TripleSpec 4.1

Sean Points
NSF’s NOIRLab
TripleSpec 4.1 Overview
• Cross-Dispersed NIR Spectrograph
  • Covers ~4.5 orders
• Spectral Range: 0.95\(\mu\)m – 2.45\(\mu\)m
  • Instrument optics can cover 0.8\(\mu\)m – 2.45\(\mu\)m
  • 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

1. Dewar Window
2. OAP 1
3. OAP 2
4. Slit Substrate
5. Collimator
6. Cross Dispersing Prisms
7. Grating
8. Spectrograph Camera
9. Detector
TripleSpec 4.1 Optics

Dewar Layout
TripleSpec 4.1 Data
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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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
TripleSpec 4.1 Startup

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  - 4’x4’ FOV
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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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Check the box
TripleSpec 4.1 Startup

- SV VNC
- Image Detector
- Tools
  - Box Profile
  - Grid
  - Offset
  - Zoom Windows
  - Zoom Guider
TripleSpec 4.1 Startup

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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
Dome Lamps On
Dome Lamps Off
Arc Lamps On
Arc Lamps Off
TripleSpec 4.1 Observations

Telescope Focus

Discovering Our Universe Together
• 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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• Select Focus Wide Script
  • Set middle focus value
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• In IRAF run ts4focus
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TripleSpec 4.1 Tel. Focus

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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
• 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
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  • Set # repeats
  • Return to Start
• 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
• 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 Observations
Spectra

Discovering Our Universe Together
TripleSpec 4.1 Spectra

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