TripleSpec 4.1

Sean Points
NSF's NOIRLab

TripleSpec 4.1 Overview

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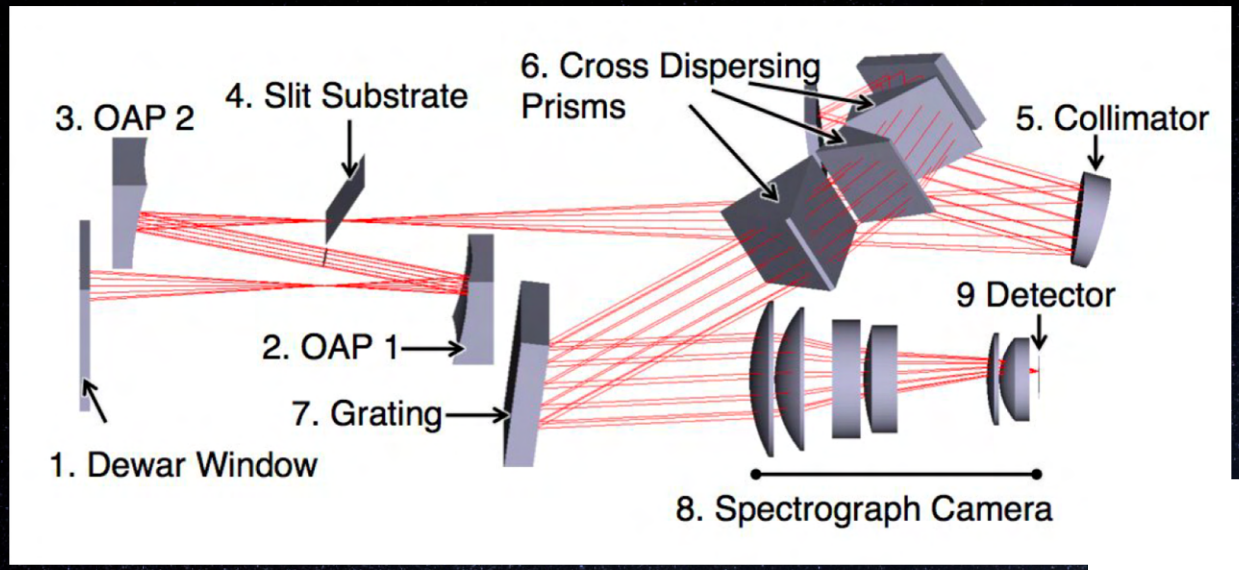
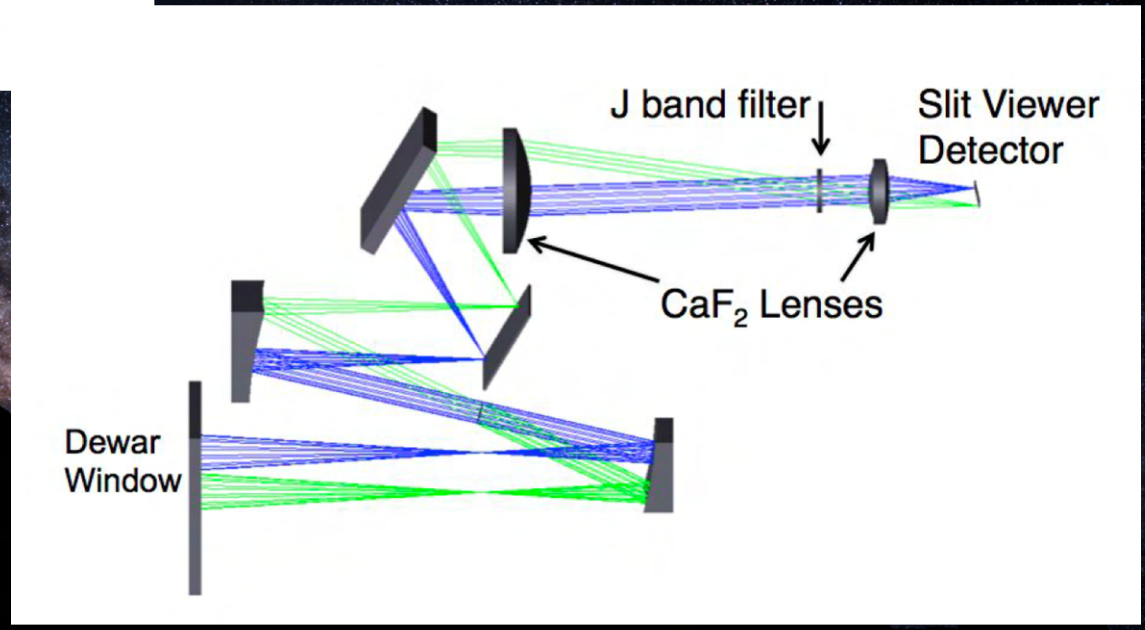
- Cross-Dispersed NIR Spectrograph
  - Covers ~4.5 orders
- Spectral Range: 0.95μm – 2.45μm
  - Instrument optics can cover 0.8μm – 2.45μm
  - Cutoff by NIR Nasmyth ISB dichroic
- Spectral Resolution ($\lambda/\Delta\lambda$): ~3500
- Slit-viewing (SV) camera for acquisition
  - J band
  - 4'x4' FOV

TripleSpec 4.1 Optics



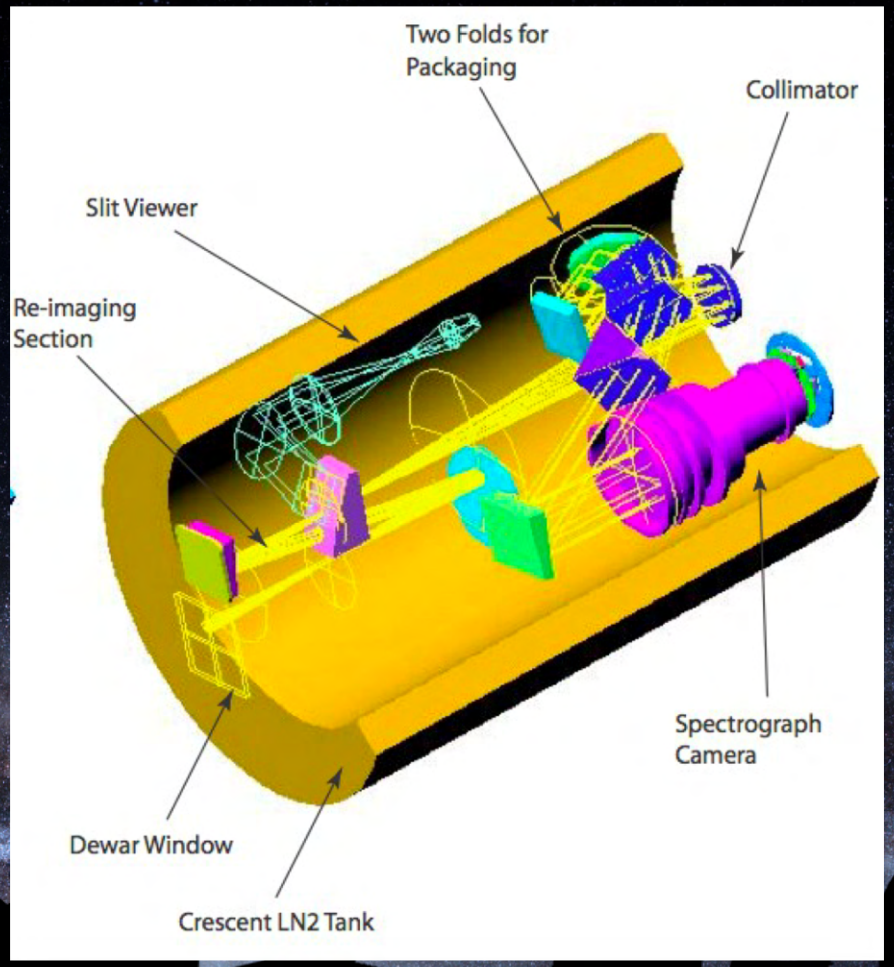
Spectrograph Optics

SV Optics

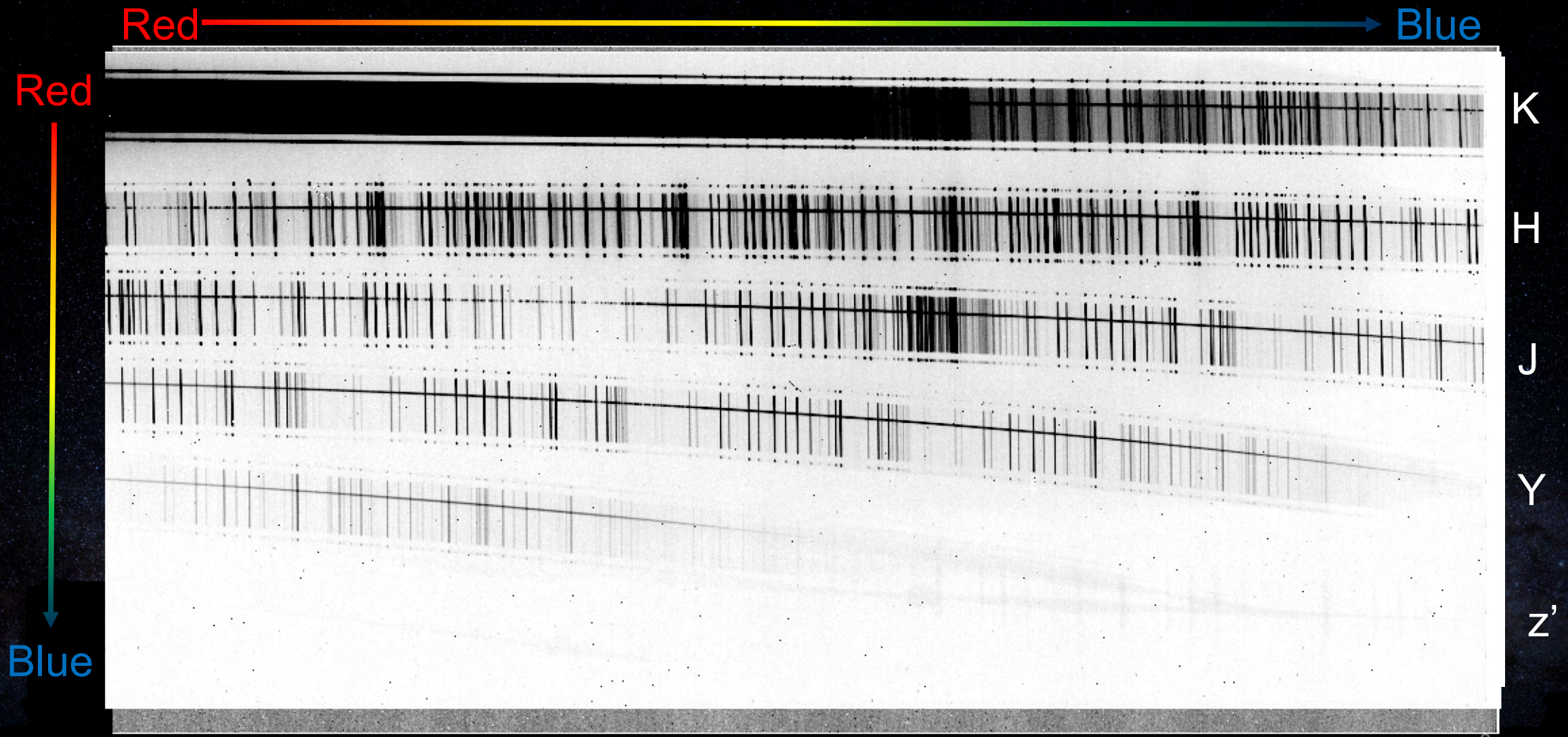


TripleSpec 4.1 Optics

Dewar Layout



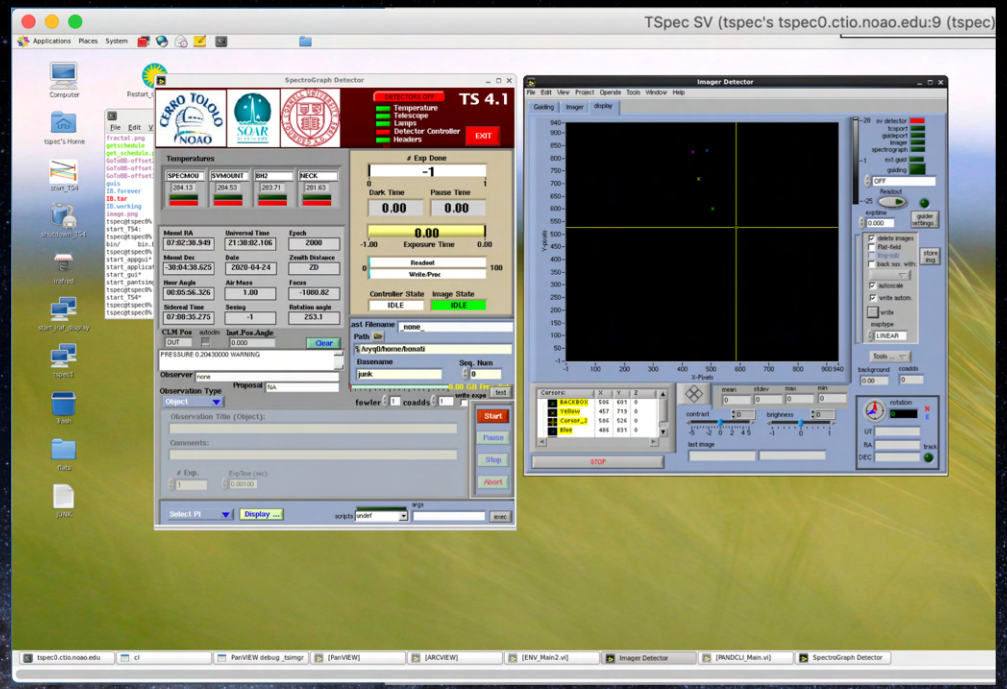
TripleSpec 4.1 Data



TripleSpec 4.1 Startup

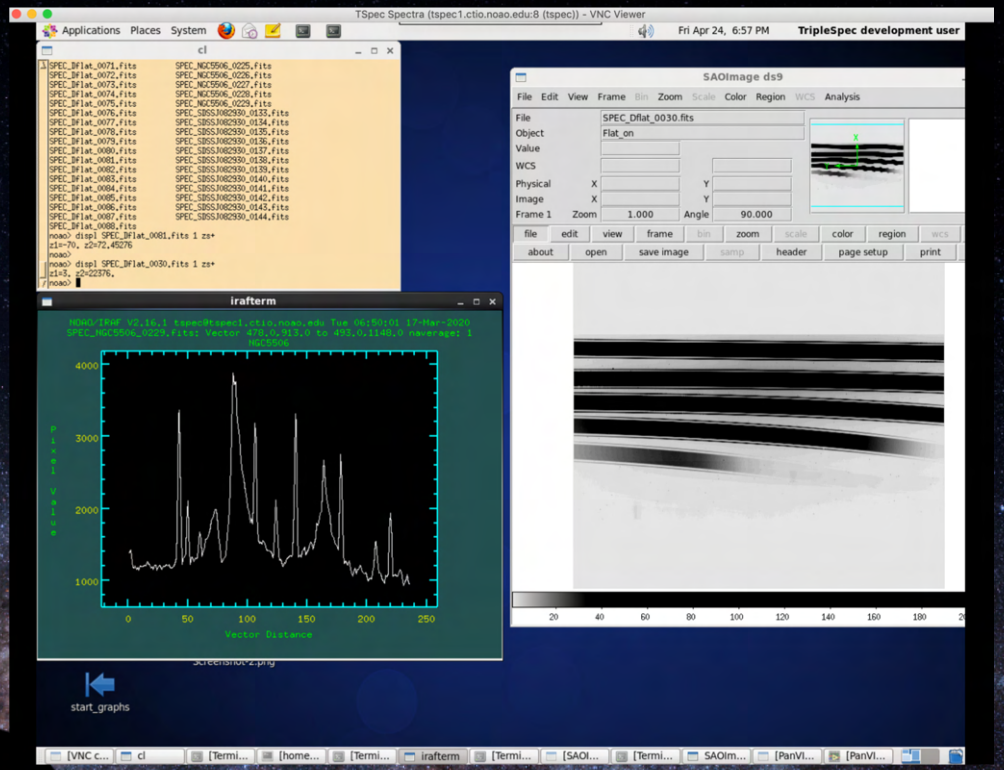
TripleSpec 4.1 Startup

- Two VNC viewers
  - 139.229.15.70:2109 (SV Camera)
  - 139.229.15.70:2208 (Spectrograph Camera)
- SV VNC
  - Click icon “start_TS4” or
  - Open Terminal
    - /home/tspec/app/bin/start_TS4



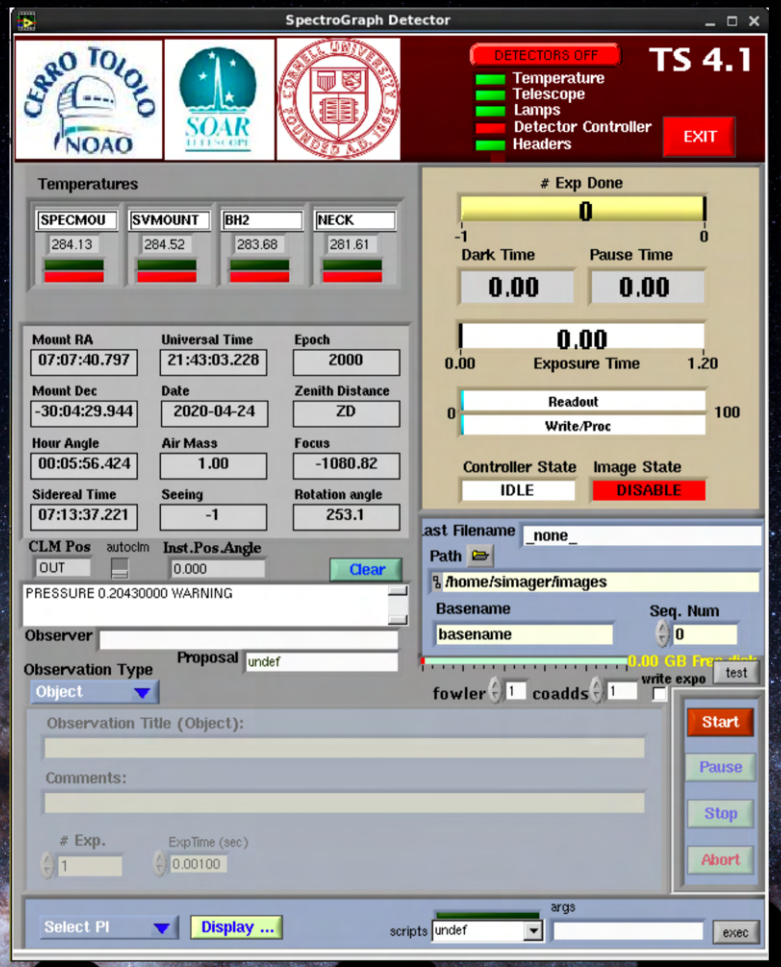
TripleSpec 4.1 Startup

- Spectrograph VNC
  - DS9 opens on startup
    - Automatic updates display
  - Make sure IRAF is open
  - Change IRAF directory



TripleSpec 4.1 Startup

- SV VNC
- Main Application GUI
  - Status
  - Telemetry
  - Setup
  - Readout
  - Observations
    - Object
    - Flats
    - Arcs
  - Telescope Focus



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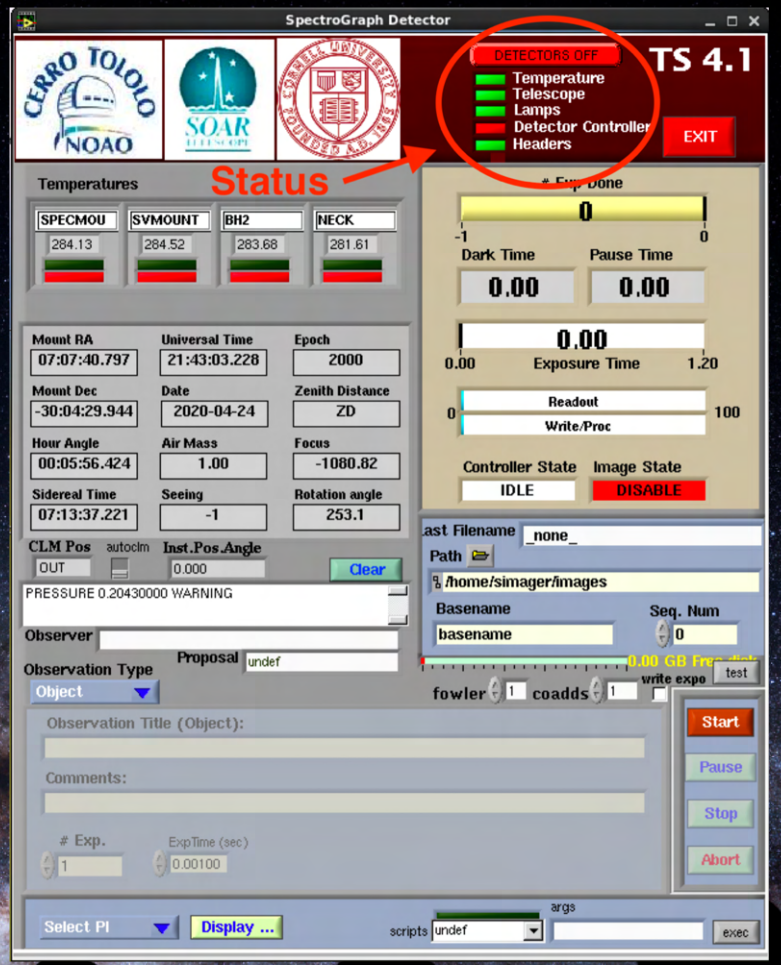

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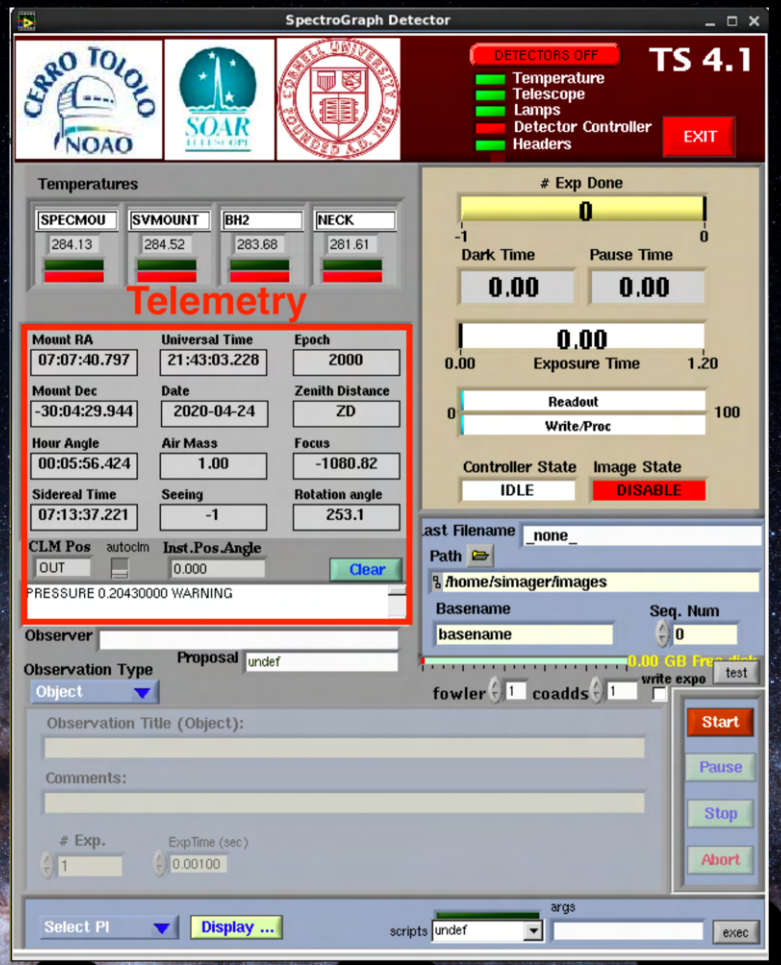

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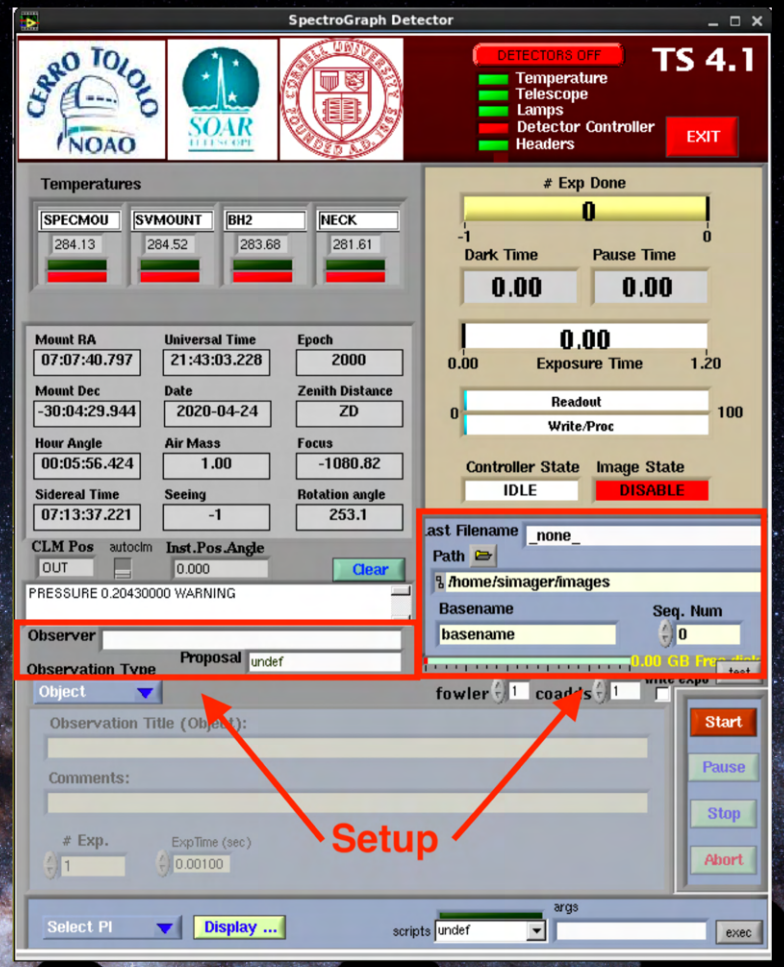

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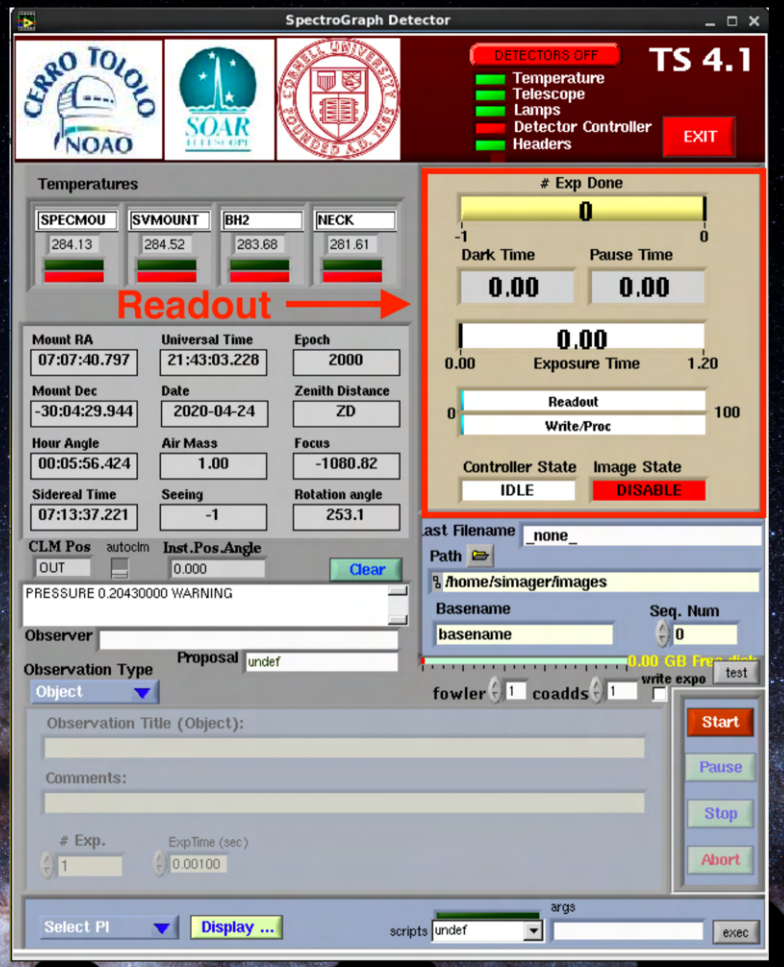

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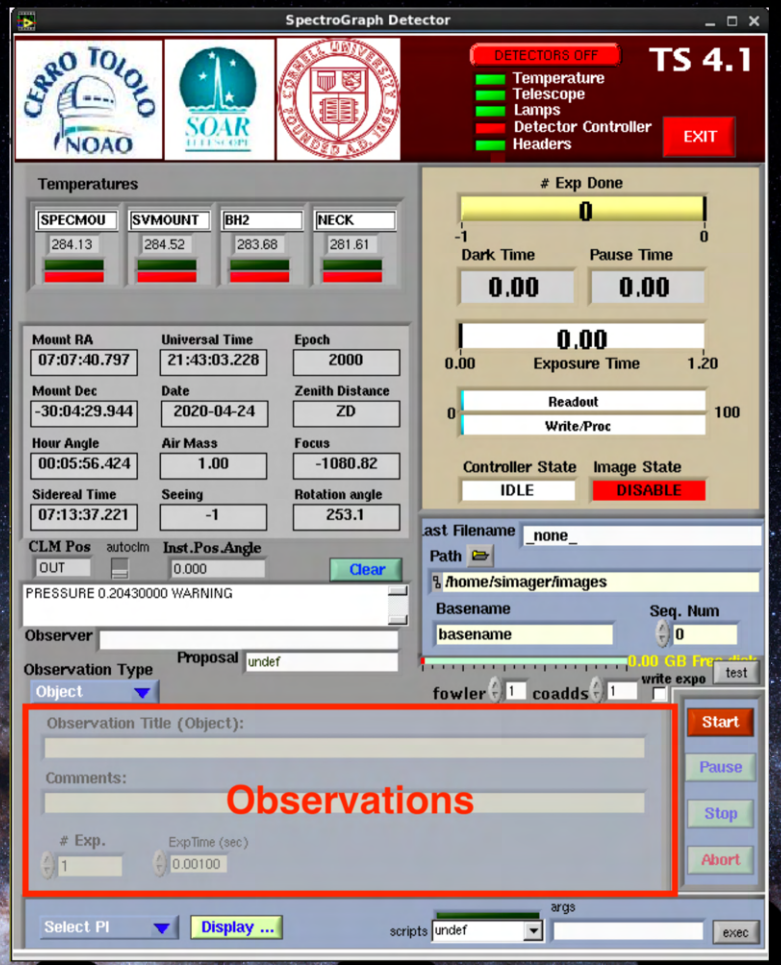

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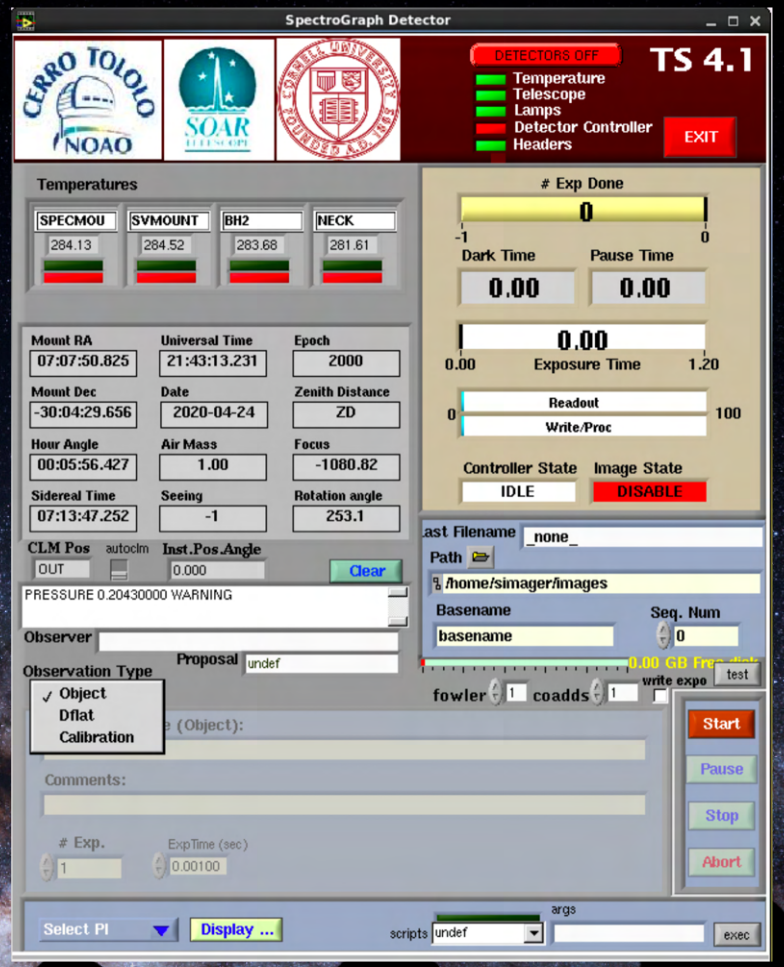

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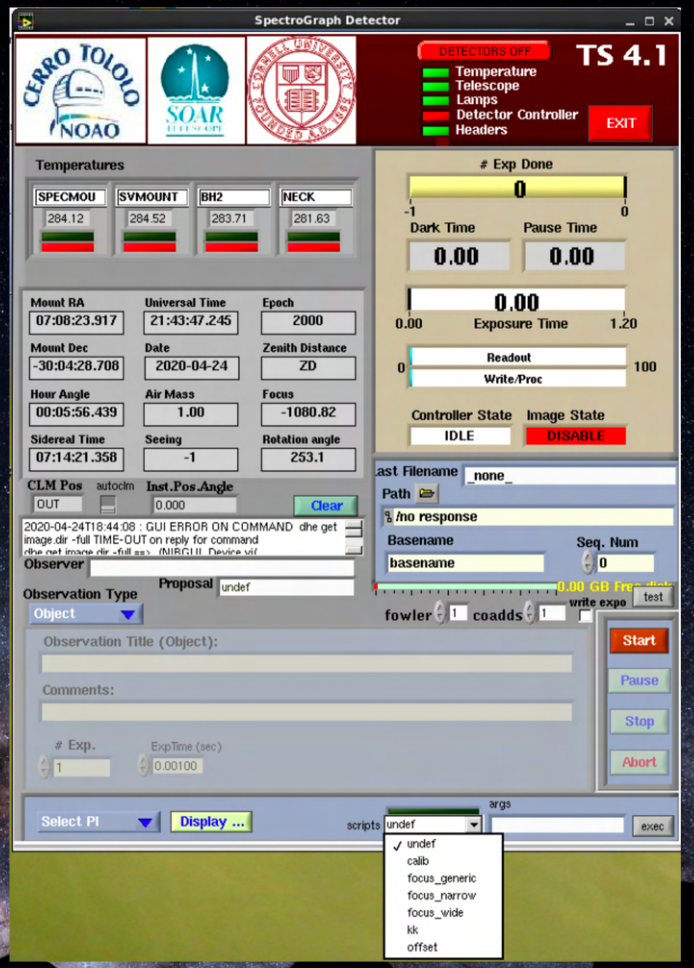
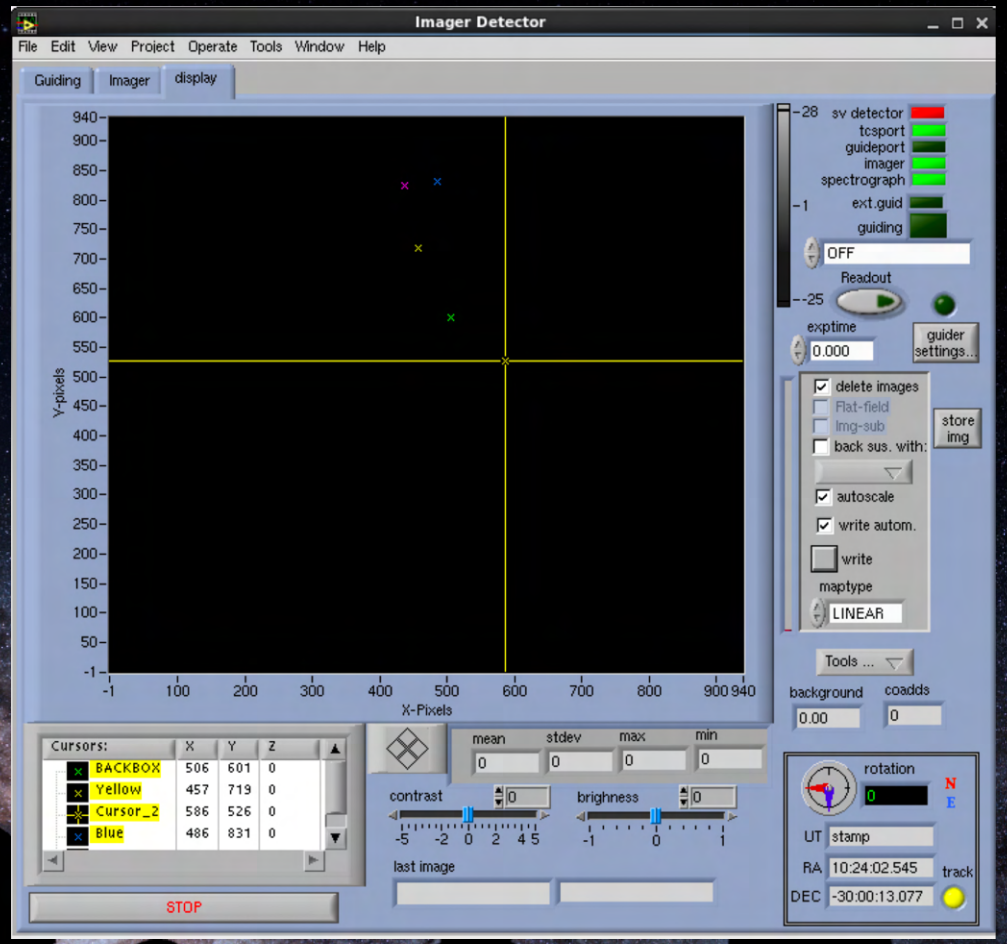


TripleSpec 4.1 Startup

- SV VNC
- Image Detector
  - 4’x4’ FOV
  - J band
  - Readout and Exp. Time
    - 0.75s – 20.0s
  - Display Orientation
  - Display Cursors



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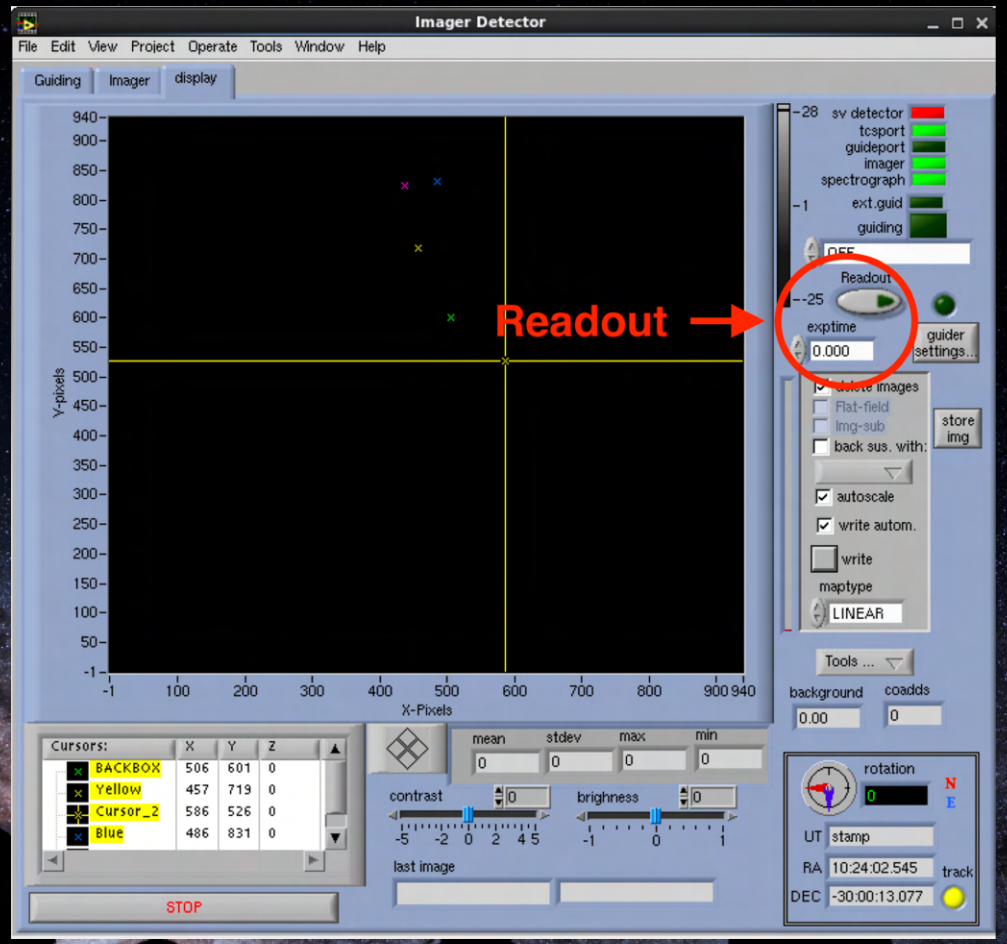

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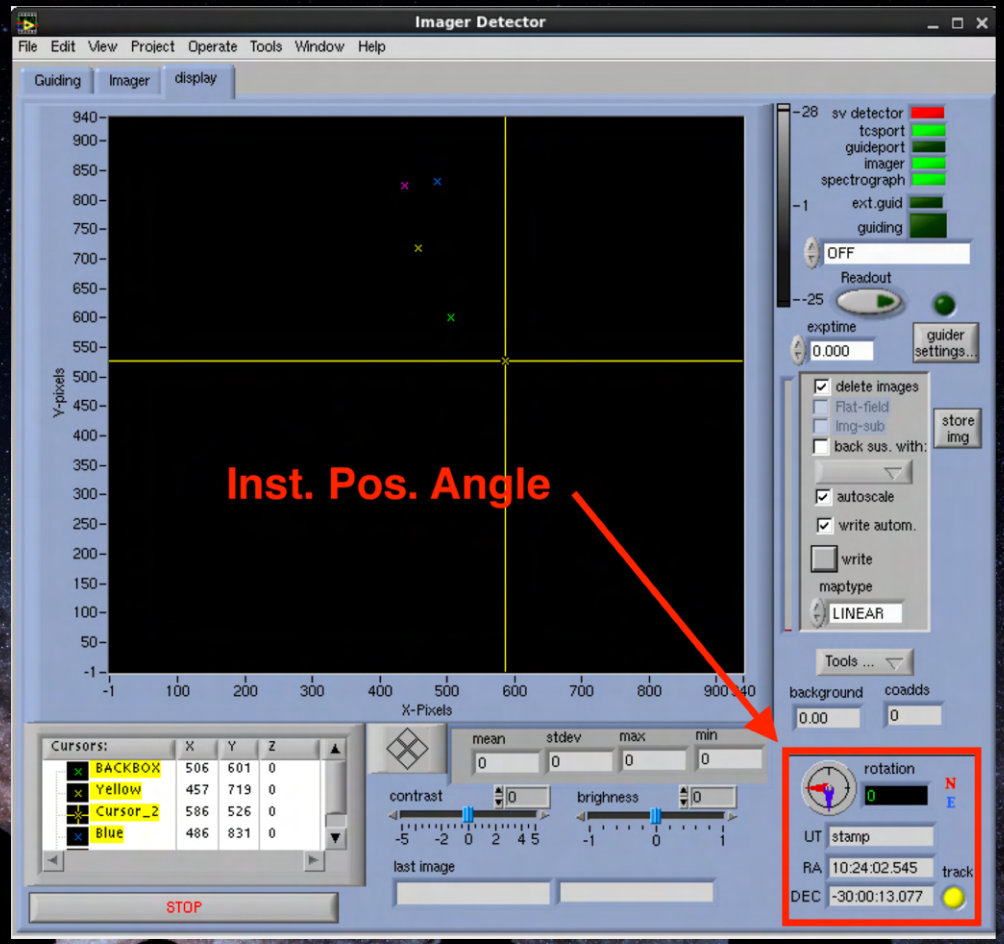

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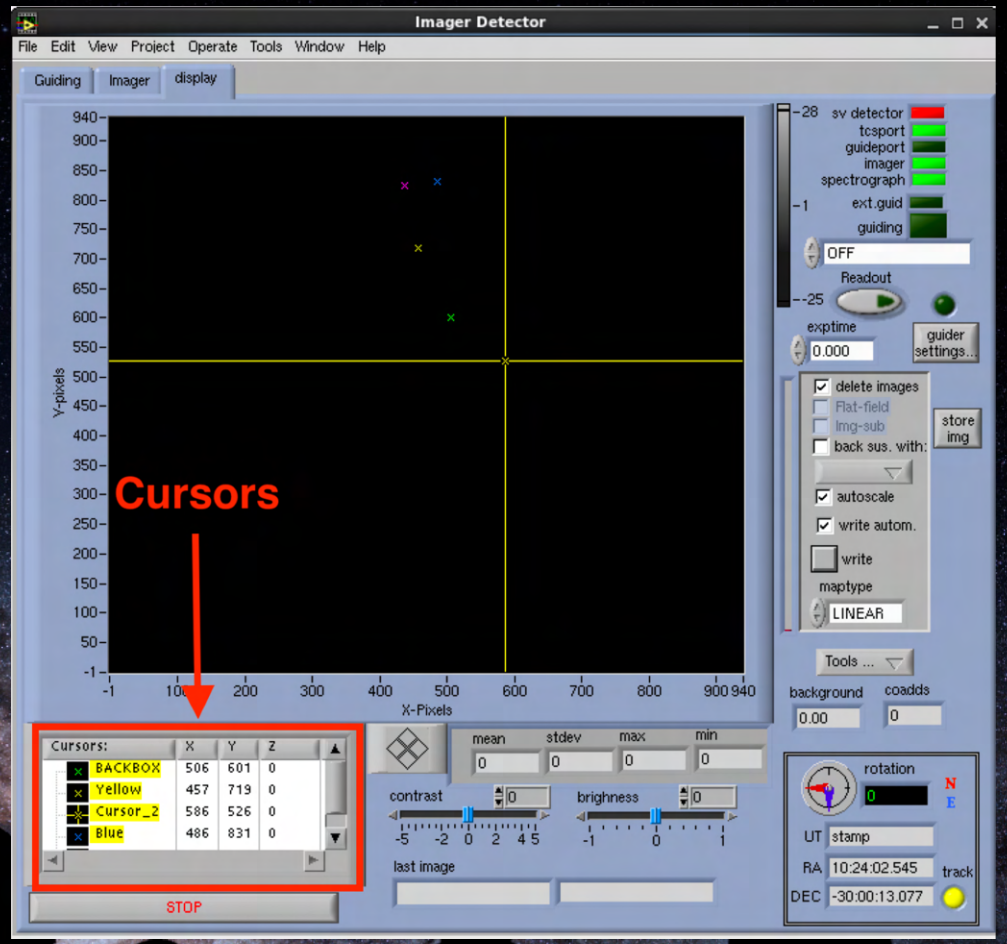
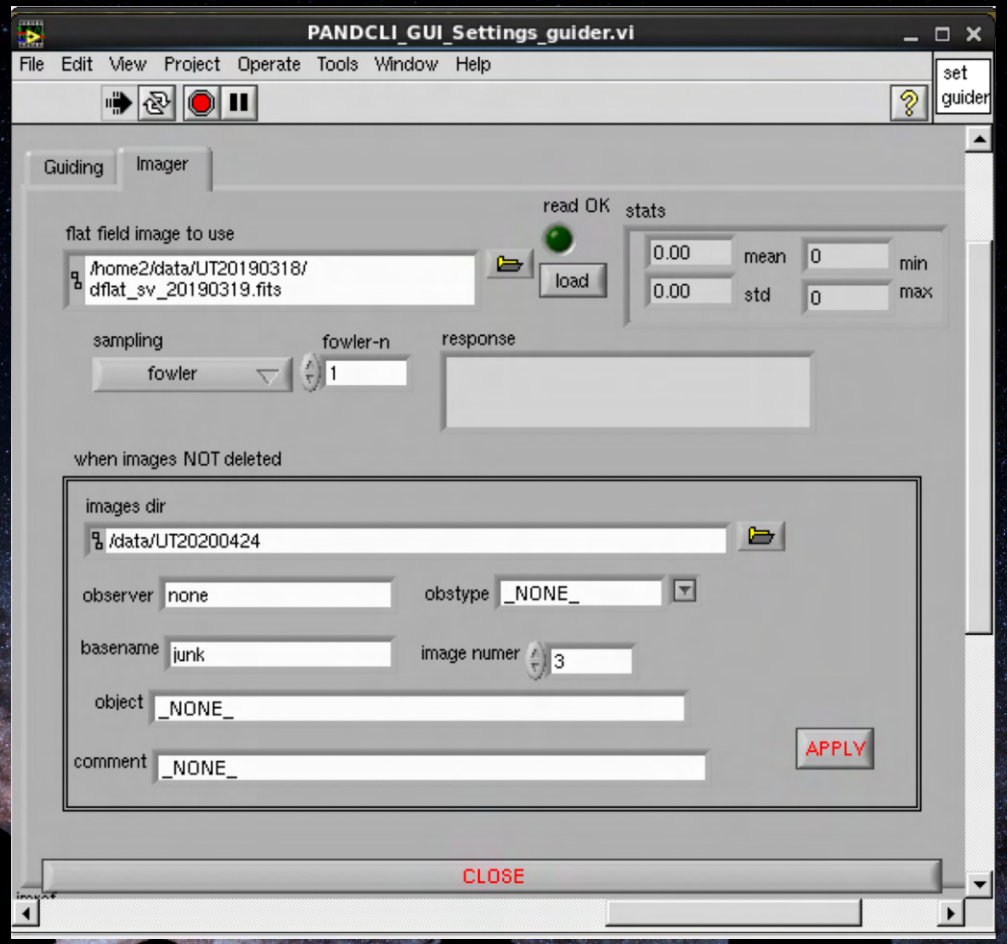


TripleSpec 4.1 Startup

- SV VNC
- Image Detector
- Guider Settings
  - Load SV flat-field
  - SV observations
  - Apply Flat



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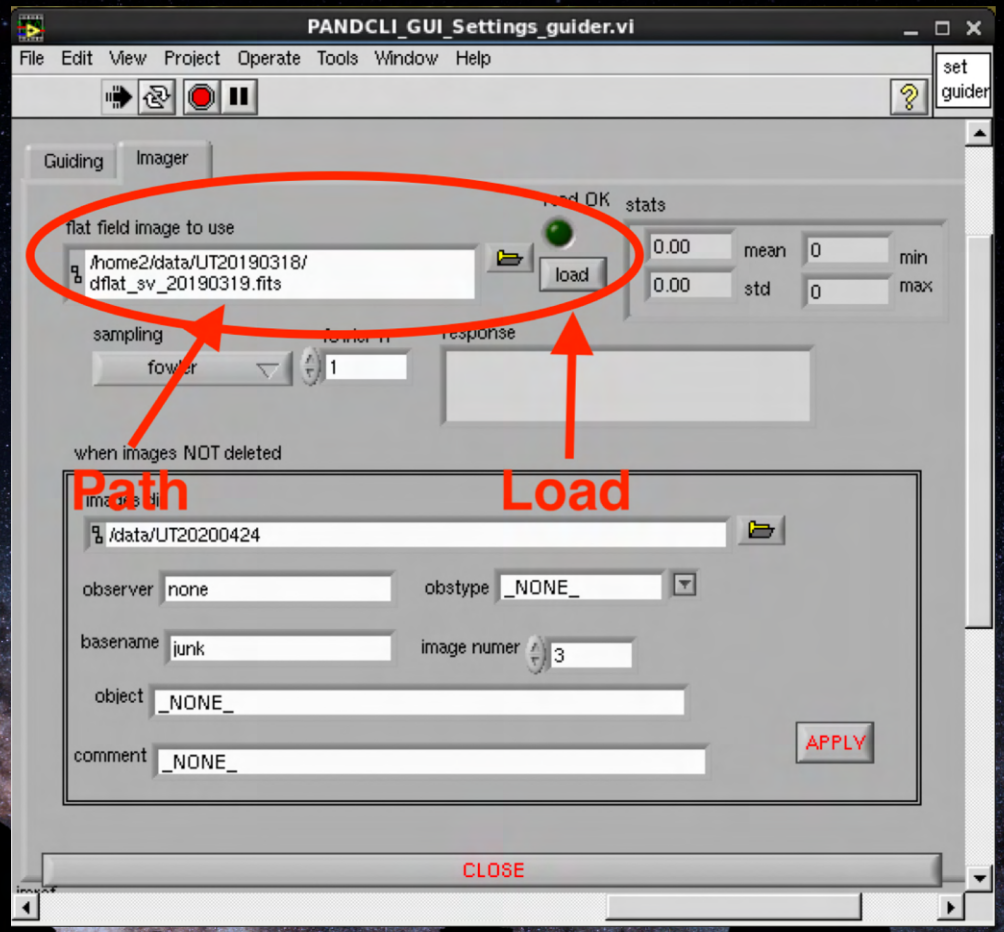

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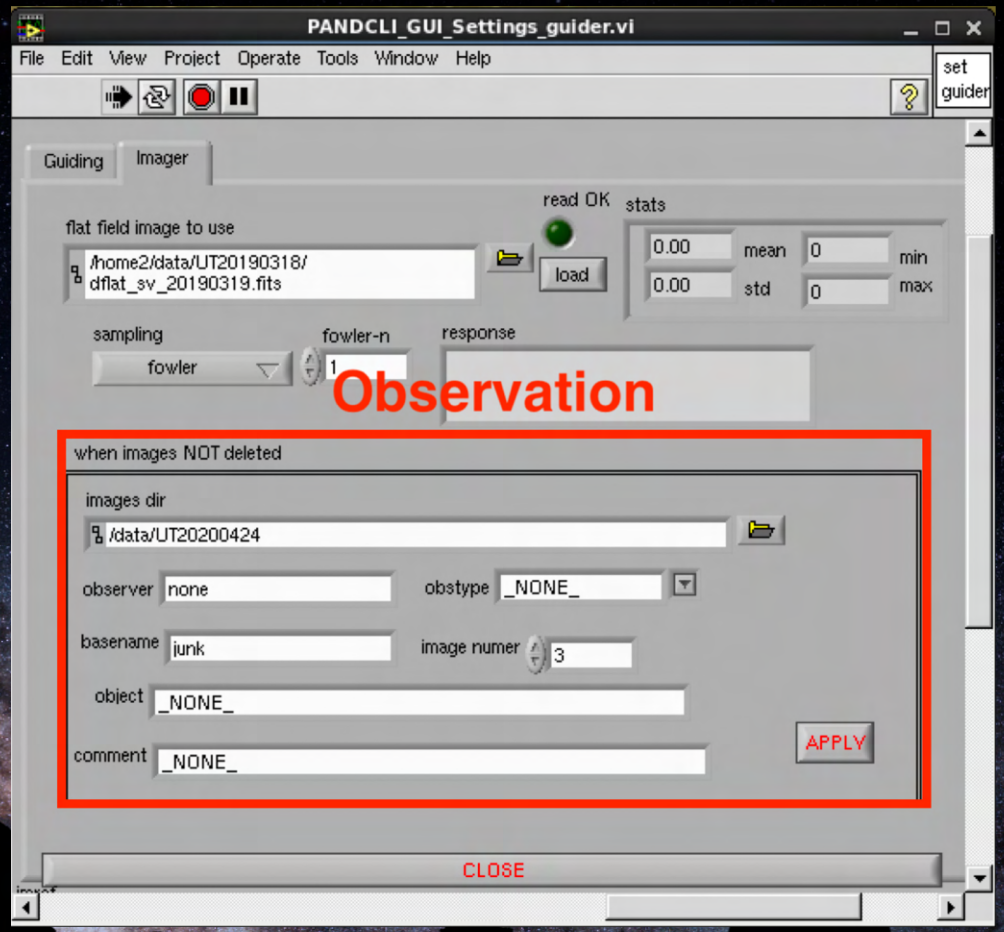

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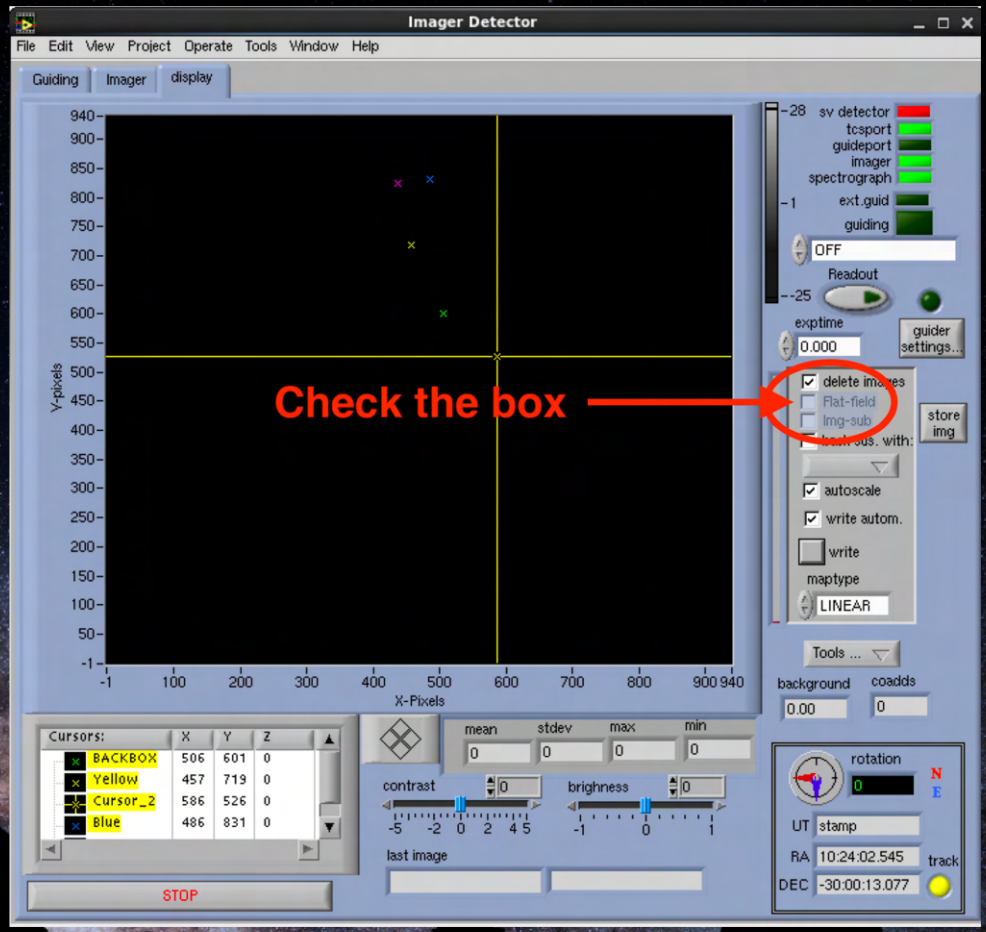

TripleSpec 4.1 Startup

- SV VNC
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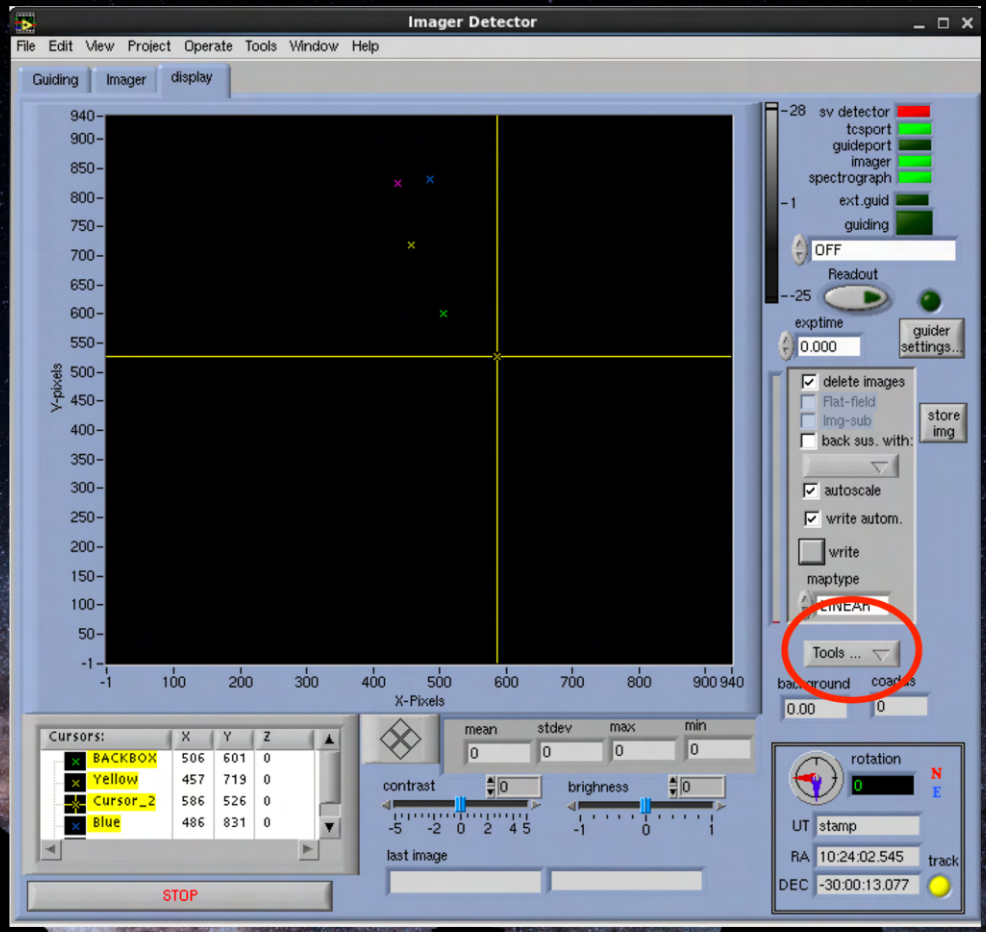
- Tools
  - Box Profile
  - Grid
  - Offset
  - Zoom Windows
  - Zoom Guider



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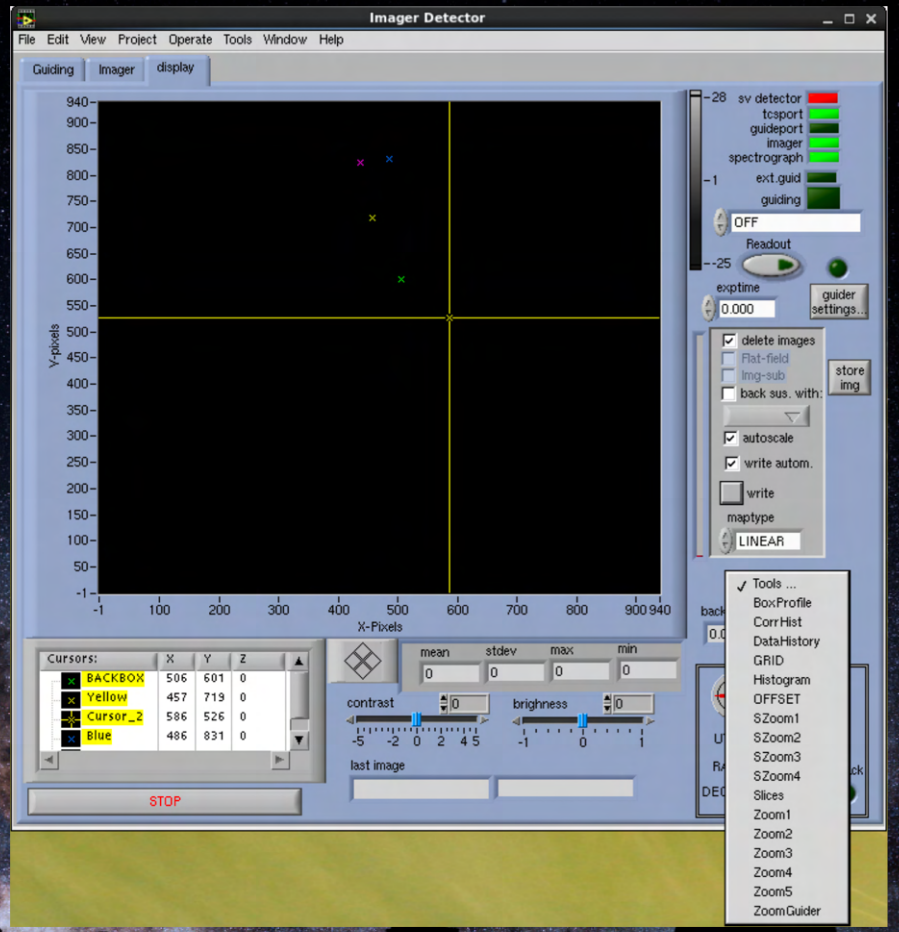

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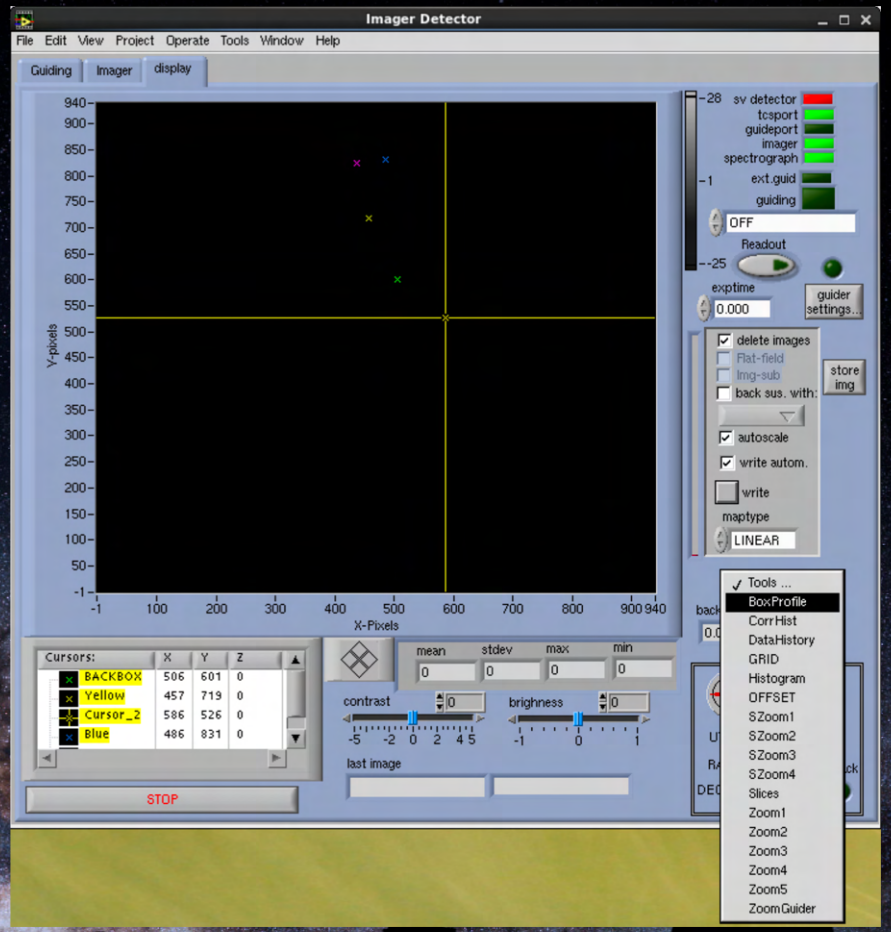

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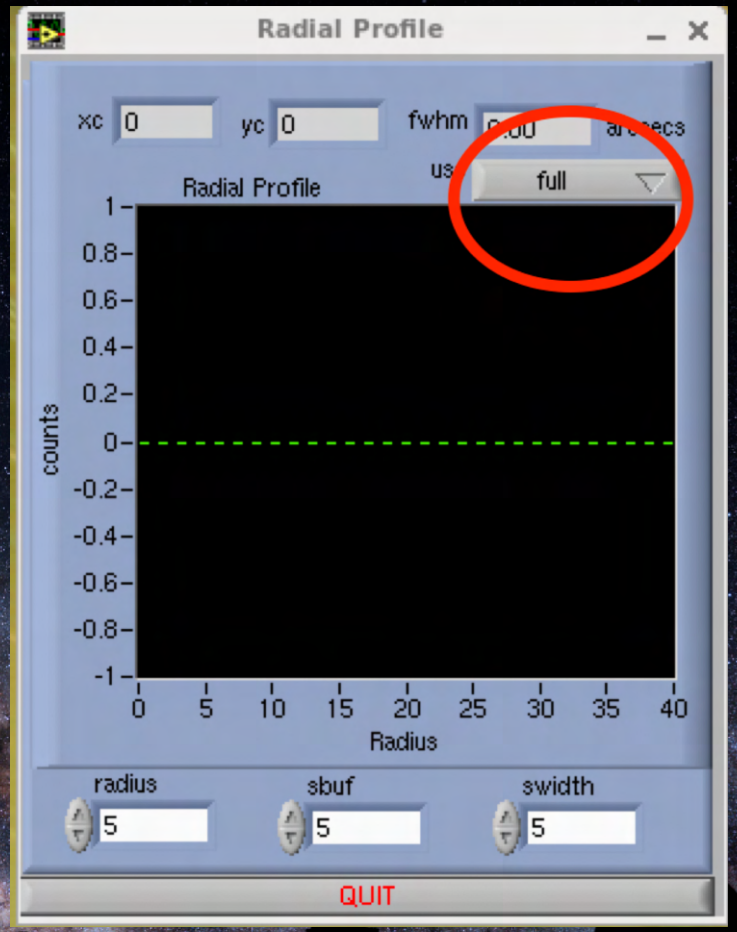

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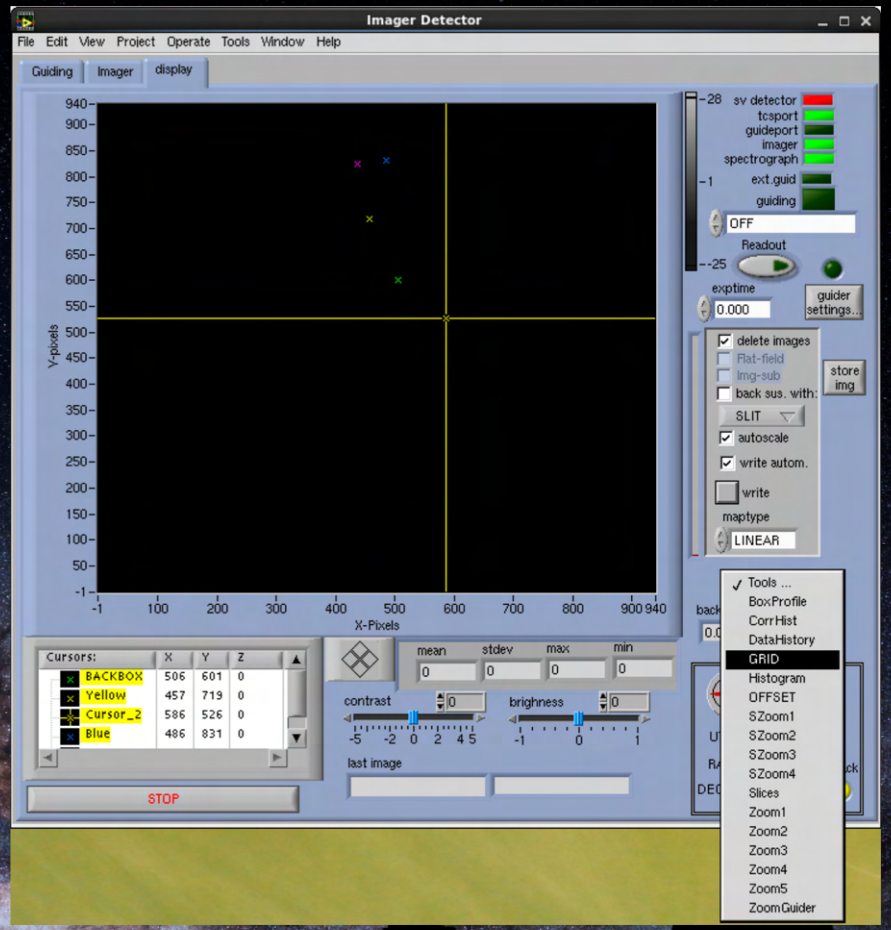

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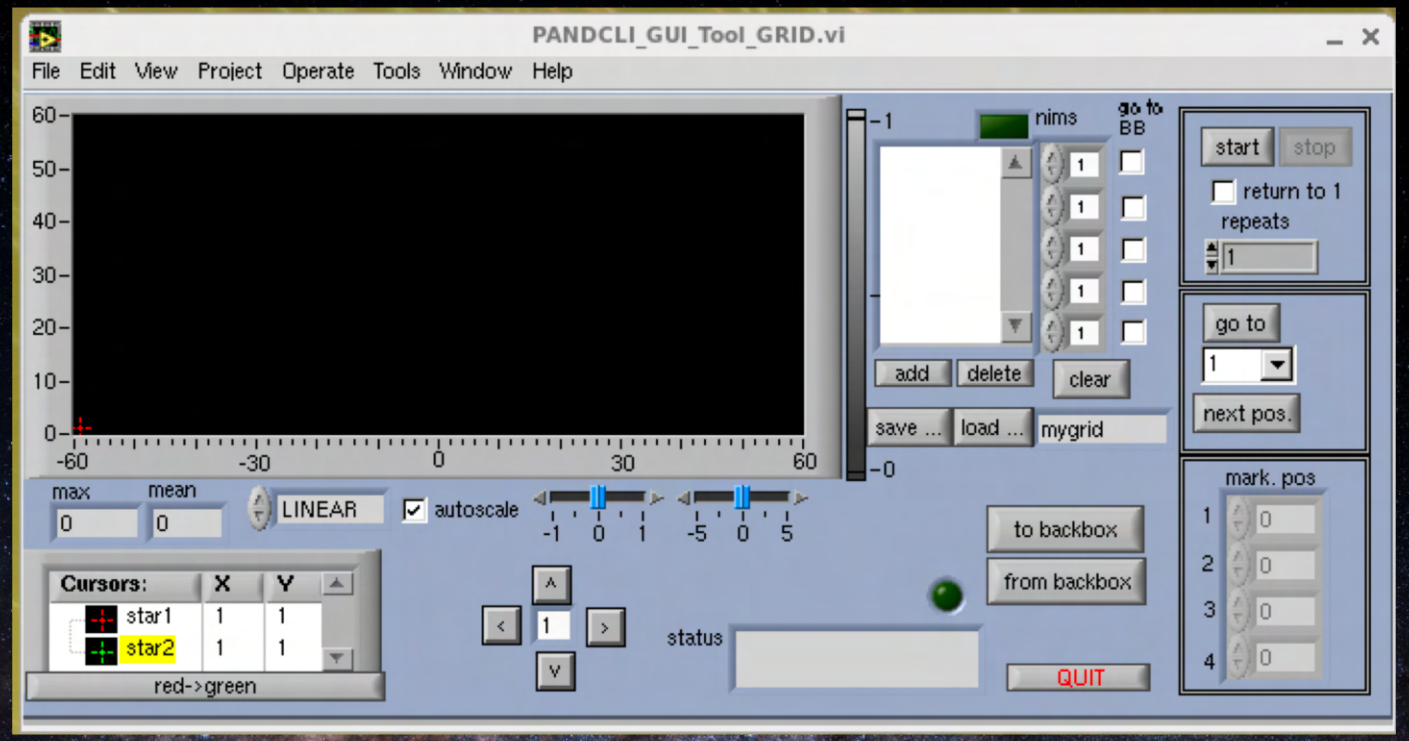

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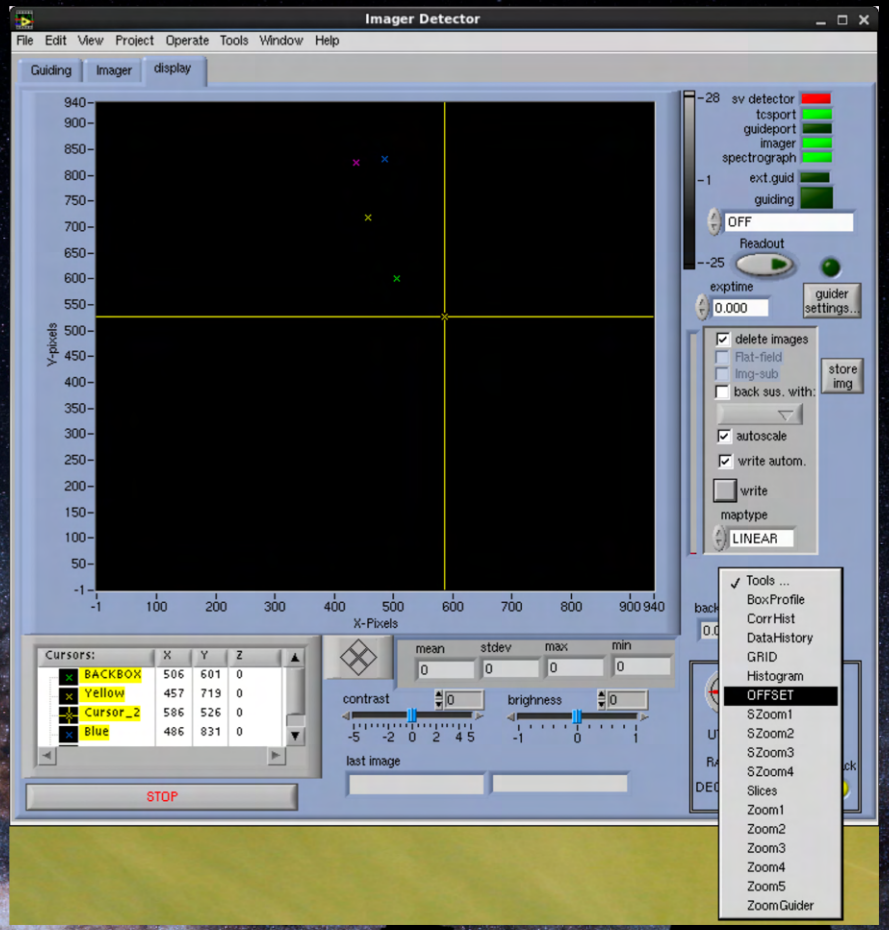

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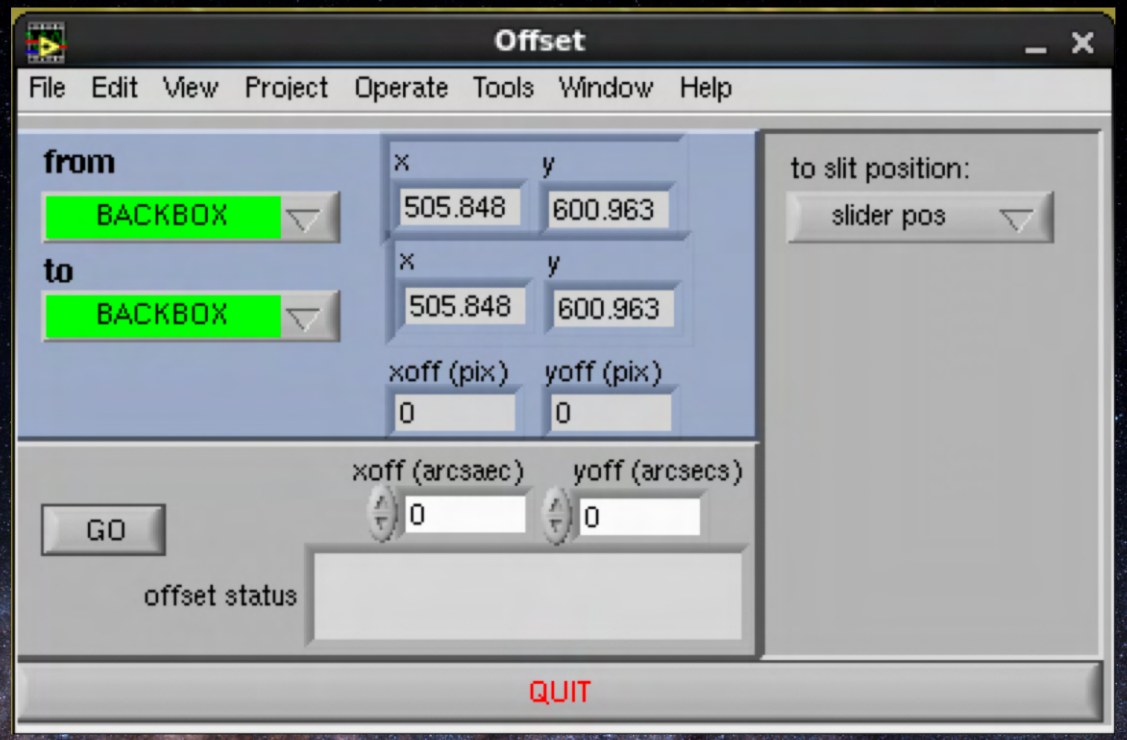

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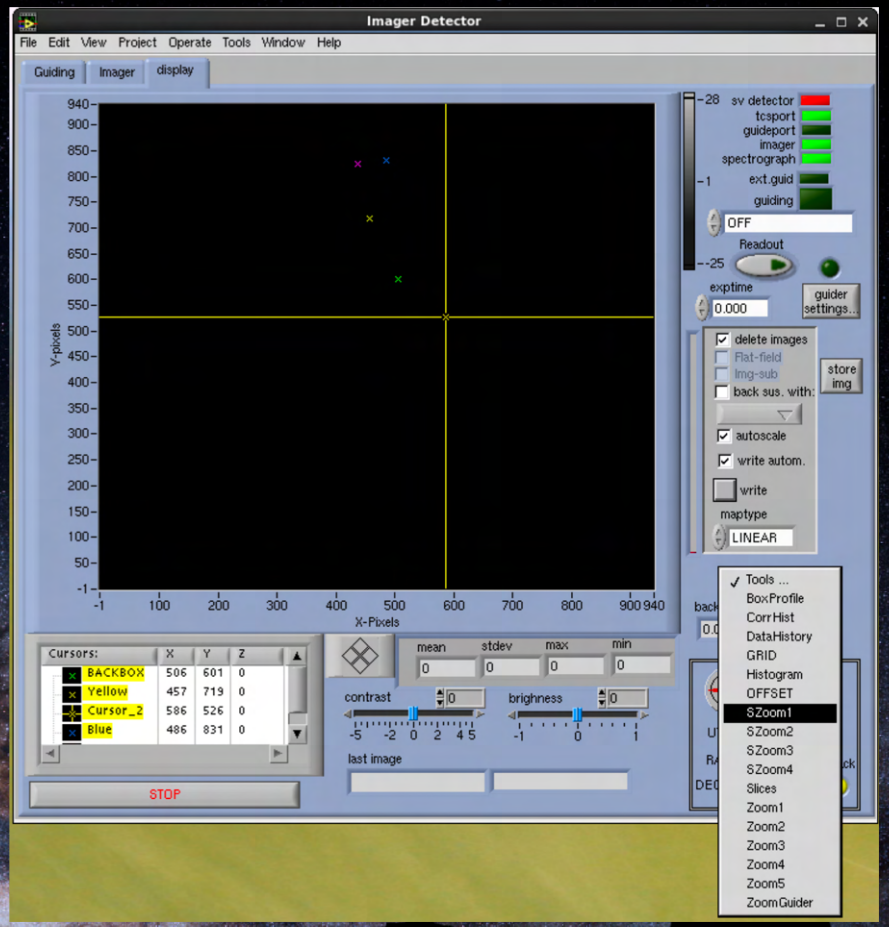

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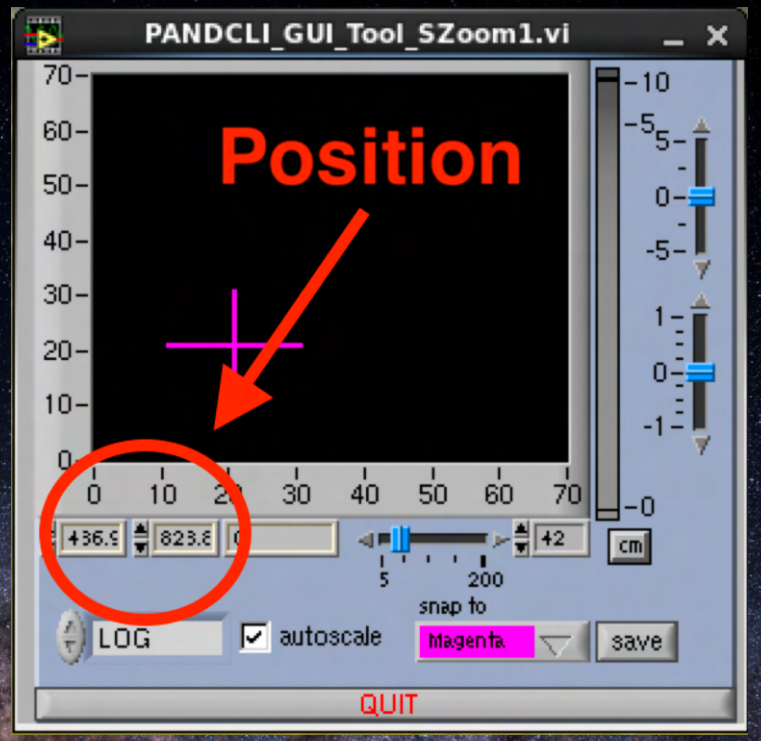

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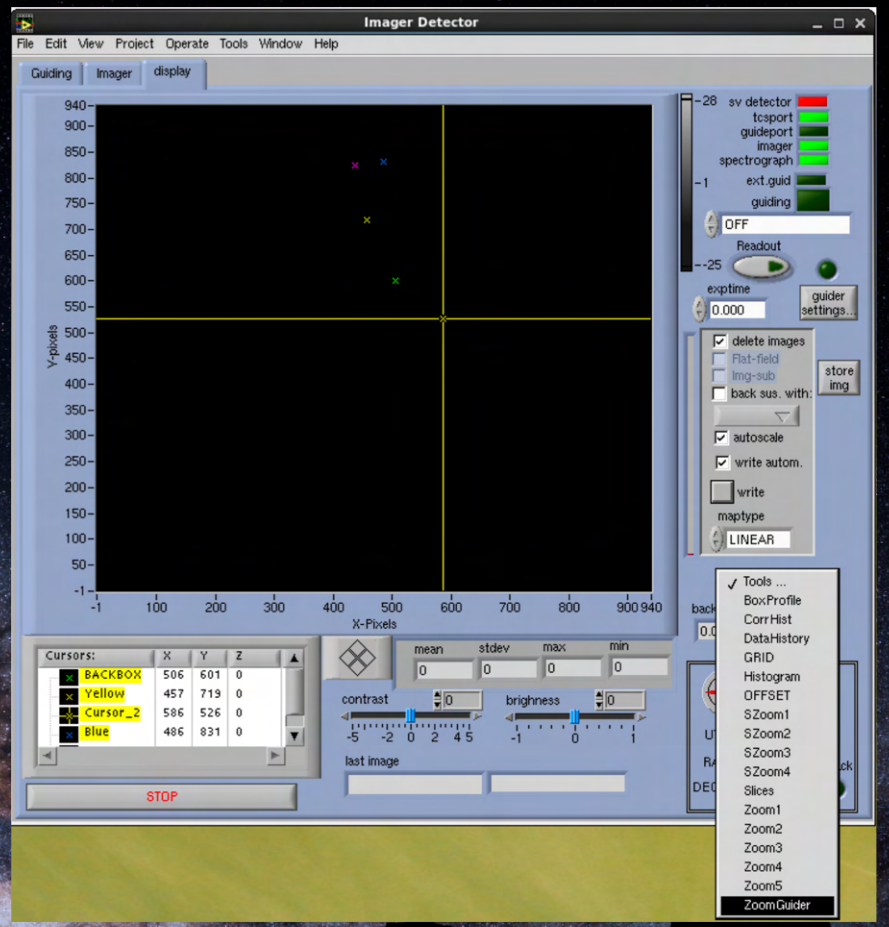

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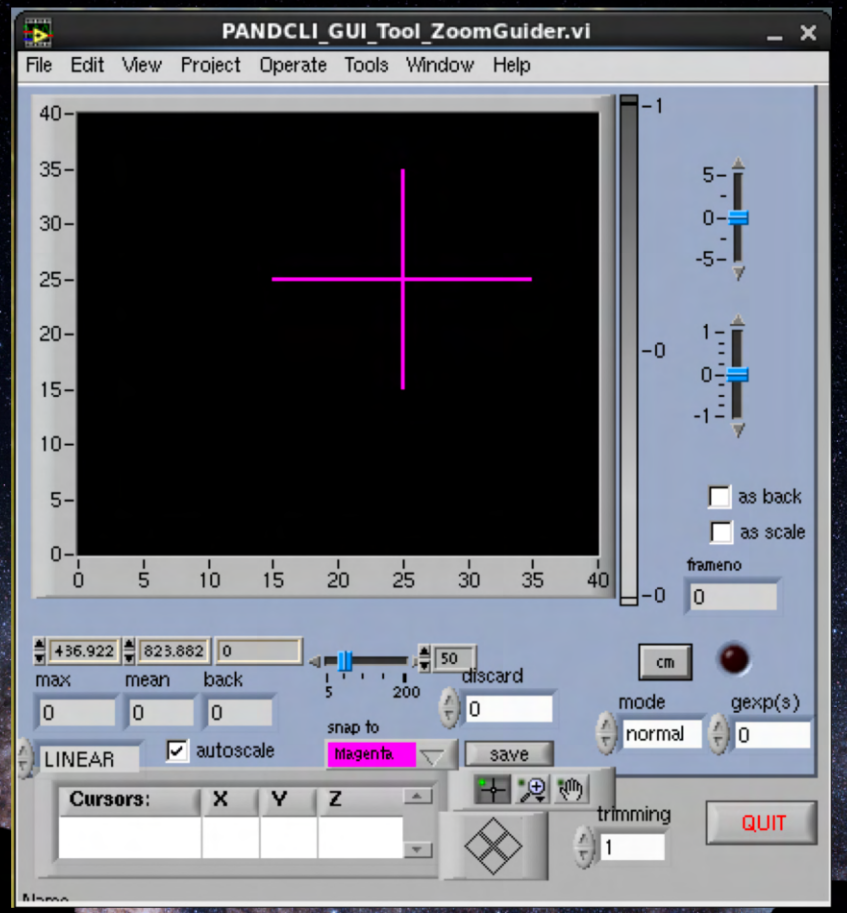


TripleSpec 4.1 Observations

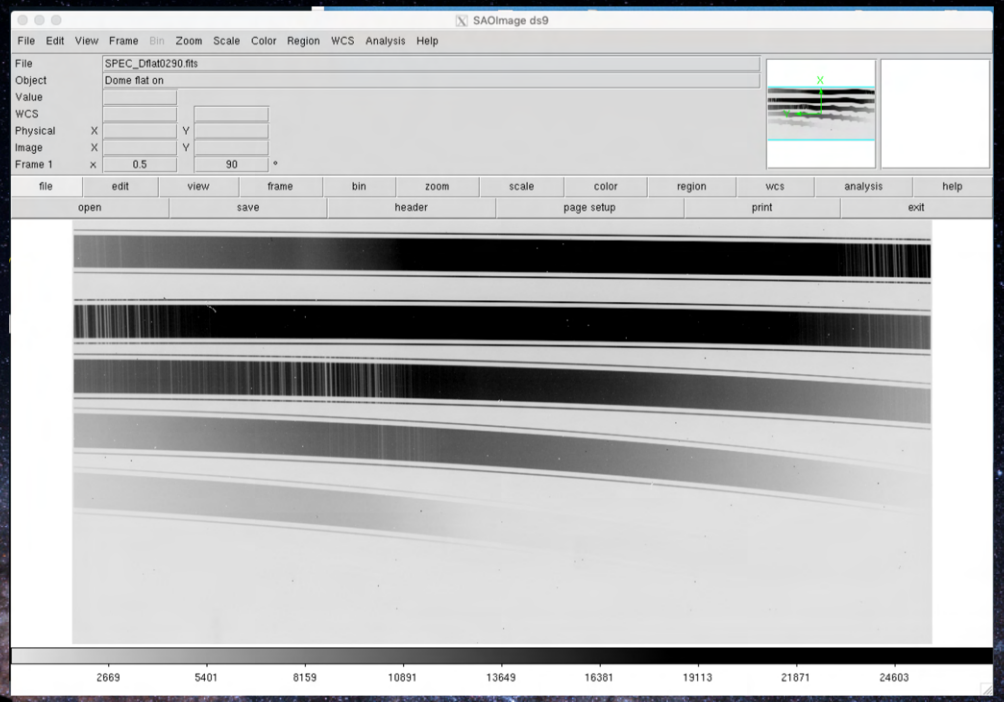
Calibrations

TripleSpec 4.1 Calibrations

- Turn off SV detector
- Flats On
  - Obs. Type: Dflat
  - CLM Pos: OUT
  - Set Obs. Title
  - Exp. Time: 2s
  - Set # Exposures: 51
  - Set Filename: FLAT_
  - Dome Lamps: 40%
- Flats Off
  - Same setup as Flats On
  - Dome Lamps: 0%
- Arc
  - Obs. Type: Calibration
  - CLM Pos: IN
  - Set Obs. Title
  - Lamp: Hollow Cathode
  - Exp. Time: 2s
  - Set Filename: ARC_
  - 5 On
  - 5 Off

TripleSpec 4.1 Calibrations

Dome Lamps On



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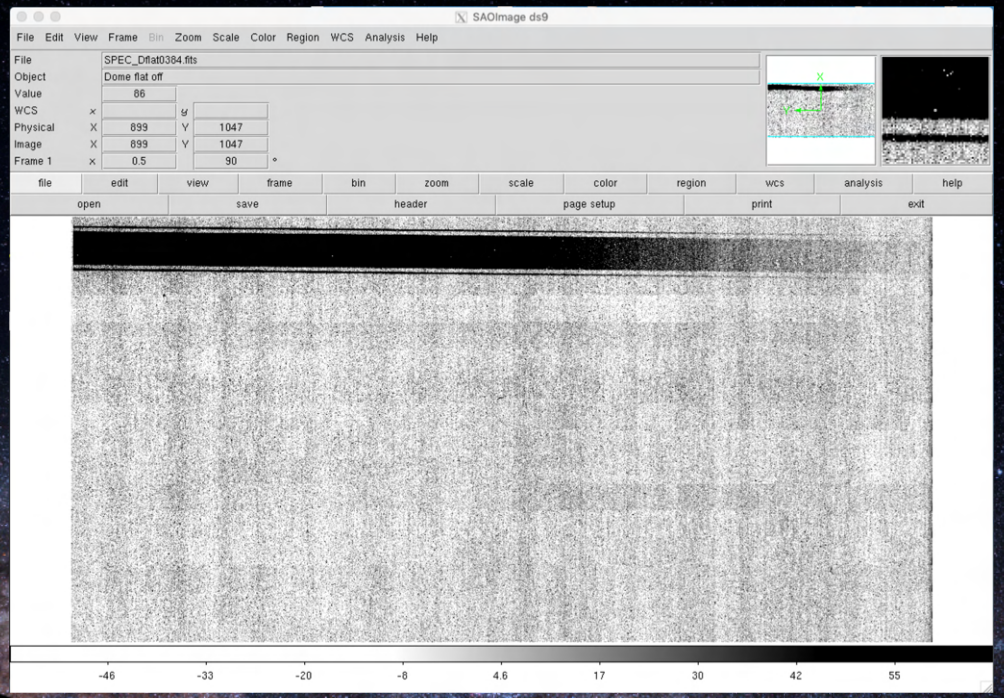
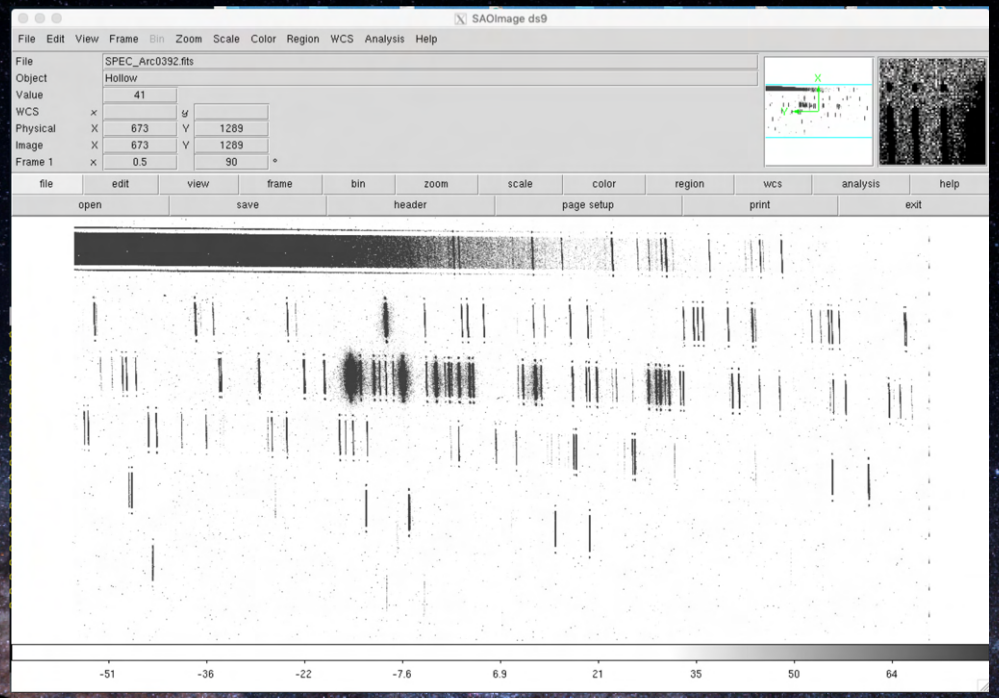
Dome Lamps Off



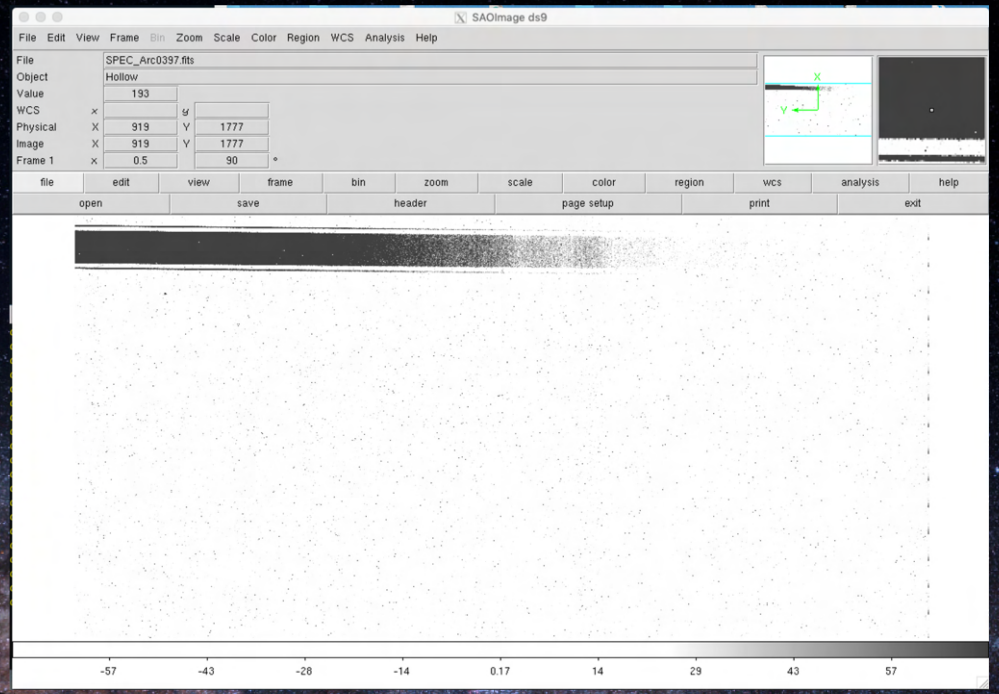
TripleSpec 4.1 Calibrations

Arc Lamps On



TripleSpec 4.1 Calibrations

Arc Lamps Off

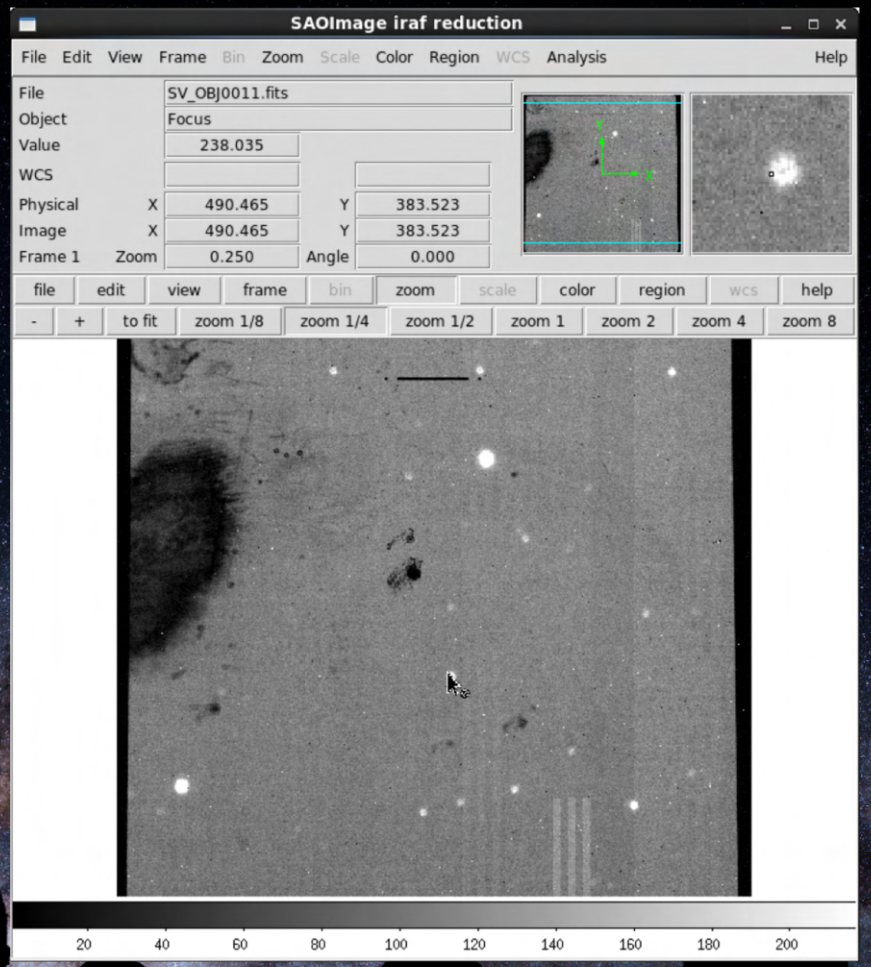


TripleSpec 4.1 Observations

Telescope Focus

TripleSpec 4.1 Tel. Focus

- Move to field
- Set SV Exp. Time: ≥ 2s
- Select Focus Wide Script
  - Set middle focus value
  - Click Exec to start
- In IRAF run ts4focus
  - Mark stars



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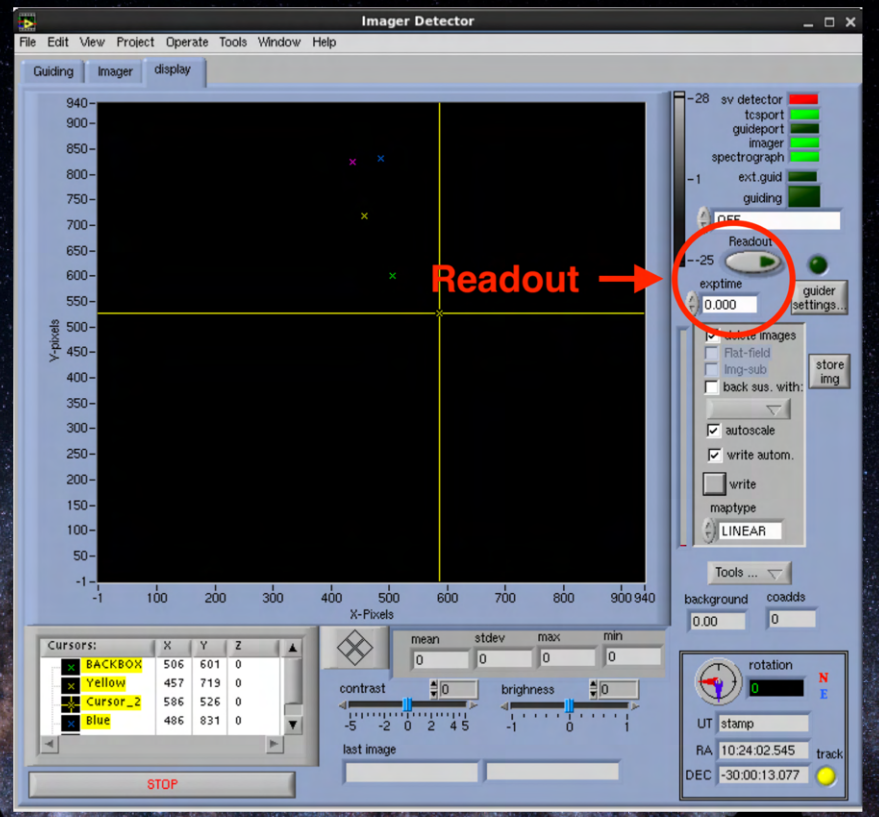

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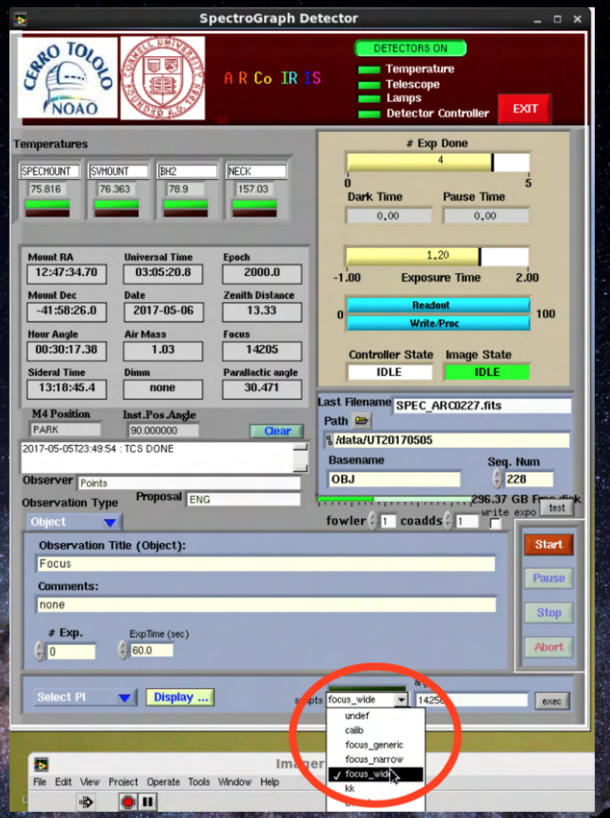

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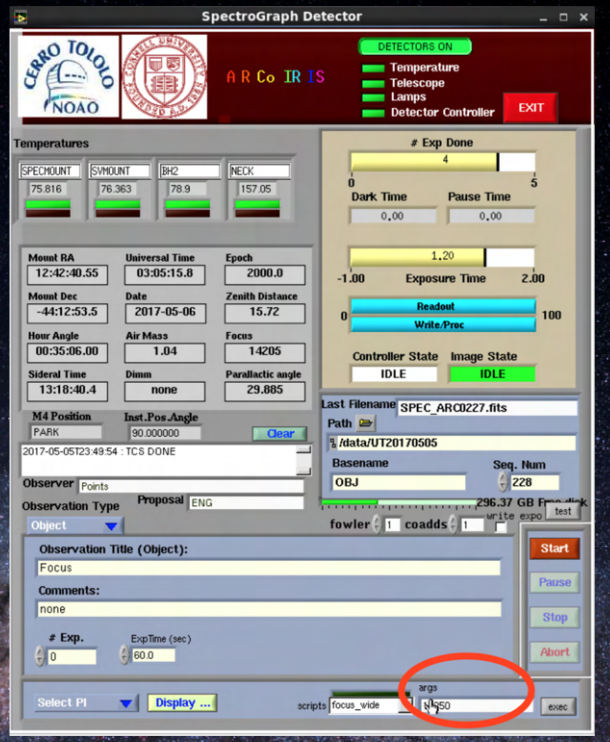

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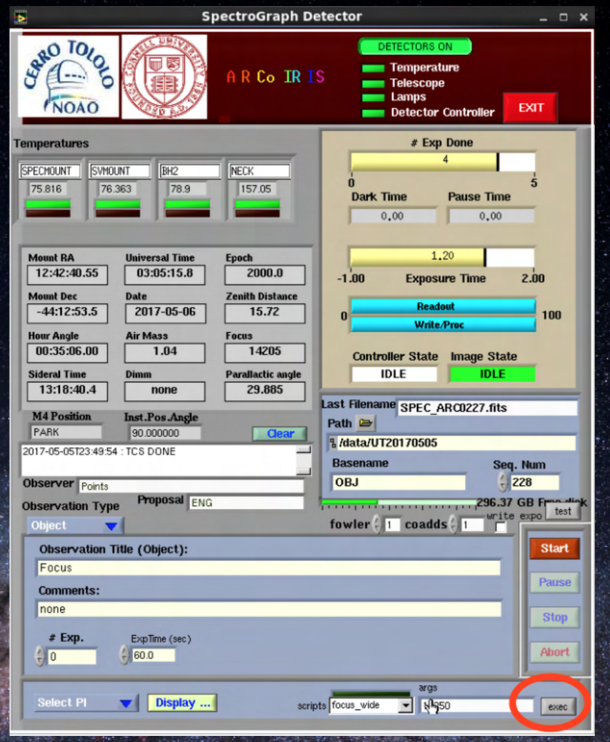
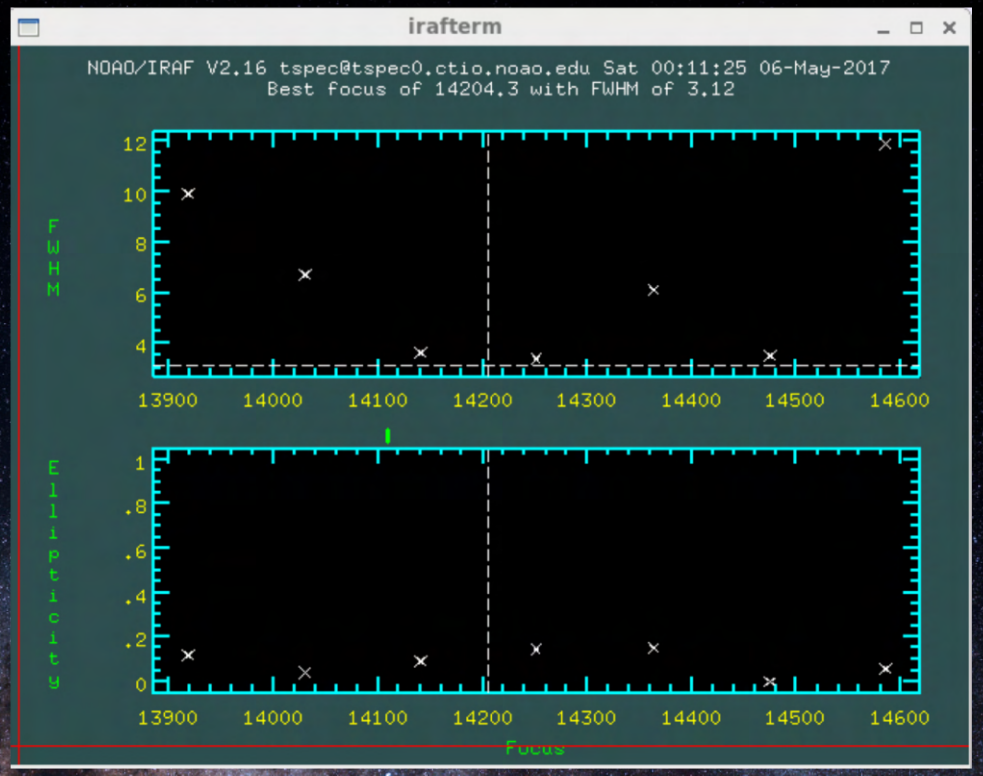
- In IRAF run ts4focus
  - Mark stars



TripleSpec 4.1 Tel. Focus

- Move to field
- Set SV Exp. Time: ≥ 2s
- Select Focus Wide Script
  - Set middle focus value
  - Click Exec to start
- In IRAF run ts4focus
  - Mark stars

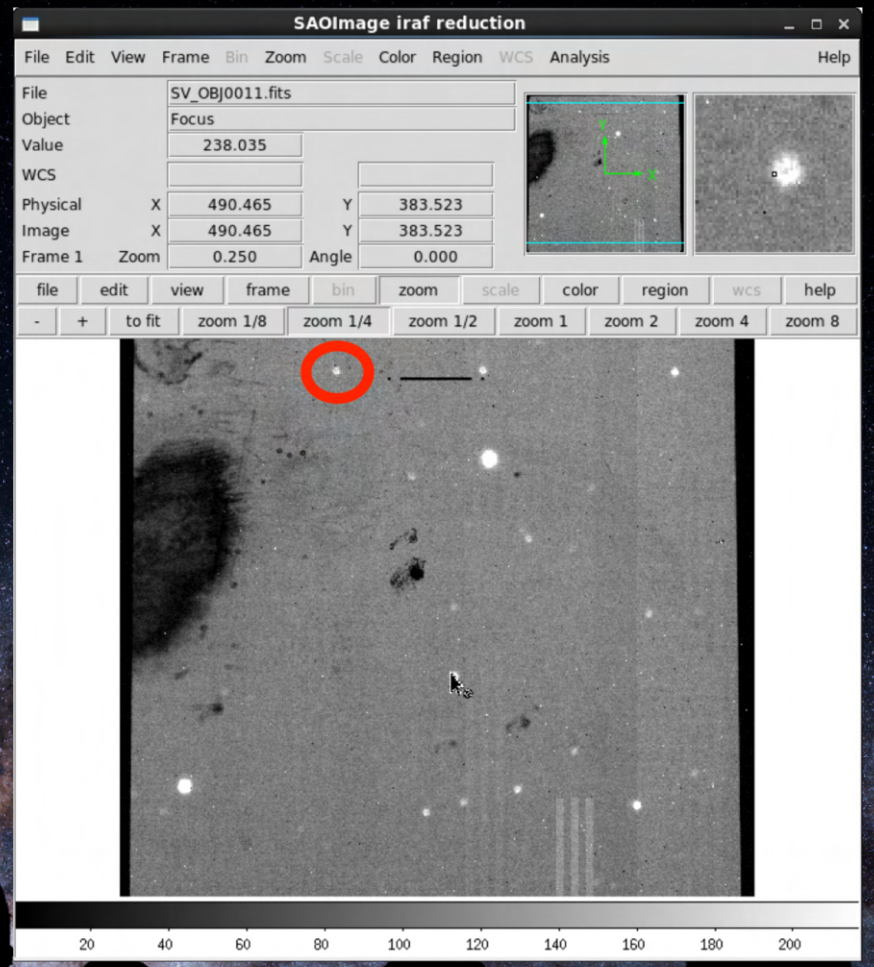


TripleSpec 4.1 Observations

Acquisition

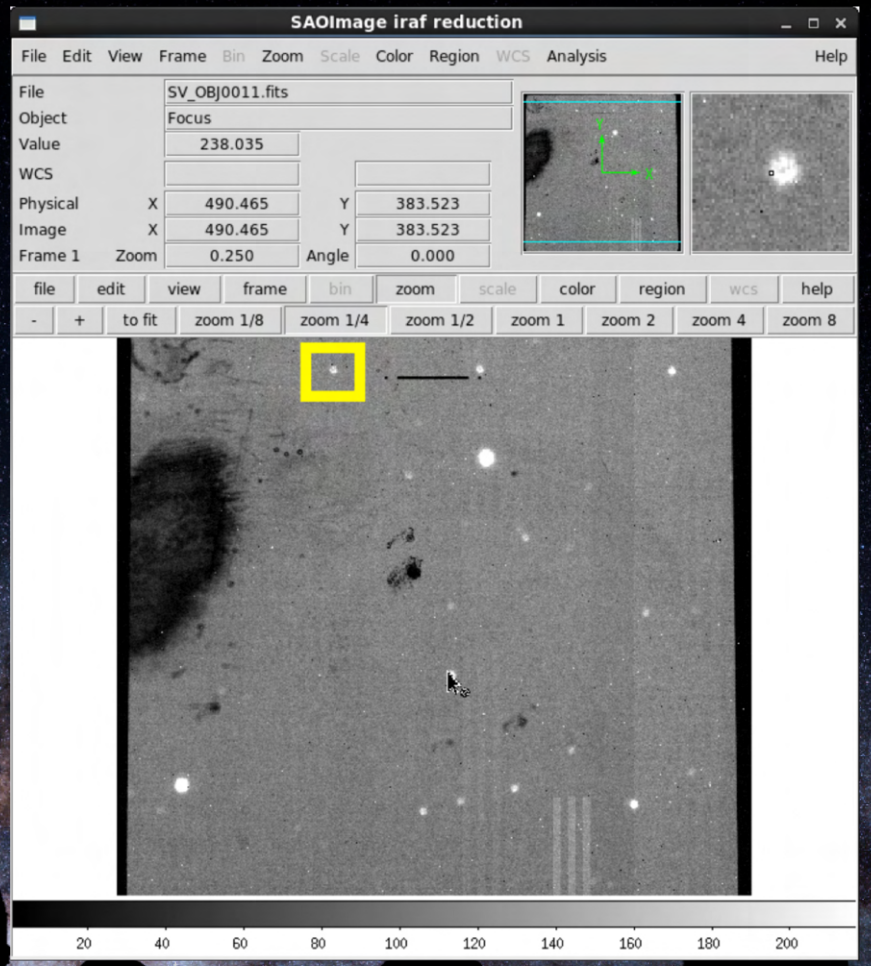
TripleSpec 4.1 Acquisition

- Find target in field
- Move Cursor to Obj
  - Center Obj with CM
- Set Grid
  - Set ABBA pattern
  - Set # repeats
  - Return to Start



TripleSpec 4.1 Acquisition

- Find target in field
- Move Cursor to Obj
  - Open Zoom for Cursor
  - Center Obj with CM
- Set Grid
  - Set ABBA pattern
  - Set # repeats
  - Return to Start



TripleSpec 4.1 Acquisition

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  - Center Obj with CM
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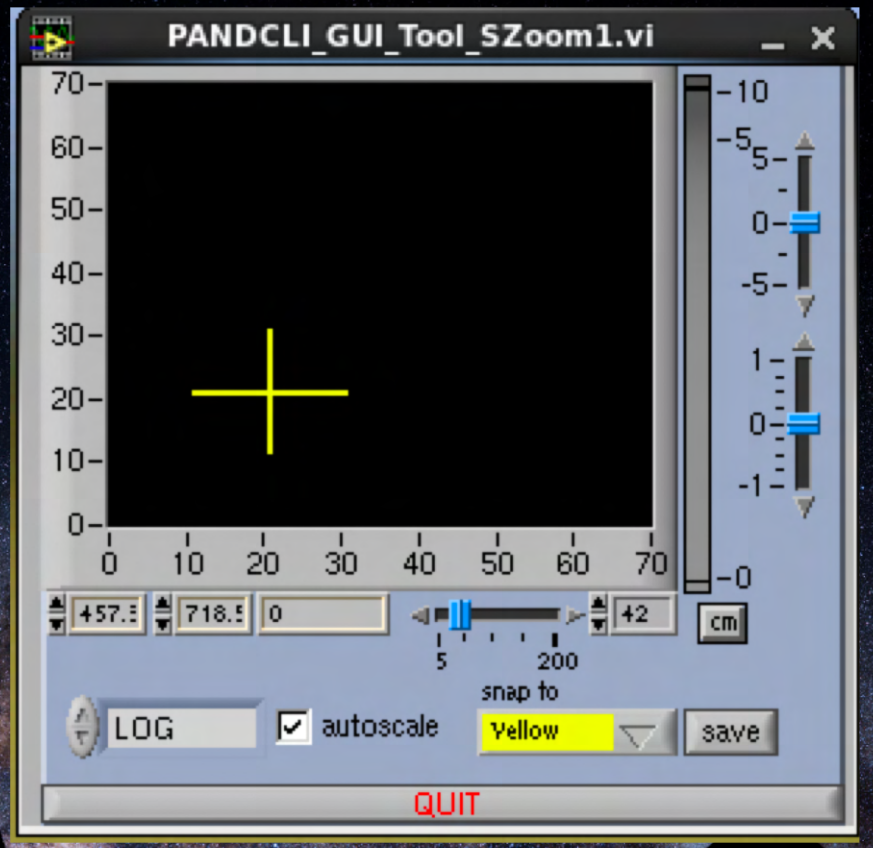

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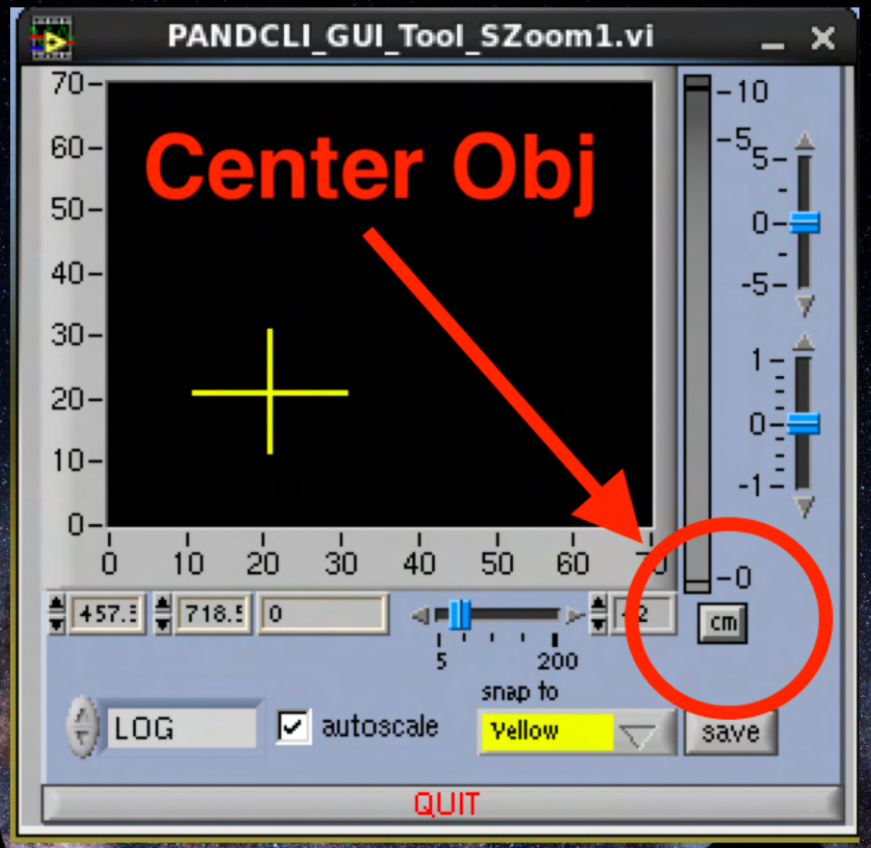

TripleSpec 4.1 Acquisition

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  - Open Zoom for Cursor
  - Center Obj with CM
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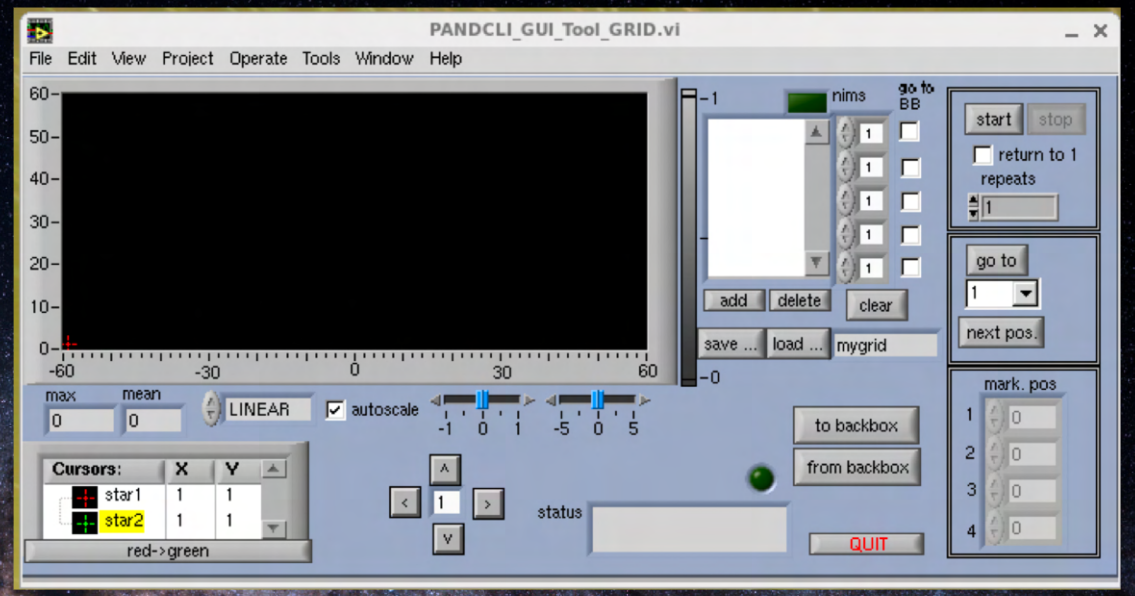

TripleSpec 4.1 Acquisition

- Find target in field
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  - Center Obj with CM
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  - Set ABBA pattern
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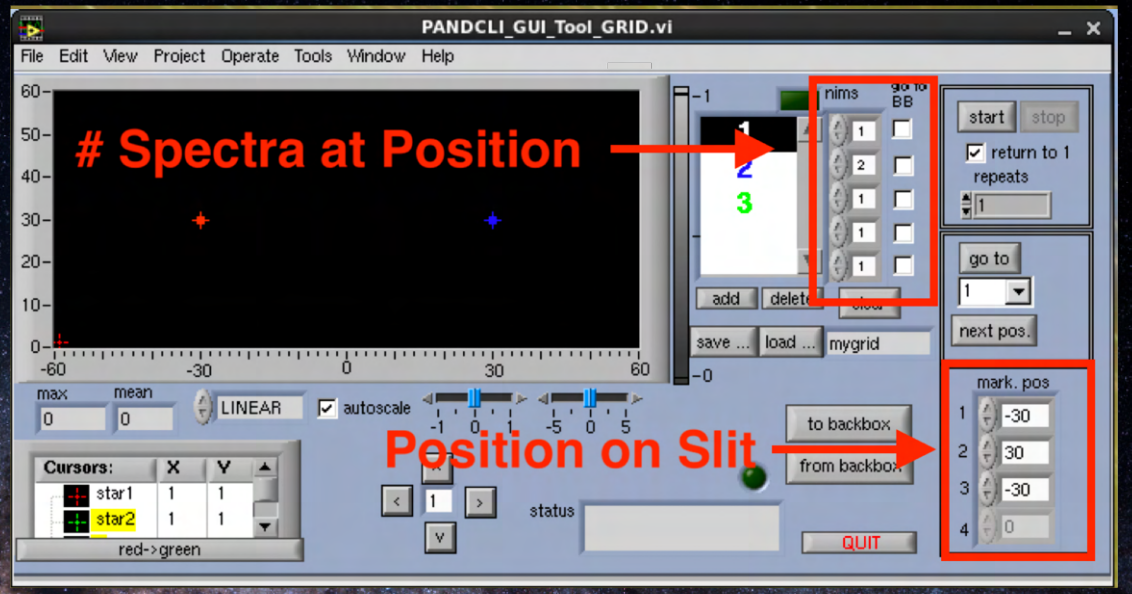

TripleSpec 4.1 Acquisition

- Find target in field
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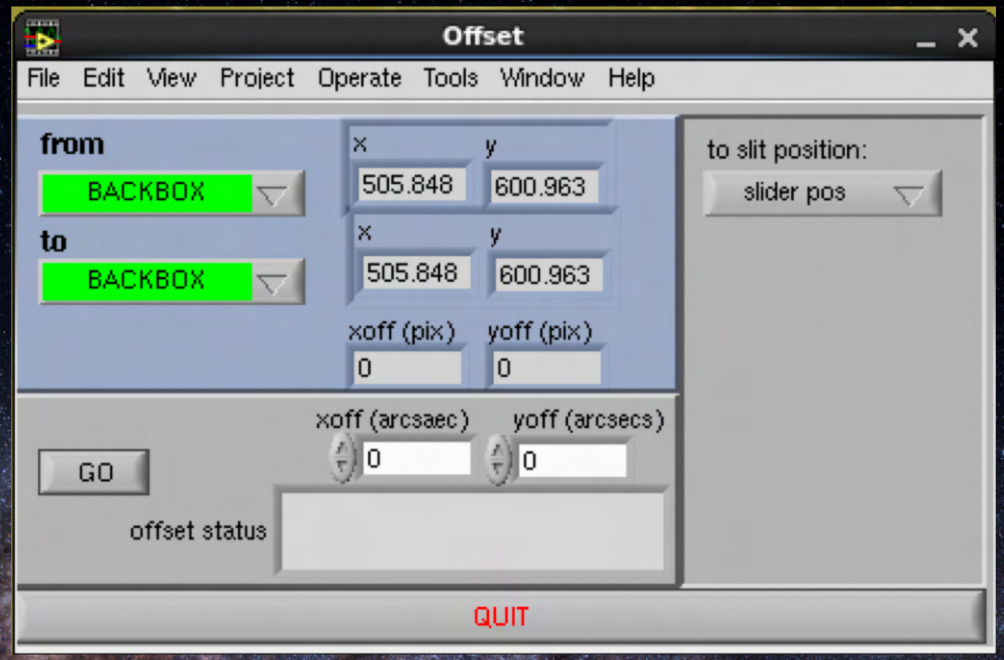
- Find target in field
- Move Cursor to Obj
  - Open Zoom for Cursor
  - Center Obj with CM
- Set Grid
  - Set ABBA pattern
  - Set # repeats
  - Return to Start

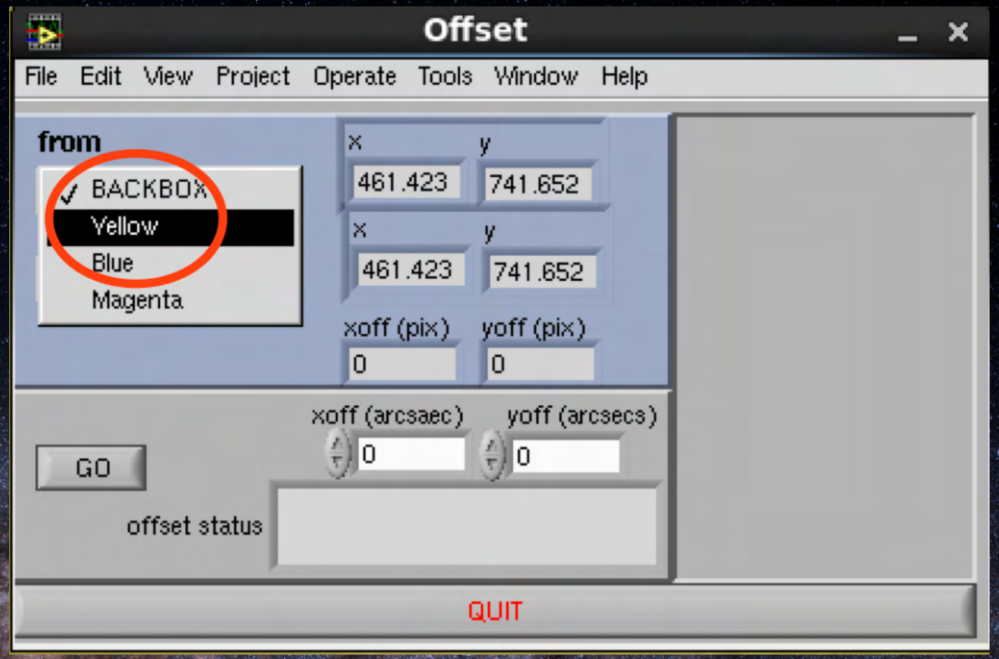
TripleSpec 4.1 Acquisition

- Perform Offset
  - From Box
  - To Slit
  - Position of 1st A
  - Fine adjustment



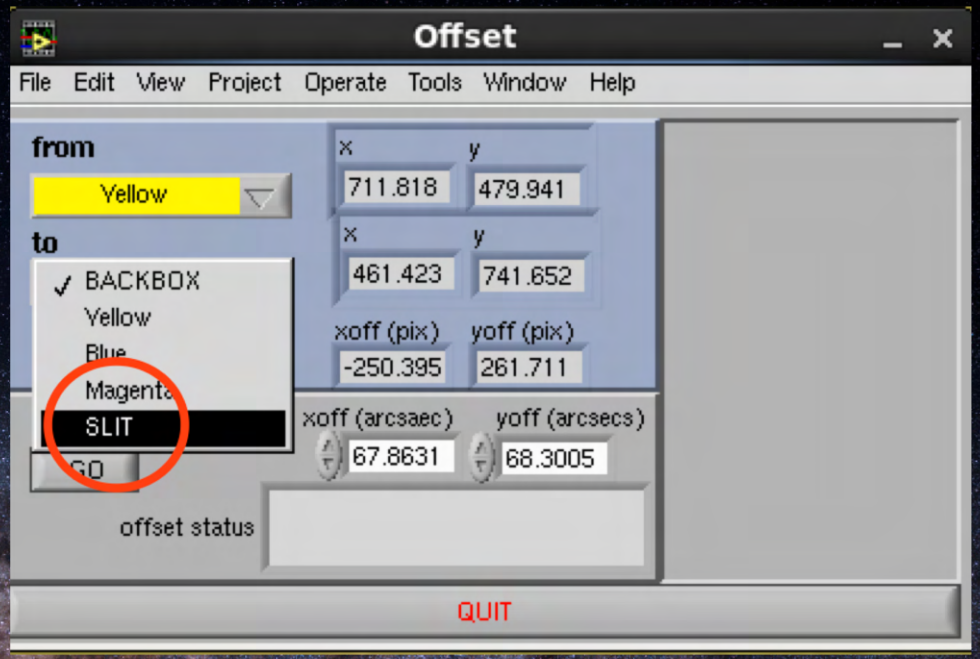
TripleSpec 4.1 Acquisition

- Perform Offset
  - From Box
  - To Slit
  - Position at 1st A
  - Fine adjustment



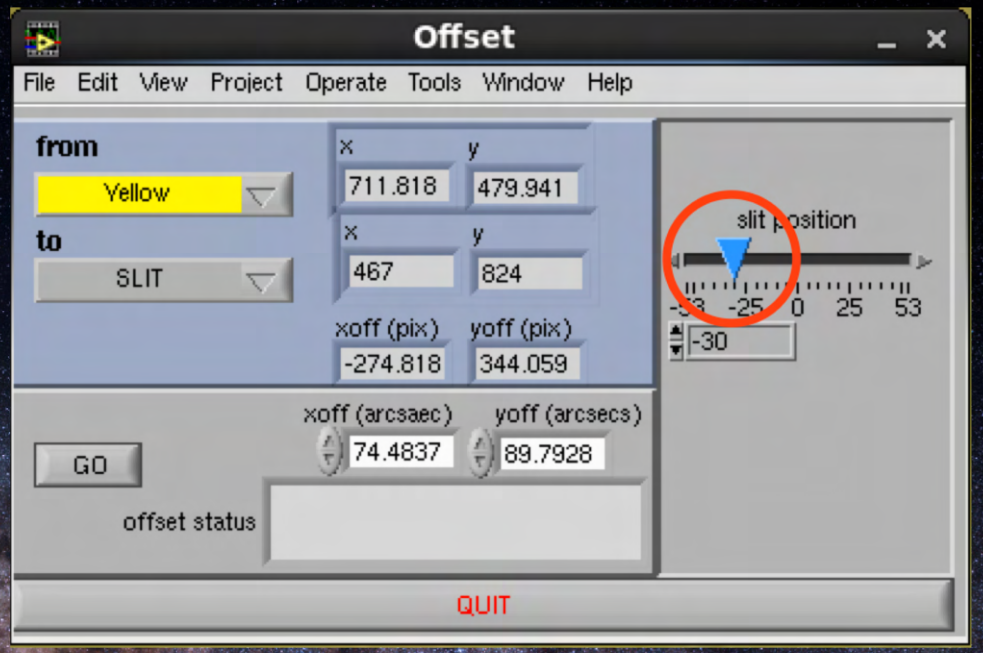
TripleSpec 4.1 Acquisition

- Perform Offset
  - From Box
  - To Slit
  - Position at 1st A
  - Fine adjustment



TripleSpec 4.1 Acquisition

- Perform Offset
  - From Box
  - To Slit
  - Position at 1st A
  - Fine adjustment



TripleSpec 4.1 Acquisition

- Perform Offset
  - From Box
  - To Slit
  - Position at 1st A
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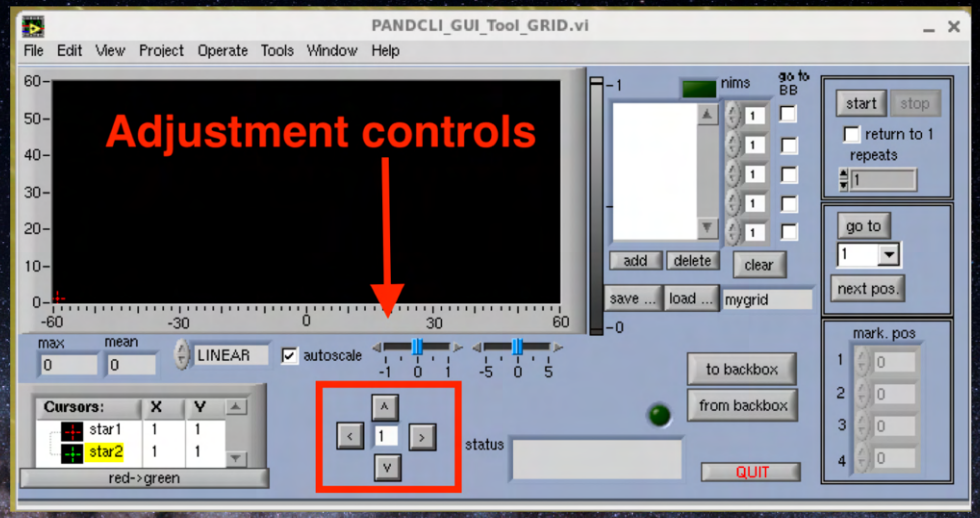
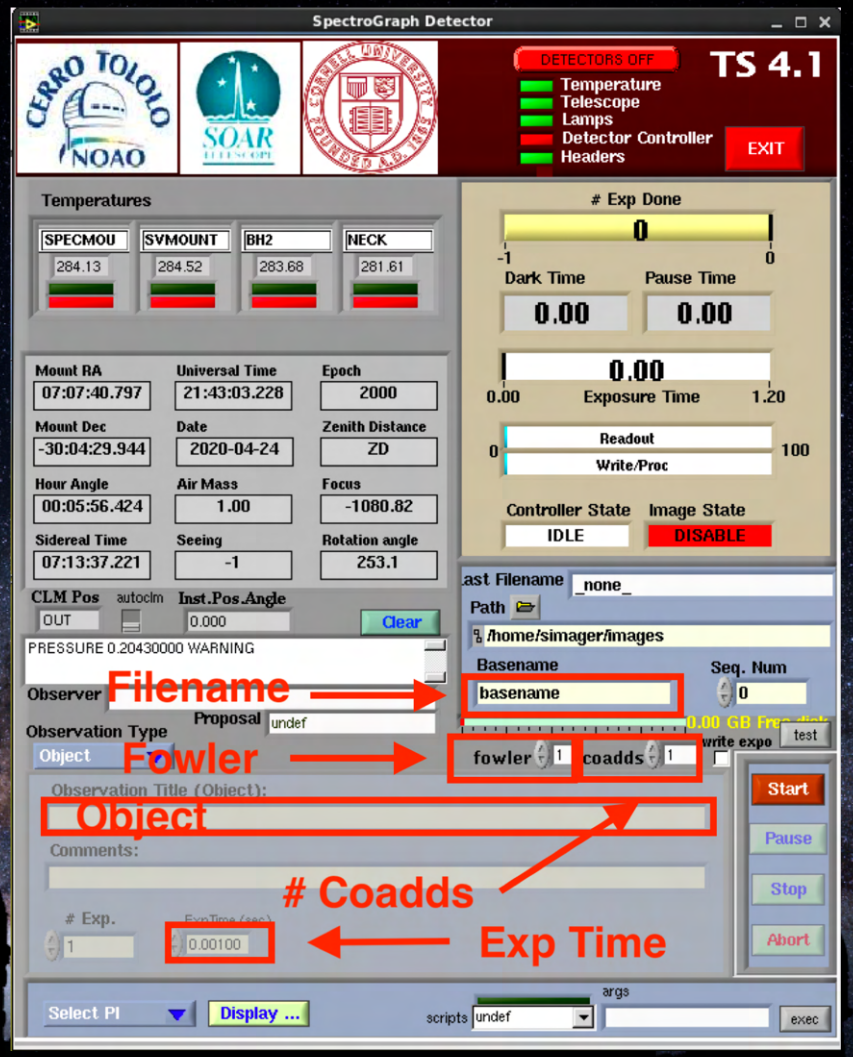


TripleSpec 4.1 Observations

Spectra

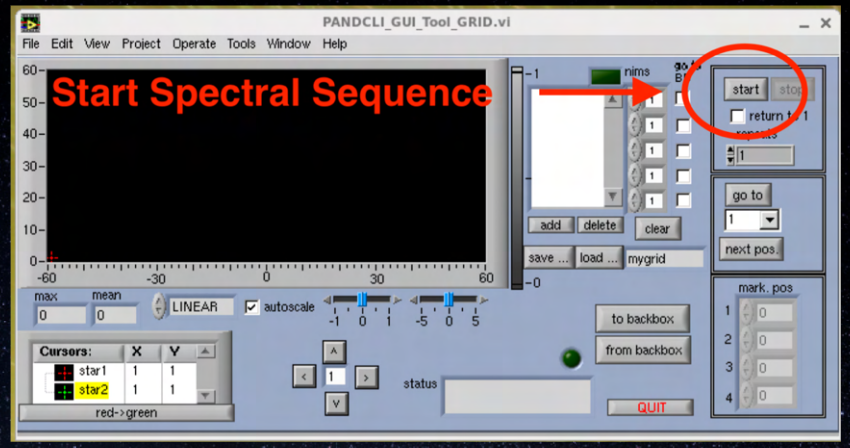
TripleSpec 4.1 Spectra

- Set Obs Info in Main App
  - Object Name
  - Exp. Time
  - Filename
  - Coadds
  - Fowler Sample



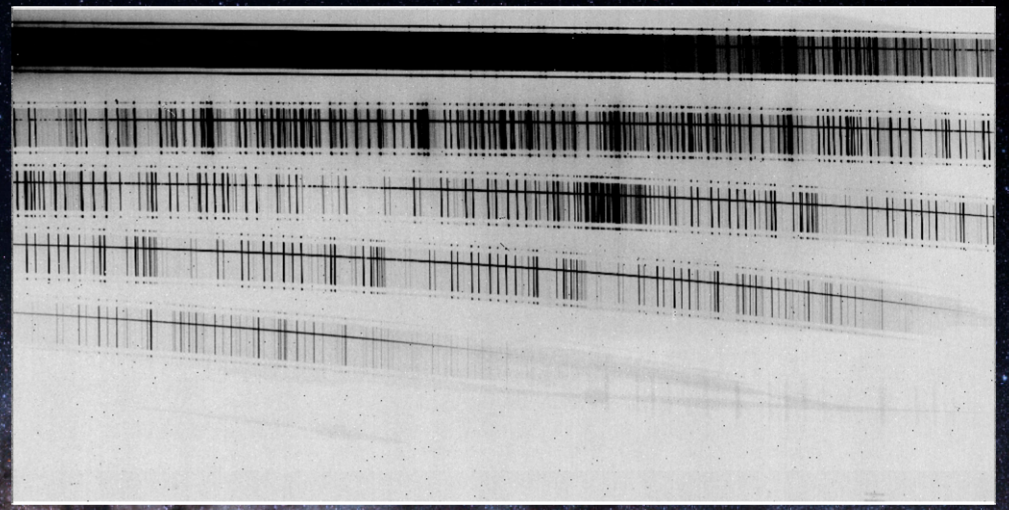
TripleSpec 4.1 Spectra

- Start Obs Sequence



TripleSpec 4.1 Spectra

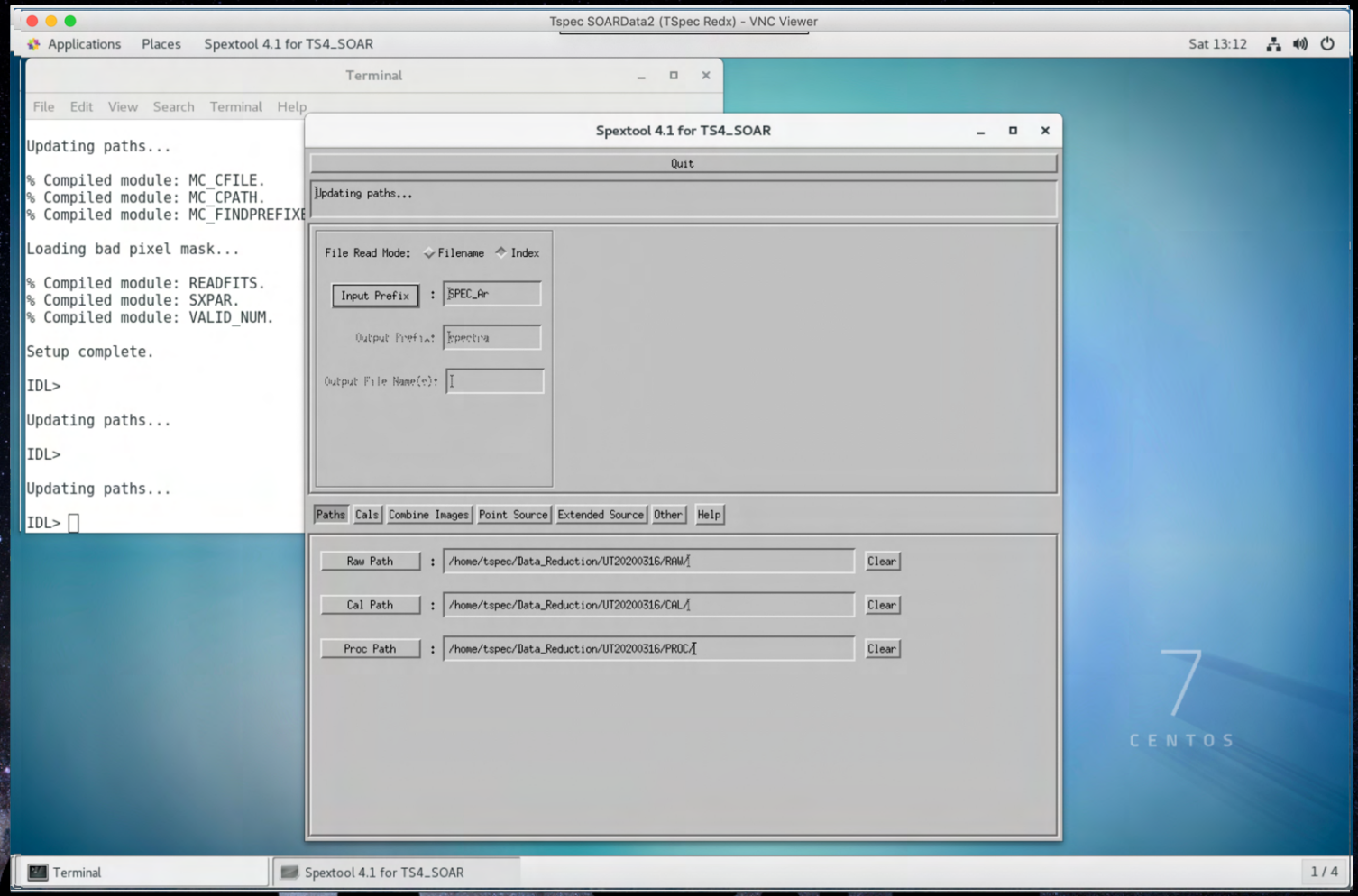
- Take Calibrations
  - Arc lamps?
    - May not be necessary
    - Can use sky lines
  - Telluric Standard
    - Nearby A0V or G2V
    - Remove atmospheric absorption lines
    - http://irtfweb.ifa.hawaii.edu/cgi-bin/spex/find_a0v.cgi



TripleSpec 4.1 Data Redx

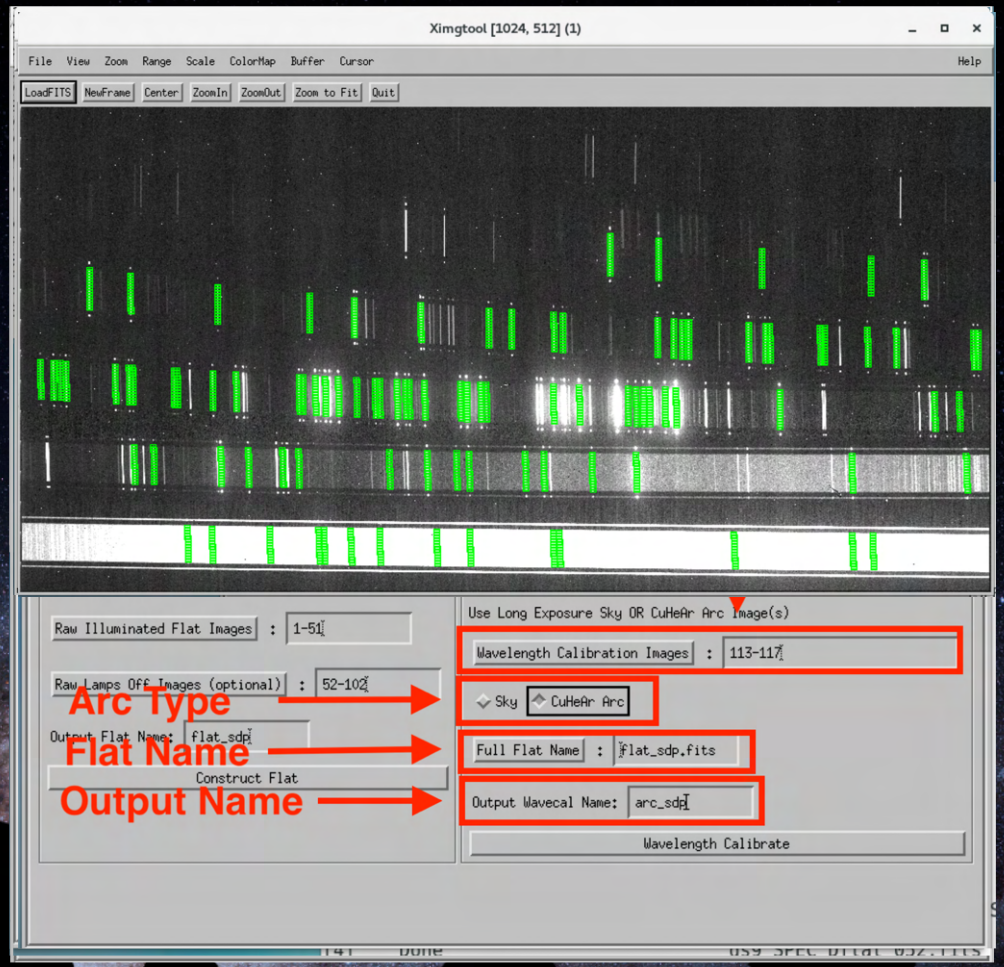
TripleSpec 4.1 Data Redx

- Runs on soardata2 (139.229.15.173)
- VNC access
- Data Reduction
- Find Data Dir
- Set Paths
- Start IDL
- Start xspextool



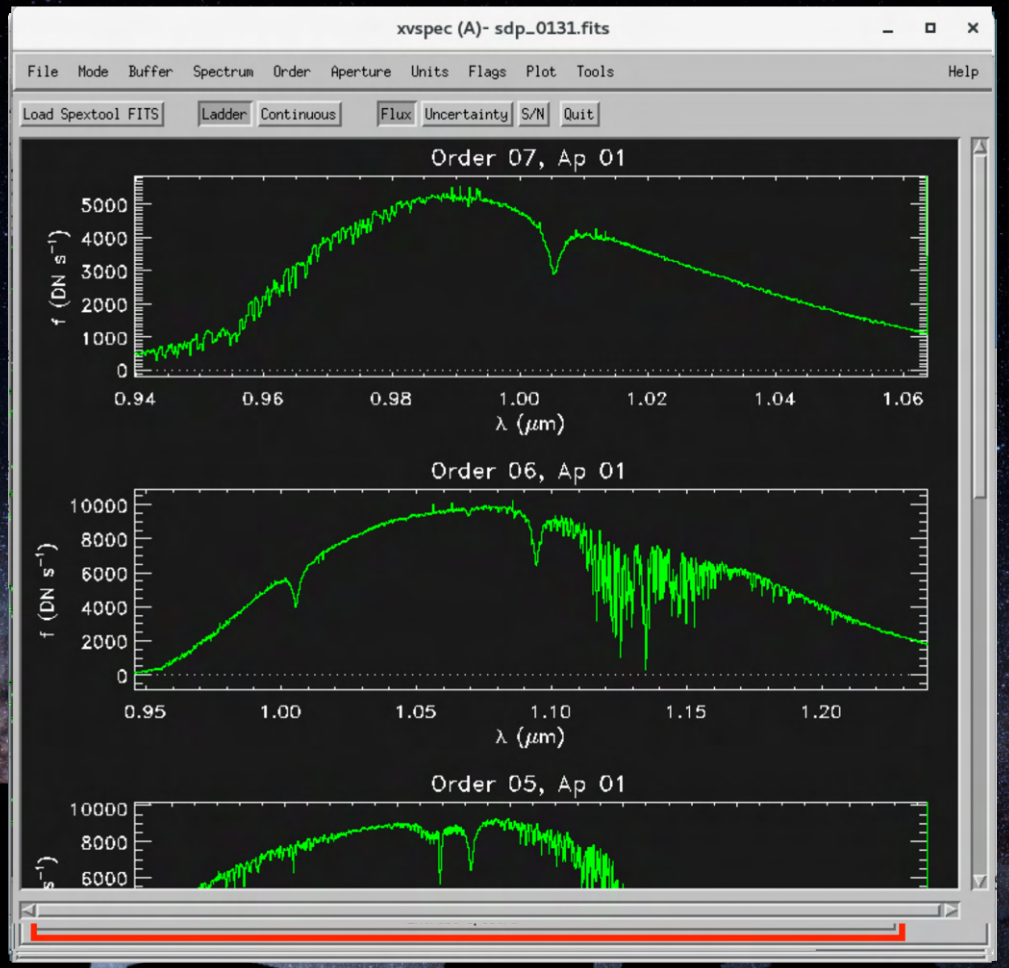
TripleSpec 4.1 Data Redx

- XSpextool
  - Process Cals
    - Construct Flat
    - Construct Arc



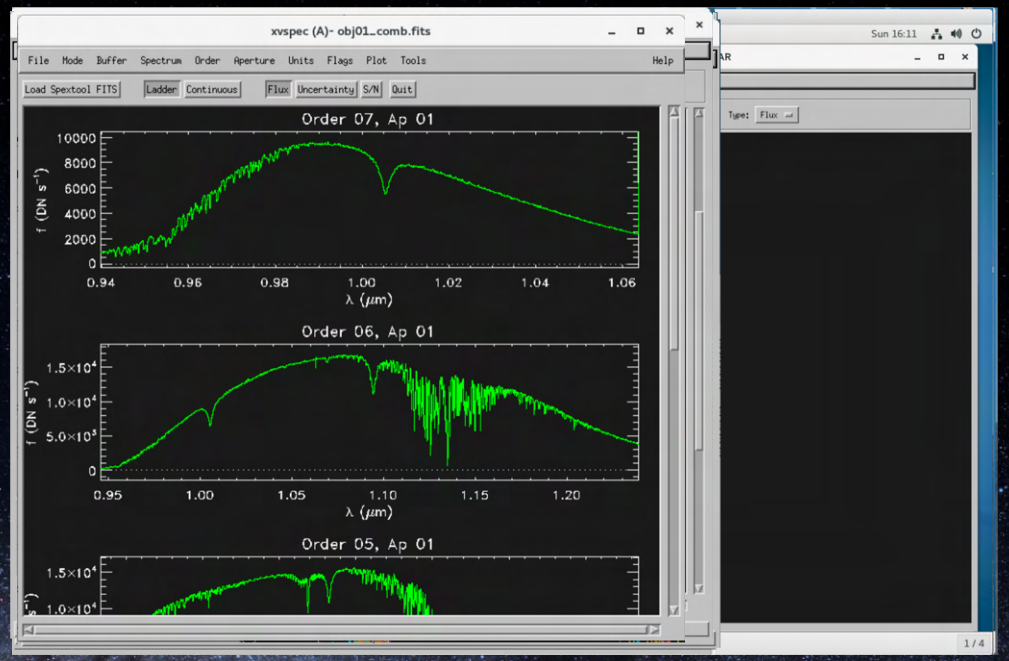
TripleSpec 4.1 Data Redx

- XSpextool
  - Extract Spectra
  - Point Source
    - Setup Files
    - Load Image
    - Make Spatial Profile
    - Store Aperture Position
    - Trace Objects
    - Show Aperture
    - Extract Spectra



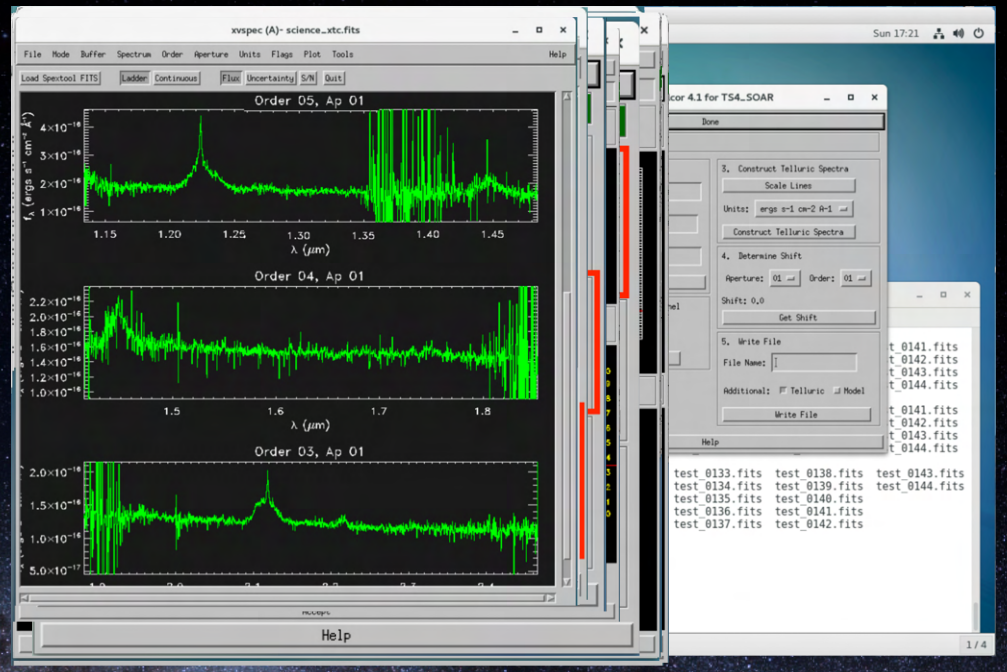
TripleSpec 4.1 Data Redx

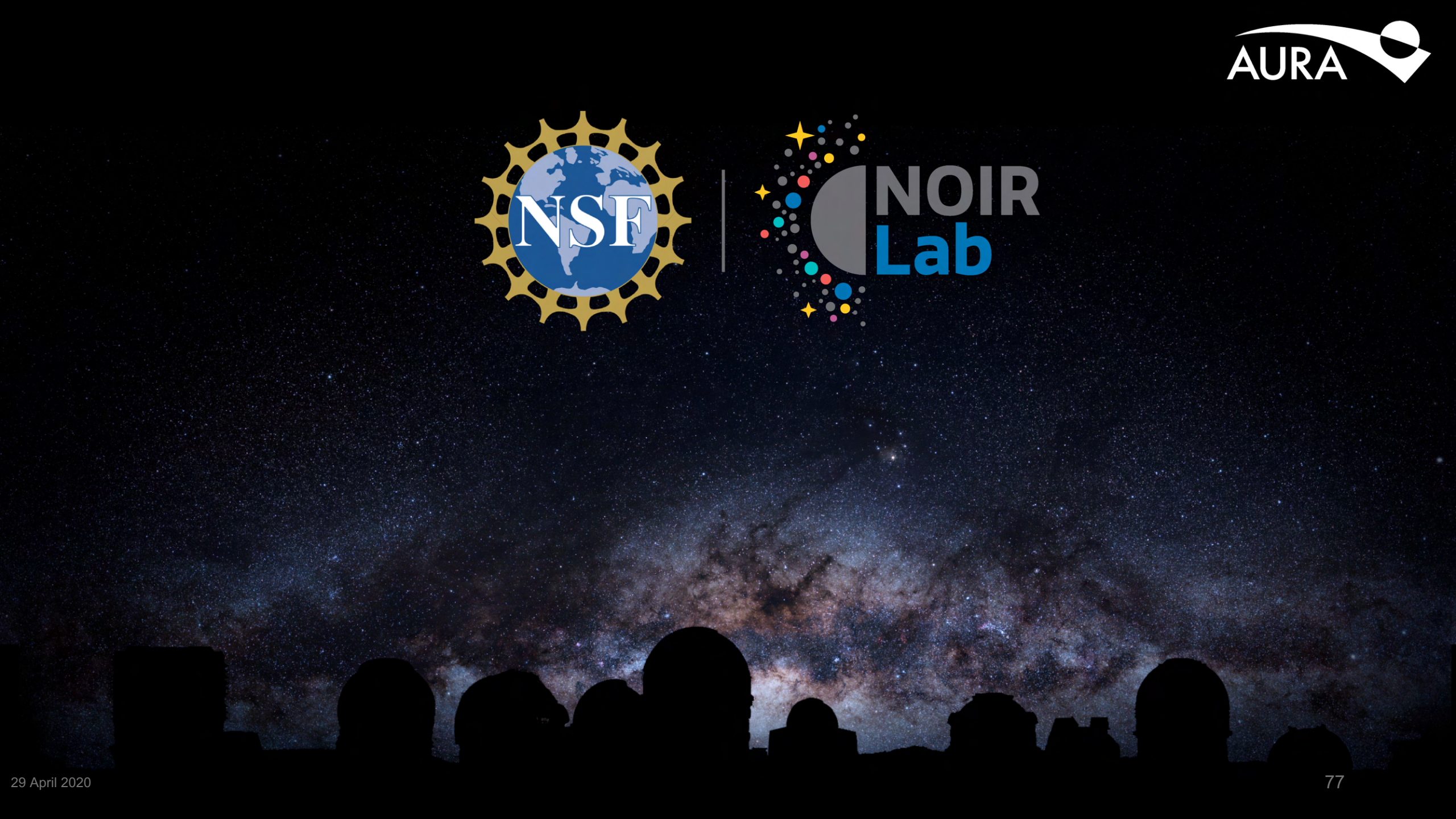
- Combine Spectra
  - xcombspec
  - Prepare data
  - Load spectra
  - Scale Spectra
  - Remove Bad Pixels
  - Combine



TripleSpec 4.1 Data Redx

- Flux-calibrate
  - xtellcor
  - Load data
  - Construct Kernel
  - Construct Telluric
  - Calculate Shifts
  - Write File
  - Examine Spectrum




AURA
NSF
NOIR
Lab