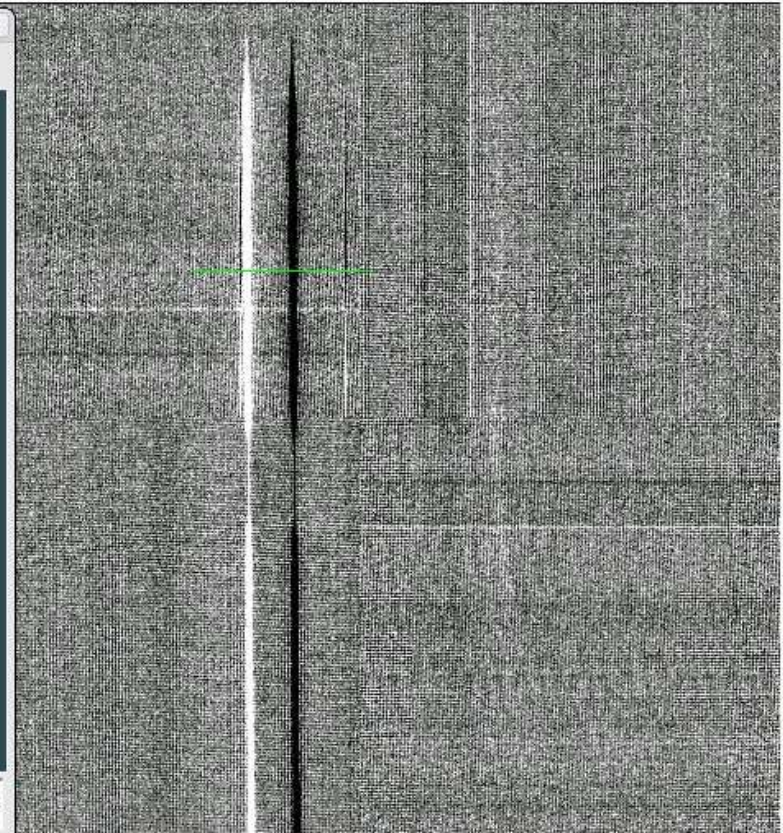
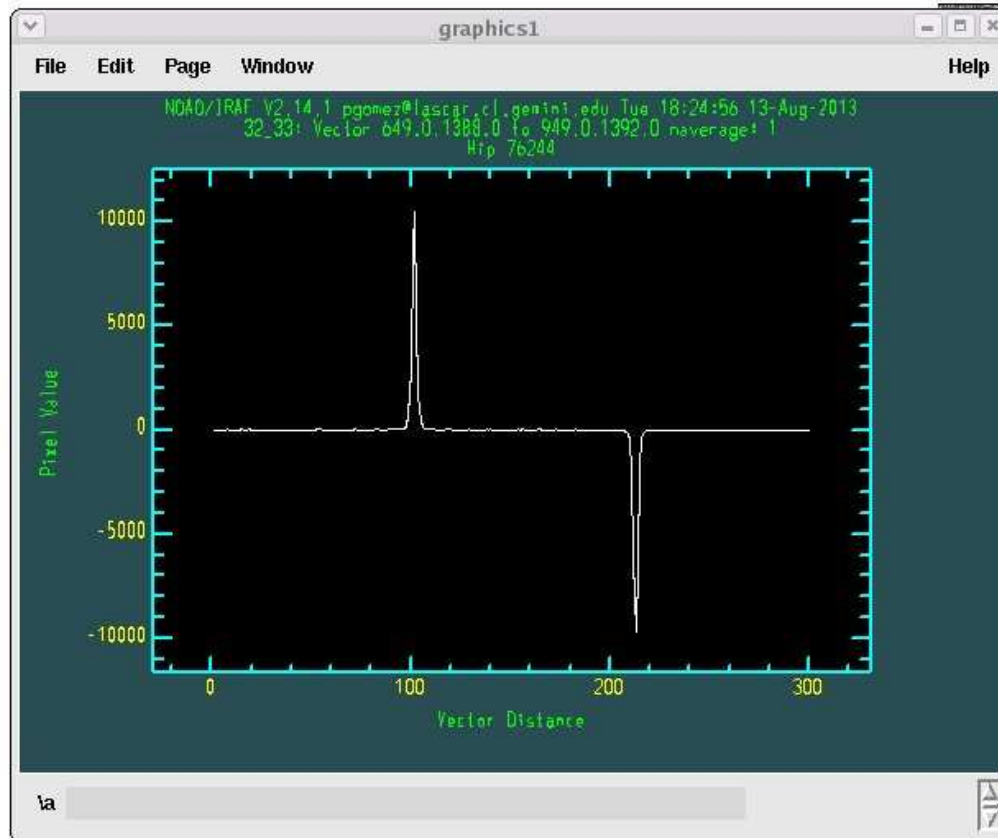


| Title ABBA 10" Offsets | | | |
|------------------------|-----|-------|---------|
| Index | p | q | Guiding |
| 0 | 0.0 | 10.0 | on |
| 1 | 0.0 | -10.0 | on |
| 2 | 0.0 | -10.0 | on |
| 3 | 0.0 | 10.0 | on |



| Offset Sequence Component | | | |
|--|--------|-------|---------|
| Configure offset based patterns with this component. | | | |
| Title Offsets | | | |
| Index | p | q | Guiding |
| 0 | 0.0 | 10.0 | on |
| 1 | 0.0 | -10.0 | on |
| 2 | 300.0 | 0.0 | off |
| 3 | 310.0 | 0.0 | off |
| 4 | 0.0 | -10.0 | on |
| 5 | 0.0 | 10.0 | on |
| 6 | -300.0 | 0.0 | off |
| 7 | -310.0 | 0.0 | off |

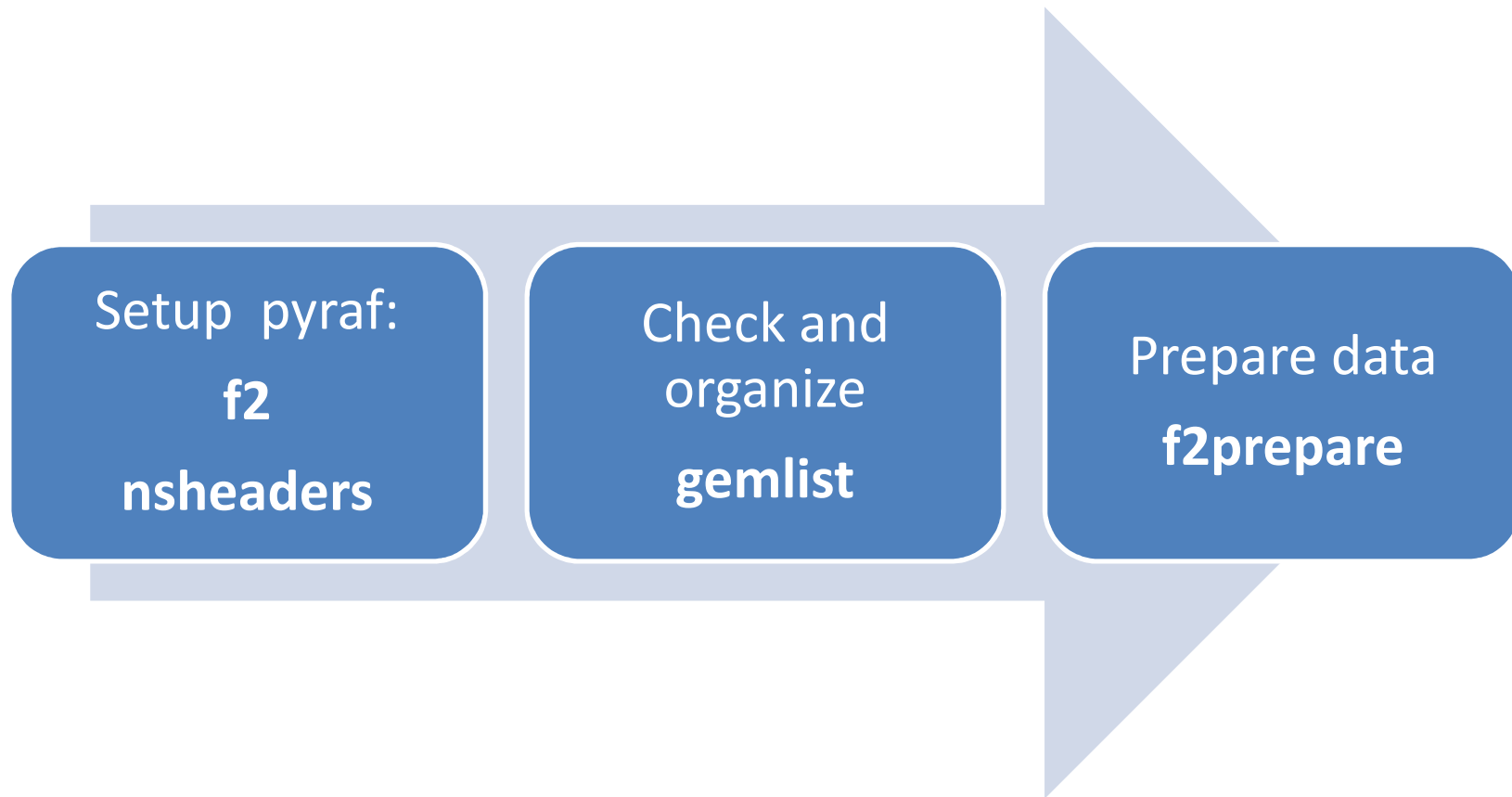
This is an example of a telluric



Don't forget the calibrations ...

- **Imaging**: We will try to take photometric standards whenever possible.
- **Imaging**: Flats to be taken once a month by SOS.
- **Long Slit**: Night Baseline GCAL will include flats and Arcs. No need for day baseline.
- **Long Slit**: **All must have a telluric**. It can be shared within a program if individual targets < 30 minutes.
- **ALL**: darks will be taken once a week. 10 needed per exp time and readout mode for science and flats only (not for Acq and arcs).

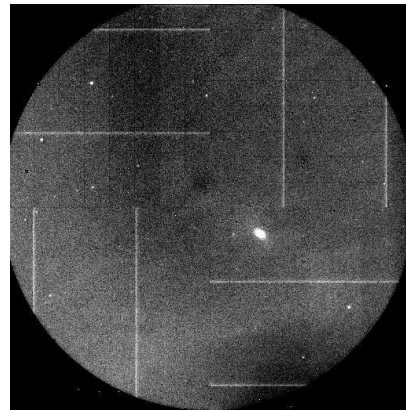
Gemini provides software for Imaging data reduction



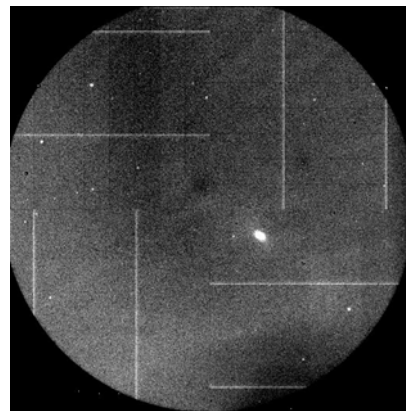
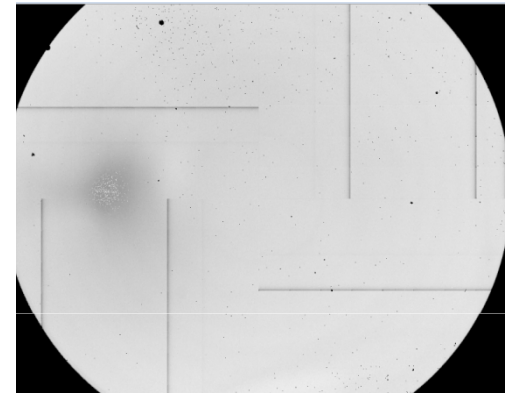
F2 data reduction package

- Examples script for:
 - Imaging
 - Longslit
 - MOS
- If you follow the steps and parameters set you will obtain reduced data.
- File a helpdesk or email in case of questions and/or problems

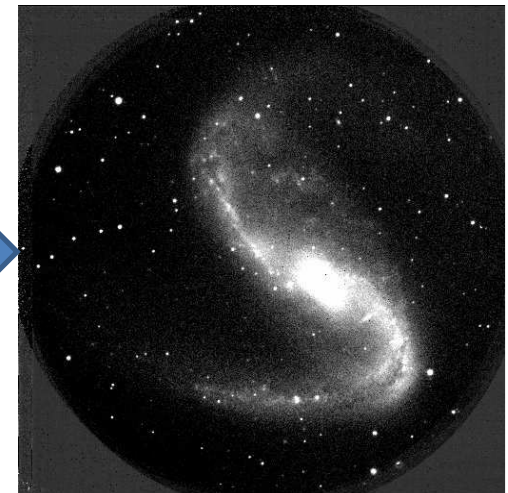
Imaging Data Procedure



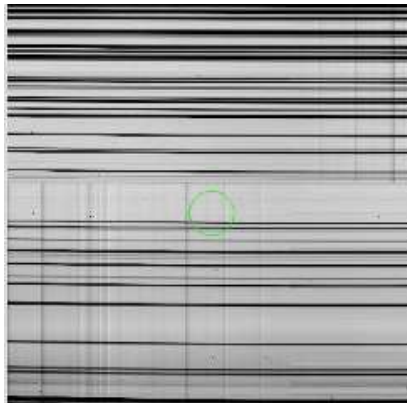
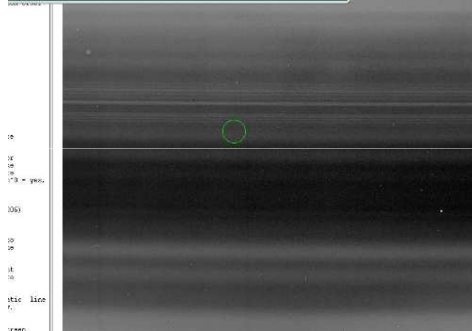
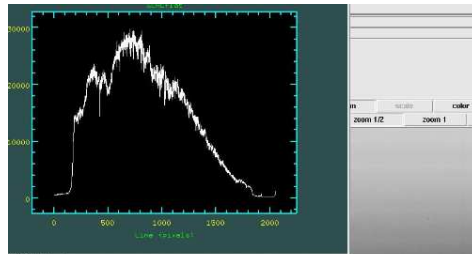
**F2prepare
Nireduce (fl_dark+)
Nisky**



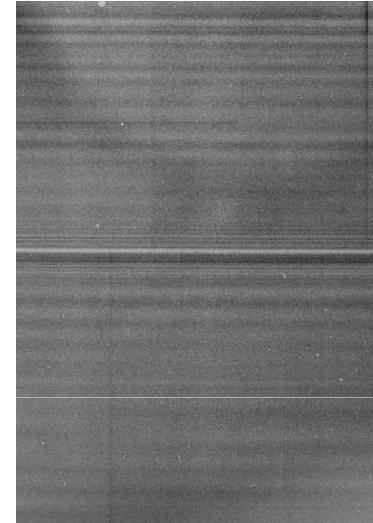
**F2prepare
Nireduce (fl_sky+ fl_dark+)
Imcoadd (align=header)**



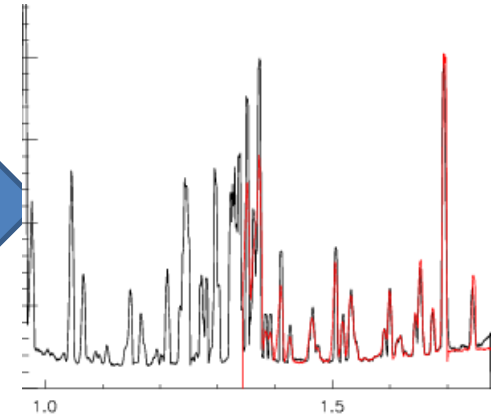
Spectroscopic Data Procedure



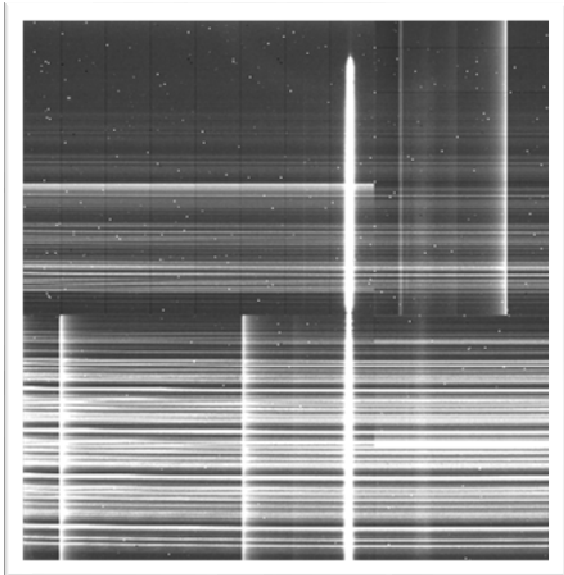
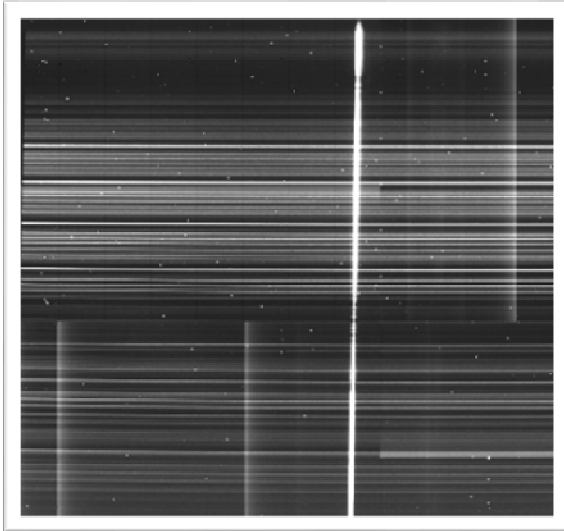
**Gemcombine @fdarks.lis
Nsreduce @flats.lis
Nsflat f@flat.lis**



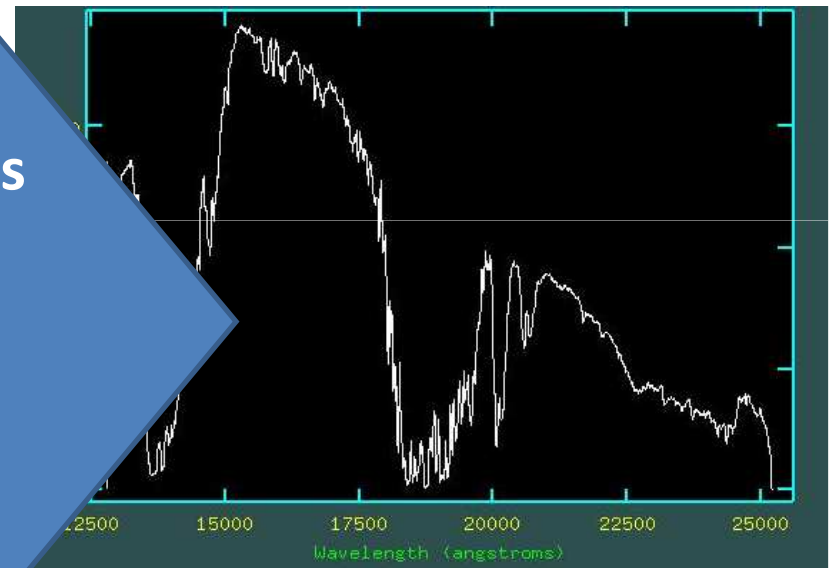
**Nsreduce @arc.lis
Nswavelength arc.fits**



Spectroscopic Data Procedure



Nsreduce f@obj.lis
Nscombine
Nsfitcoords
Nstransform
nsextract



Final Comments

- We want you to come to Gemini : "Bring One, Get One" Student Observer Support Program
- We want your instruments. New modes to bring PI instruments to Gemini (check webpages)