SPIRE FTS SOF1 Pipeline

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SPIRE FTS Standard Pipeline Delivery

- Observing Modes for the SPIRE FTS
  - Observing Modes
  - Main points Regarding the release of SOF1
  - Observing Mode Structure
- SPIRE FTS Pipeline
  - Overview
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    - Create Spectra
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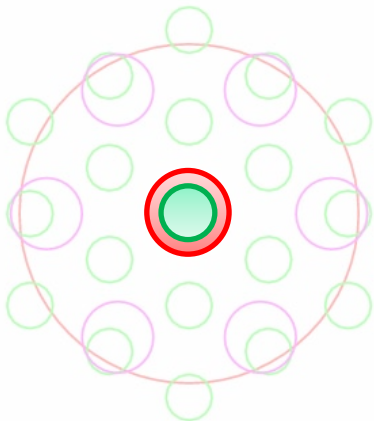
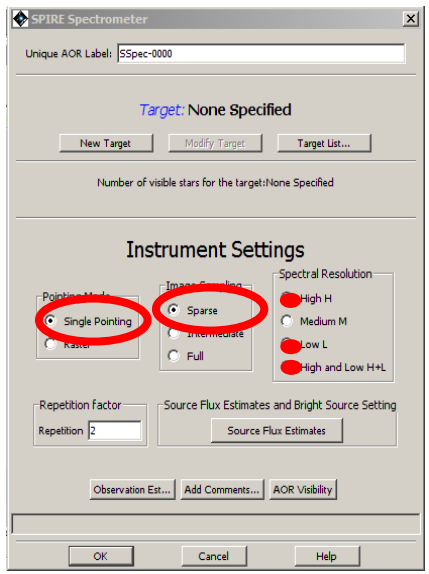
Observing Modes

The observing mode *SOF1* was released last Friday

***In HSpot*:**

- **Single Pointing *(central detectors only)***
- **Sparse**
- **High (H) and Low (L) resolution**
- **High + Low (H+L) resolution***





SOF1 Release -- Highlights

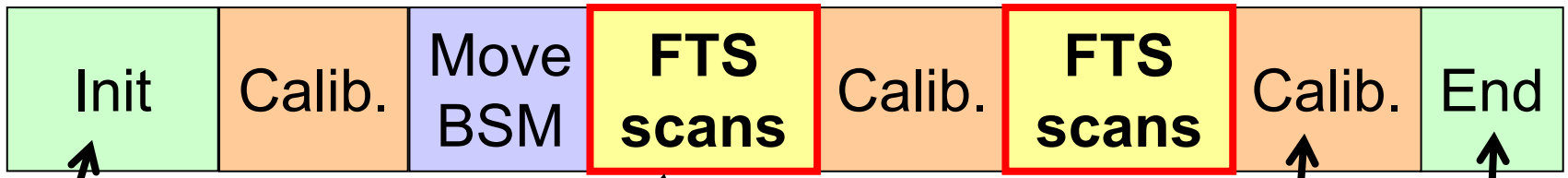
- **Continuum Sensitivity better than HSpot after 5 repetitions. We believe we are *at least* a factor of 2 better than HSpot in final sensitivity** *(HSpot currently includes factor 2 "pessimism factor")*
- **Spectral Resolution:** Better than in HSpot for both HR and LR modes.
- **Wavescale calibration:** Accurate to within 1/10 of a resolution element (30km/s in HR mode).
- **Beam Sizes:** Slightly larger than in HSpot
  - SLWC3: 35" vs 34"
  - SSWD4: 19" vs. 16"

SOF1 Release -- Caveats

- **Bright Source Mode:** Not included in SOF1 release. Sources as bright as Neptune set as the current upper limit.
- **Mapping**: Off-axis detectors are included in final products but have not been properly calibrated.
- **Thermal Variations:** Additive effect. Instrument variations affect SLW, Telescope affects SSW. Weaker sources most susceptible. Line fluxes not affected.
- **Fixed Pattern Noise:** Systematic effect that can obscure weak lines. Latest Flux Calibration **greatly** reduces this effect, but the flux calibration is not as accurate (10%-20% offset). Photometric accuracy is better, but FPN has not been removed yet with this method.
- **NB:** SPIRE FTS has been used on only 8 of the 216 ODs.

SPIRE FTS Observations

- Observations are divided into ***Building Blocks***:

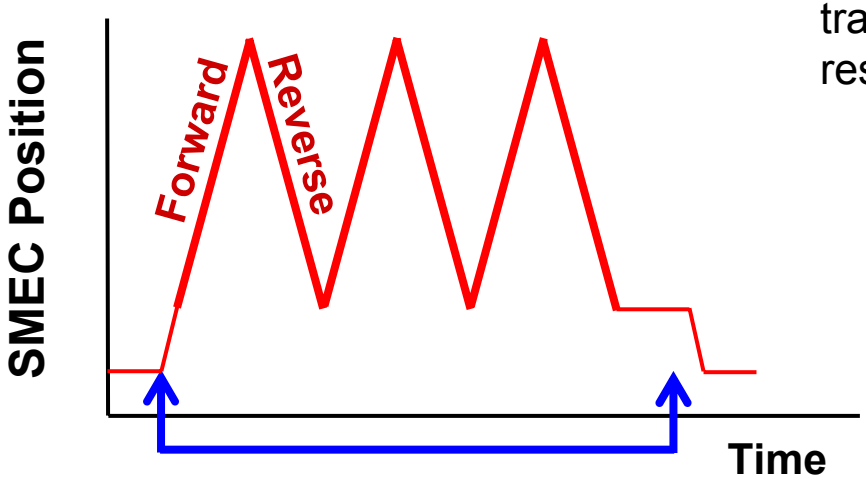


Initialisation of instrument

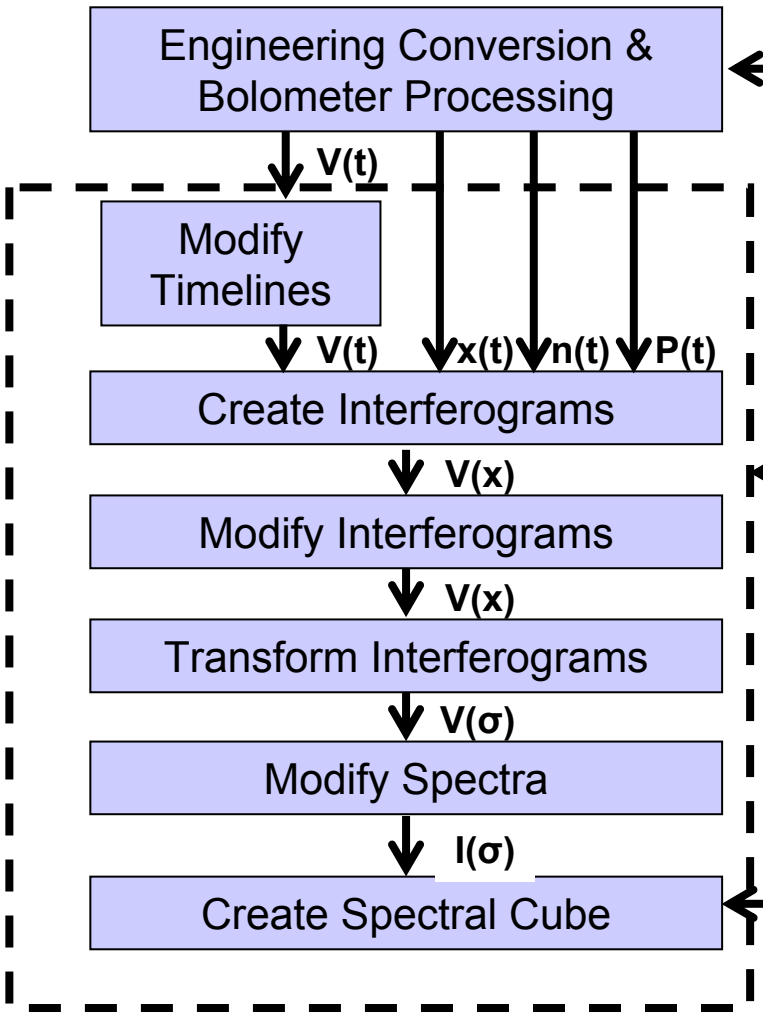
Mechanism scanned

Calibrator flashes to track detector responsivity

Reconfigure instrument, SMEC back to HOME etc.



FTS Pipeline – Steps

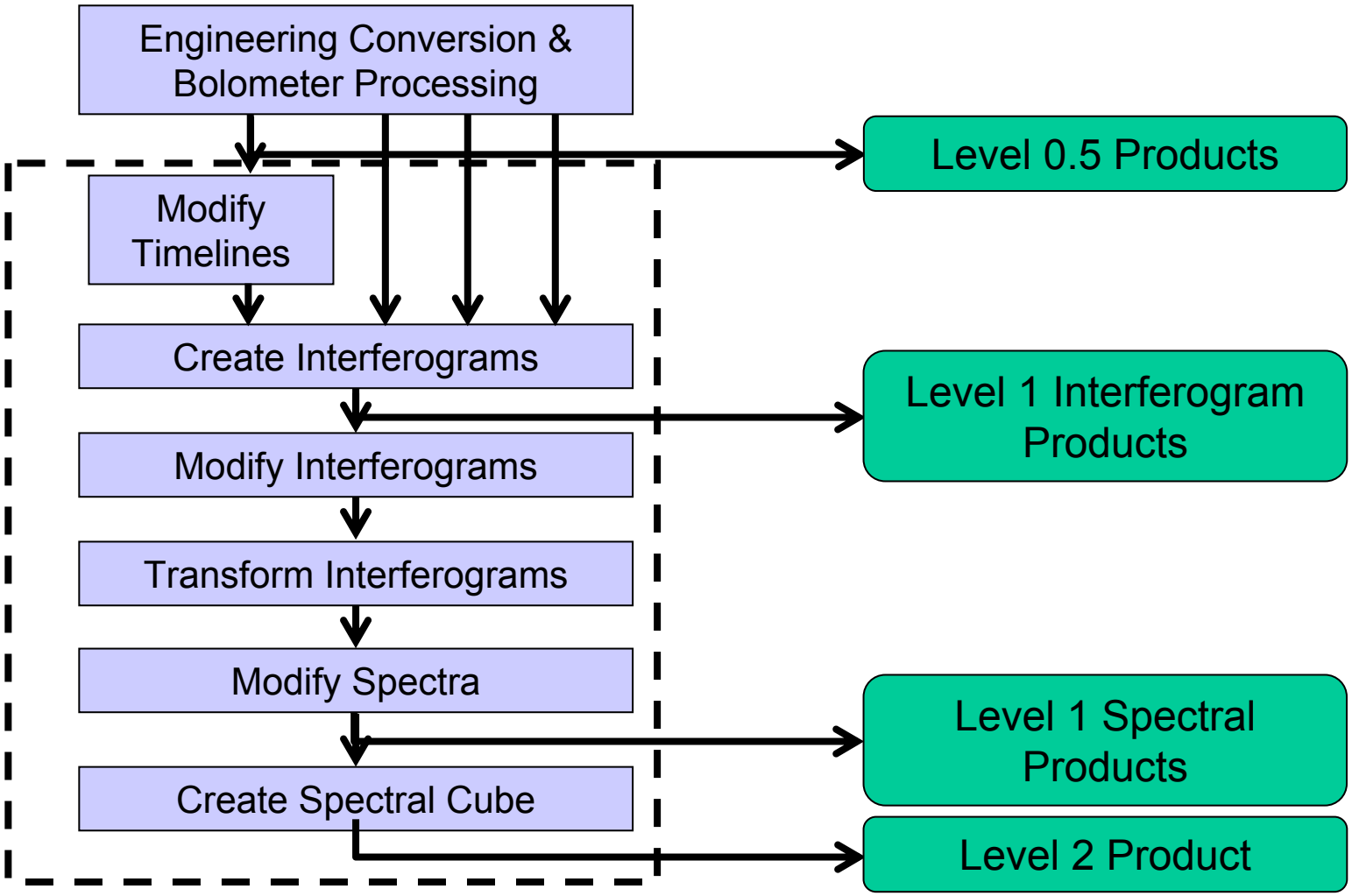


Apply these steps to All Building Blocks

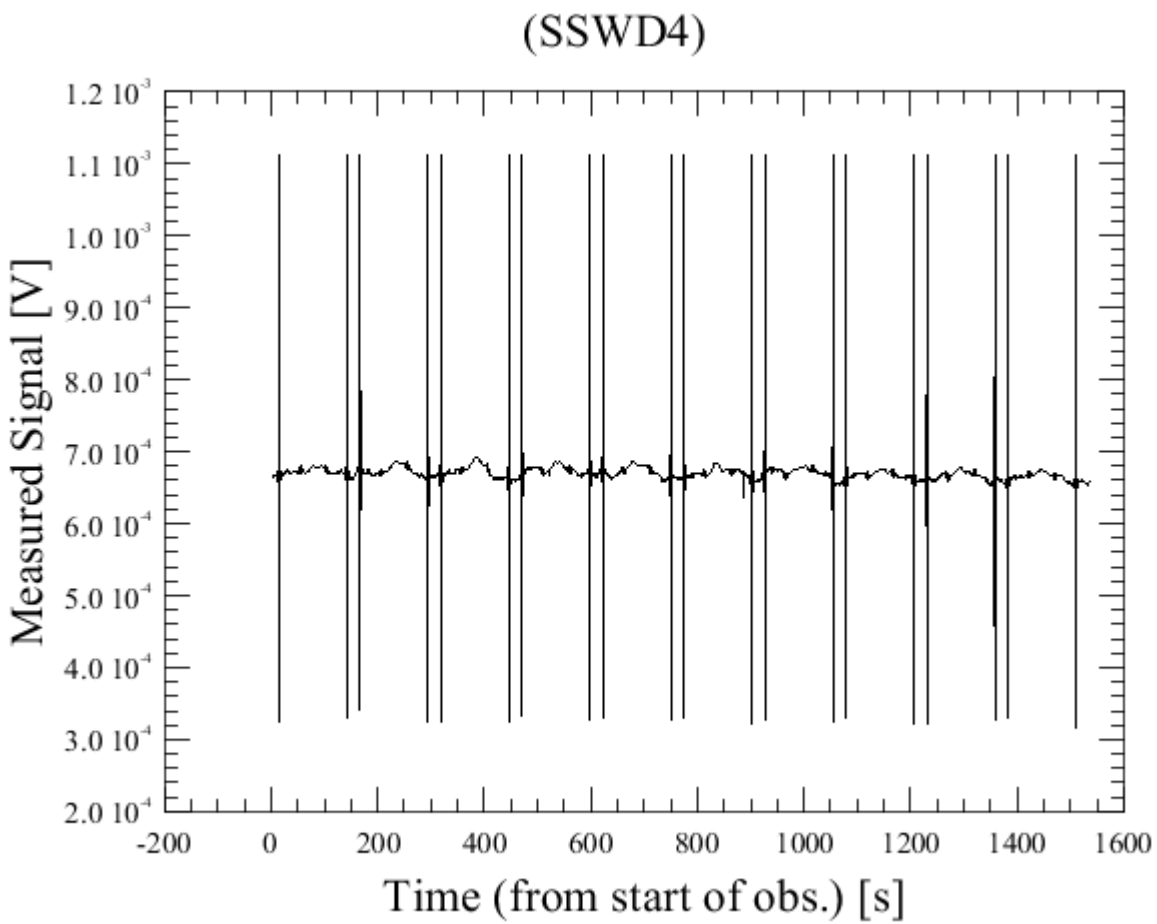
Repeat the steps in this section for each FTS Scan Building Block

Merge the results from the FTS Scan Building Blocks

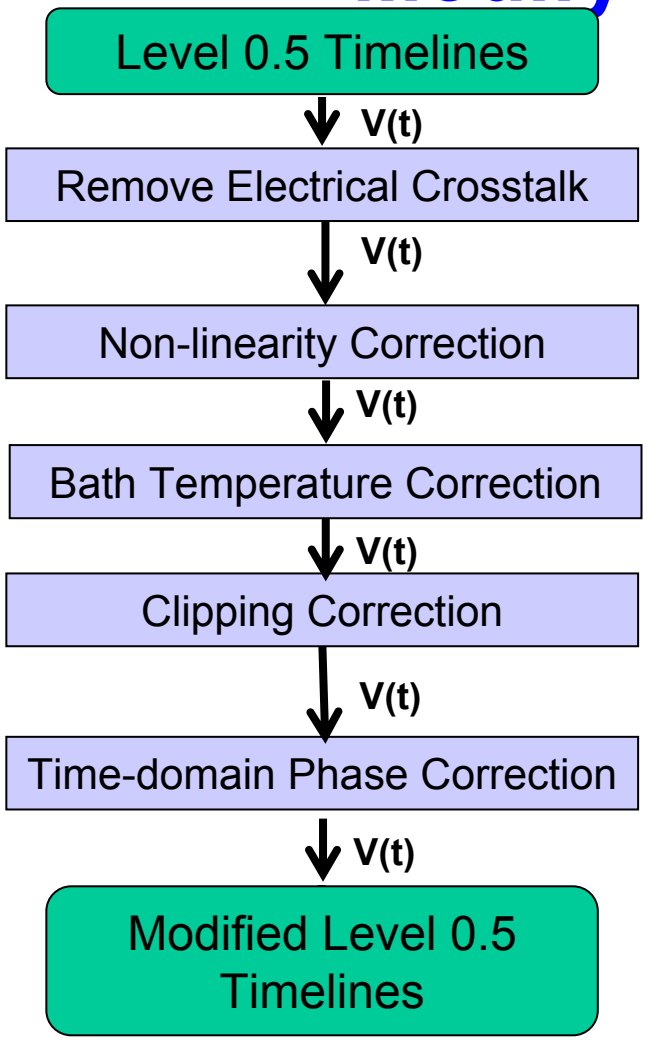
FTS Pipeline – Outputs



Modify Timelines

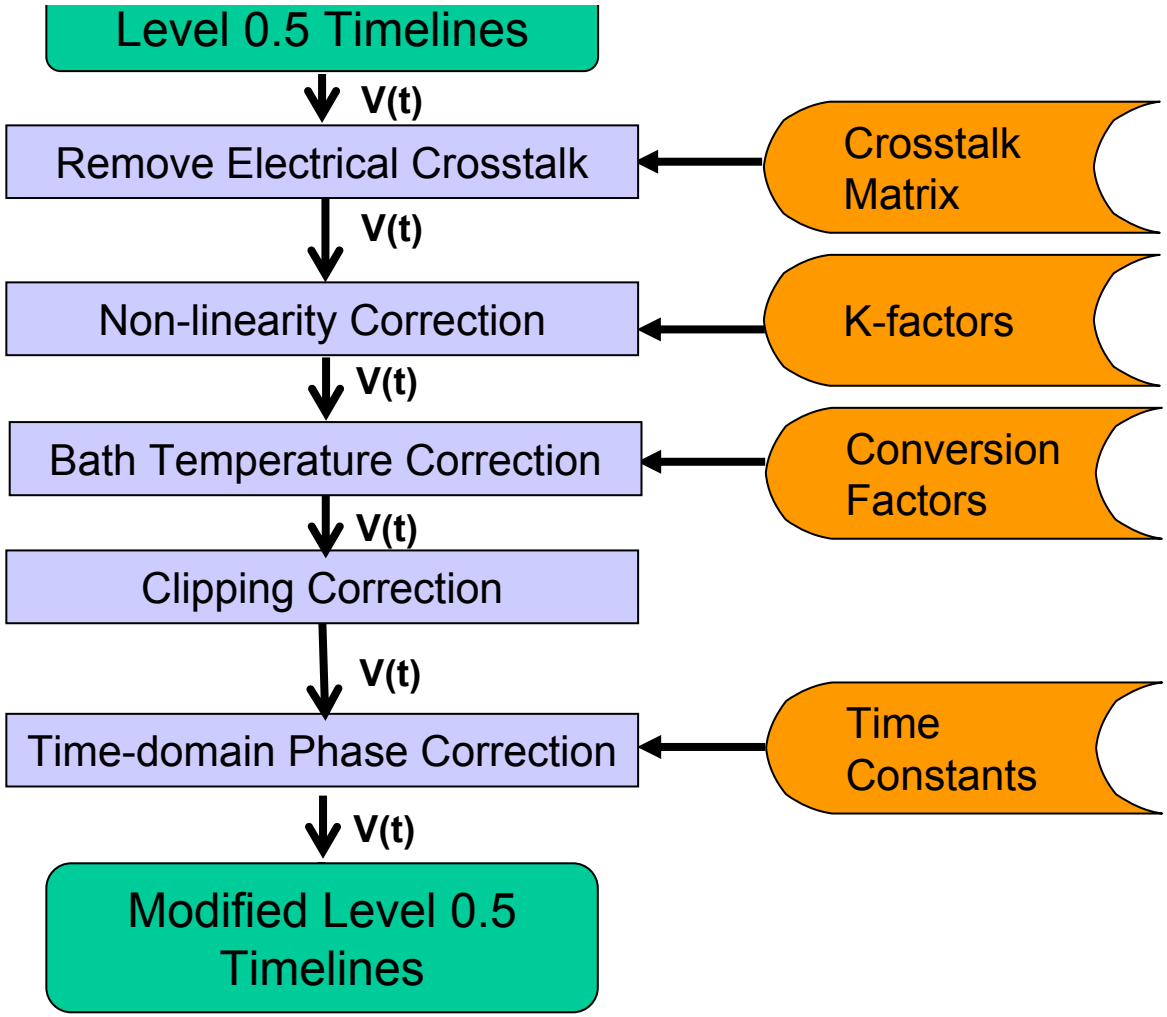


Modify Timelines



The steps in this section of the pipeline are best applied to the measured detector signals in the time domain

Clipping Correction



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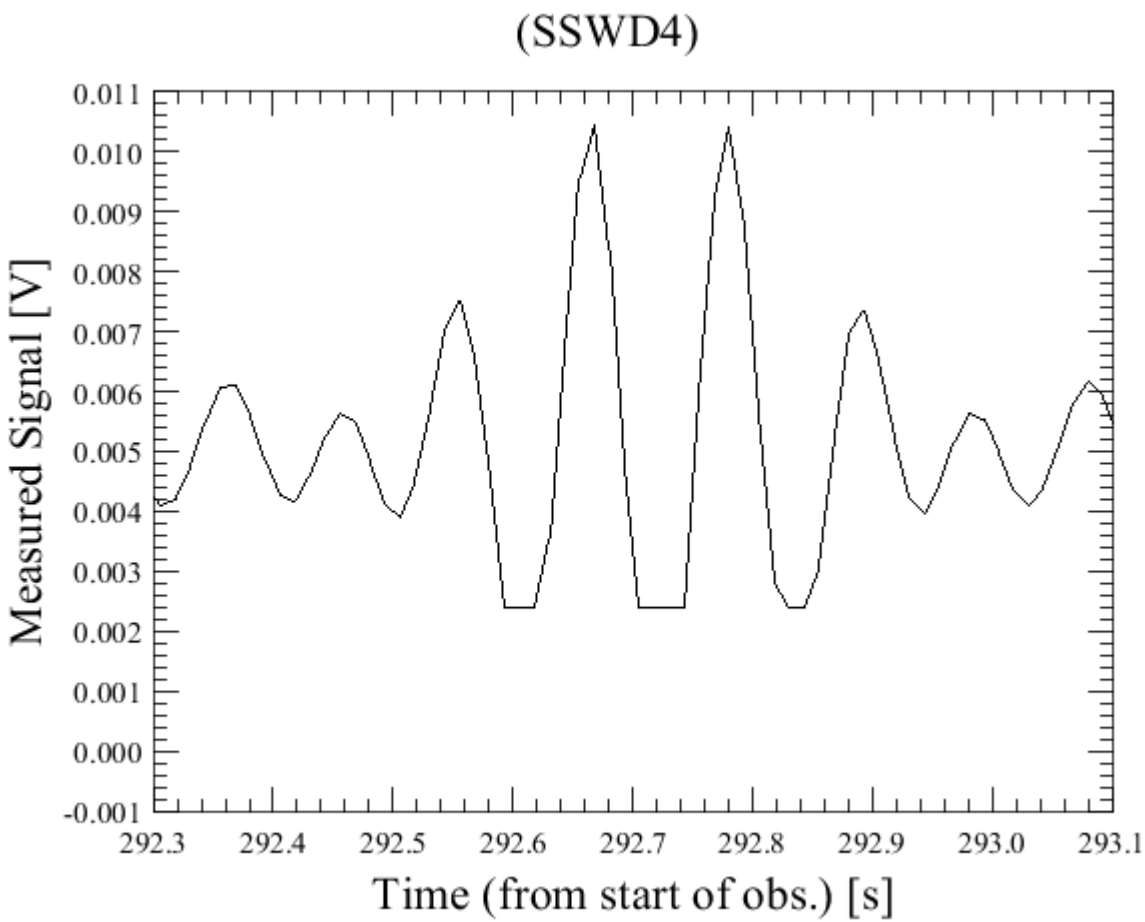
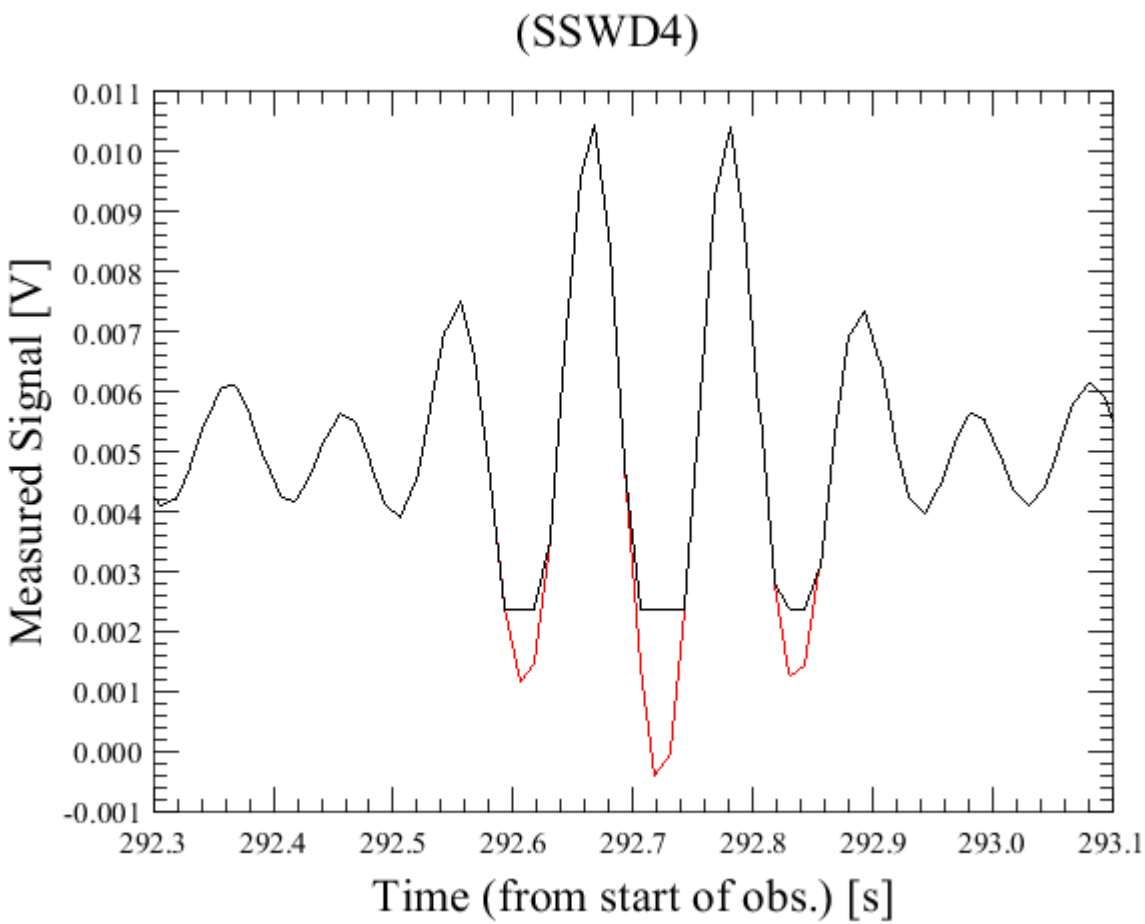
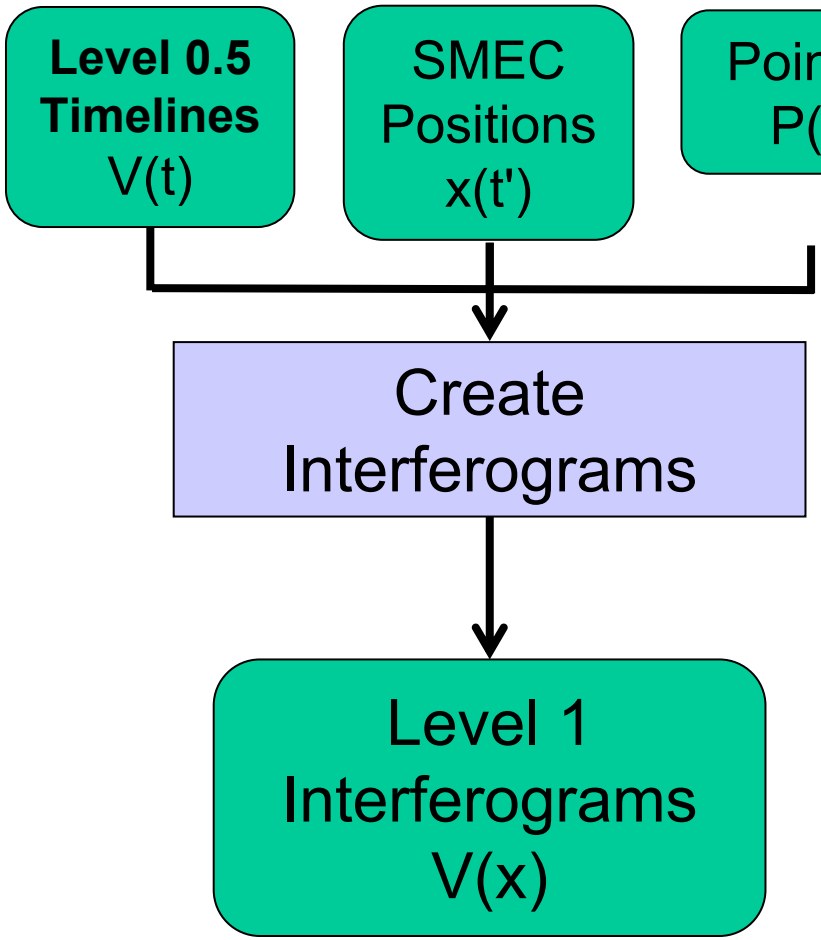


Clipping Correction



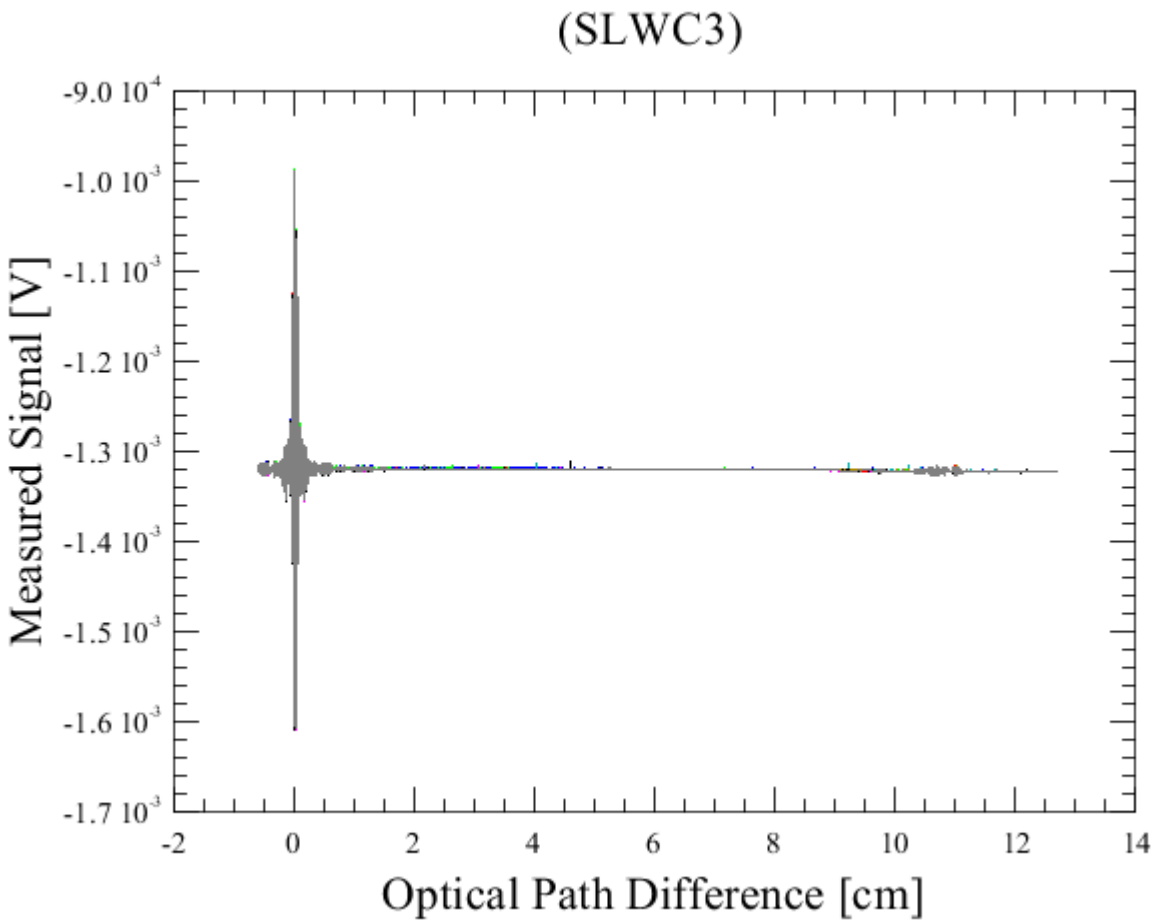
Create Interferograms



Once time domain processing is complete, the detector signals and SMEC positions can be merged to create interferograms.

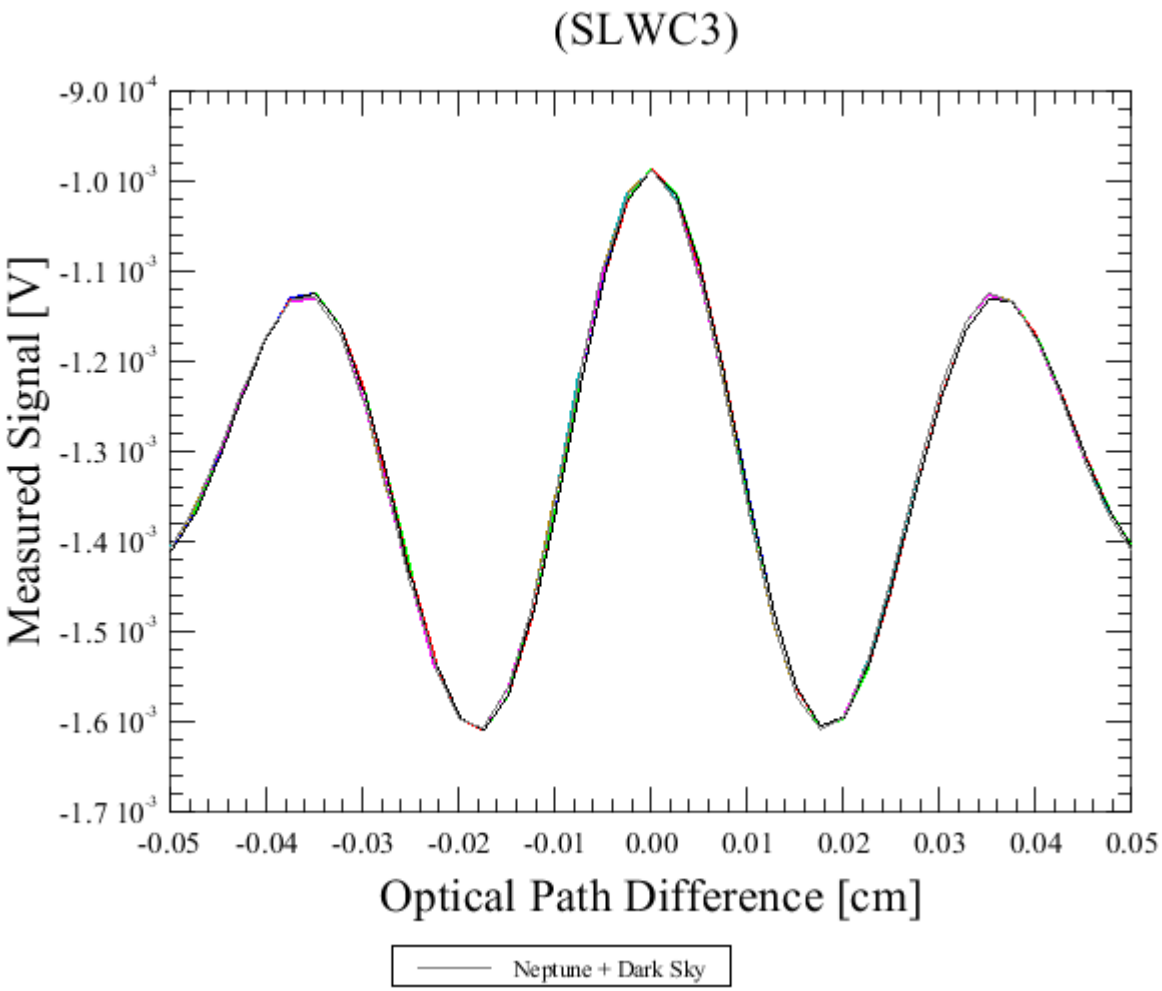
Create Interferograms -- Calibration Files

Level 0.5 Timelines V(t)

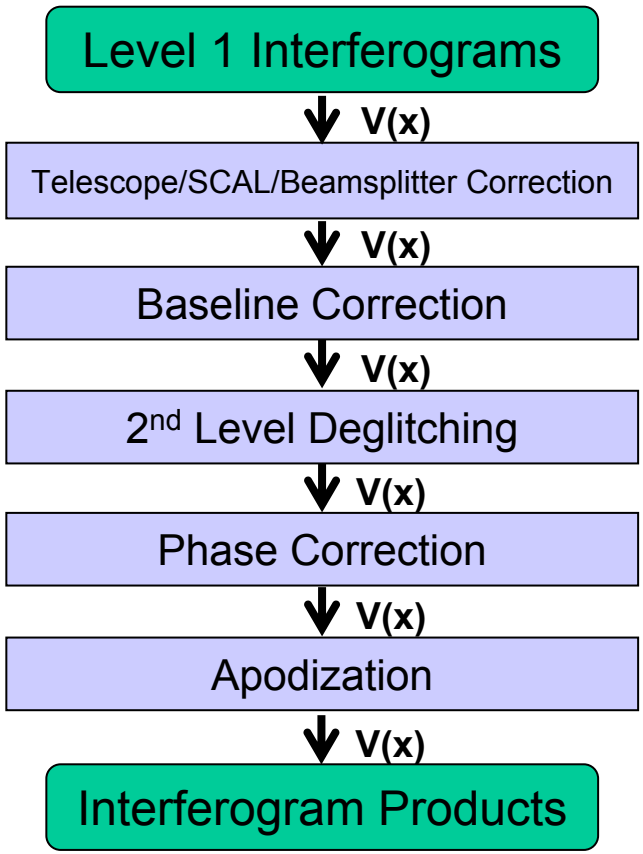


Create Interferograms -- Calibration Files

Level 0.5 Timelines V(t)

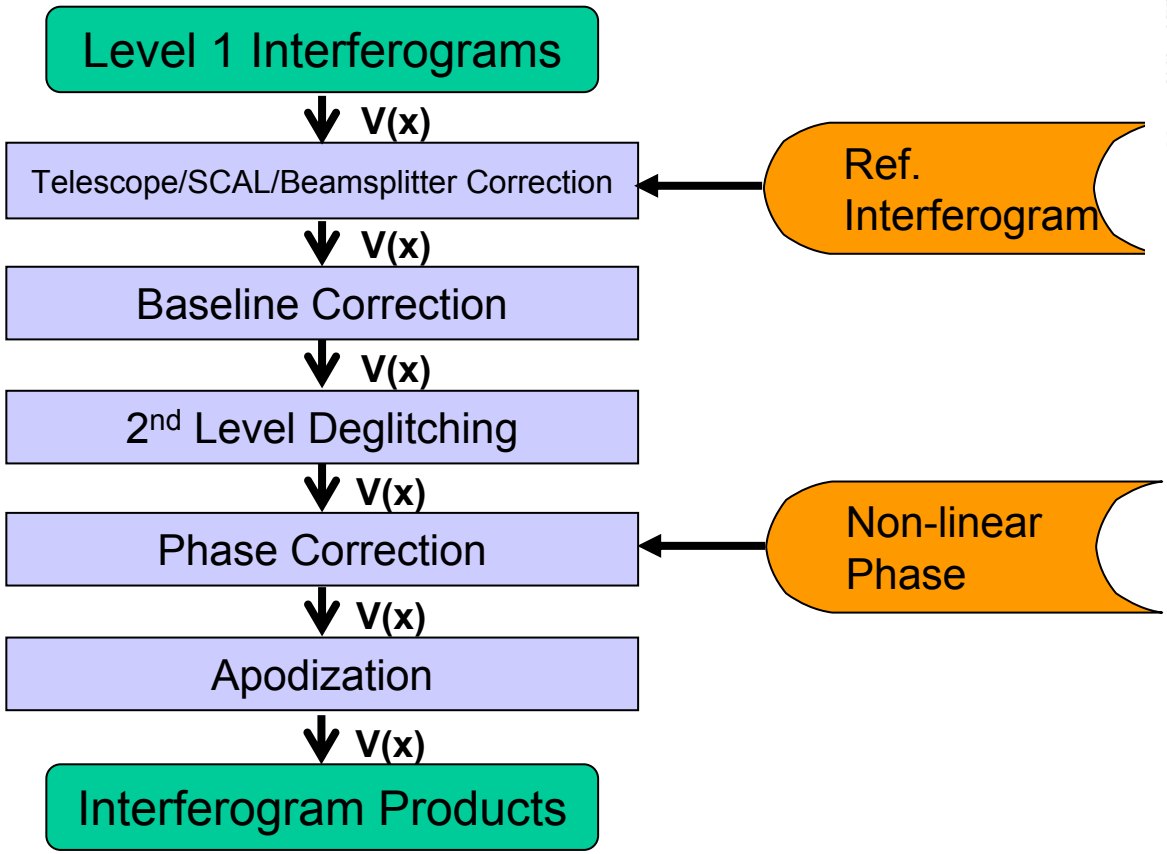


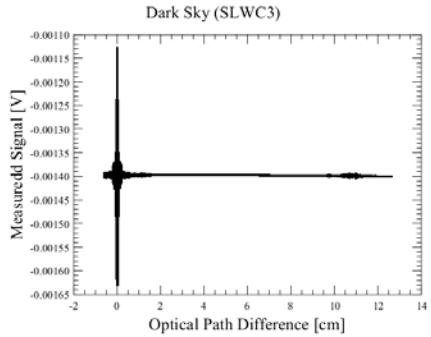
Modify Interferograms



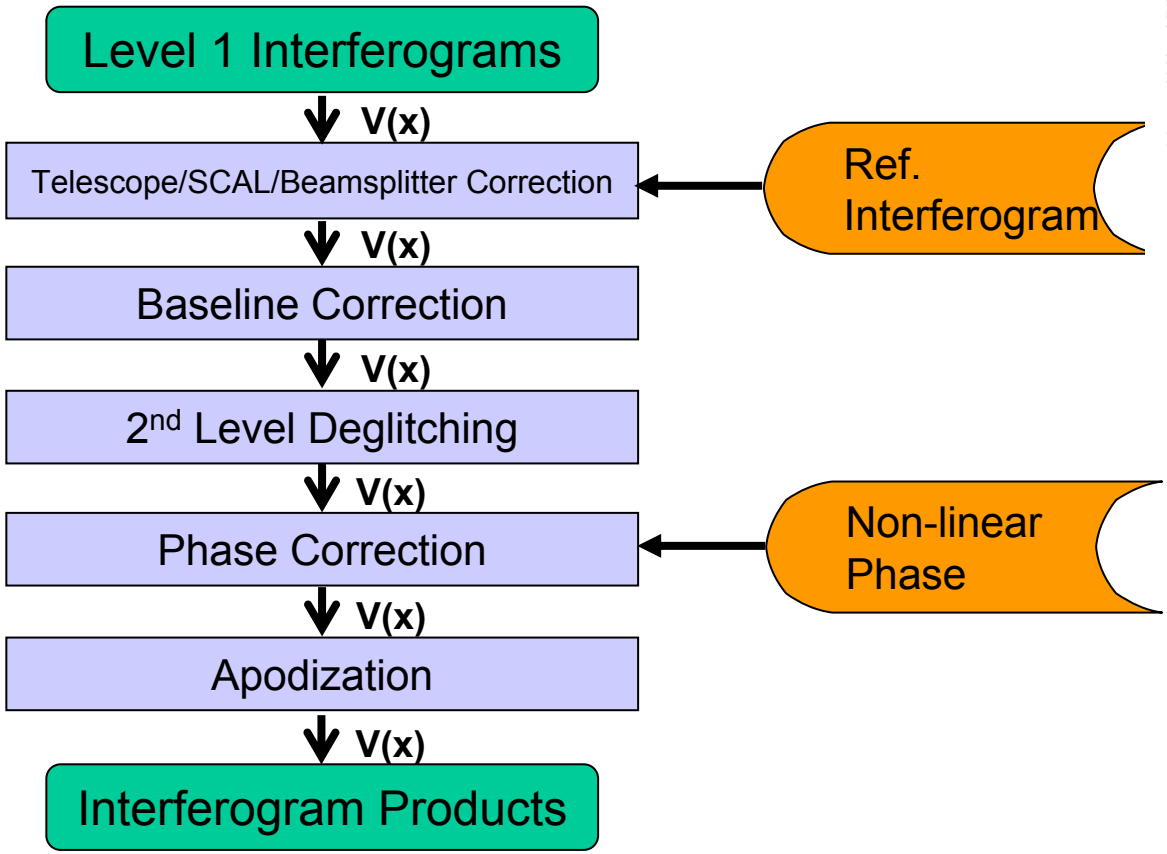
The steps in this section of the pipeline take advantage of the positional redundancy of the interferograms from each mechanism scan.

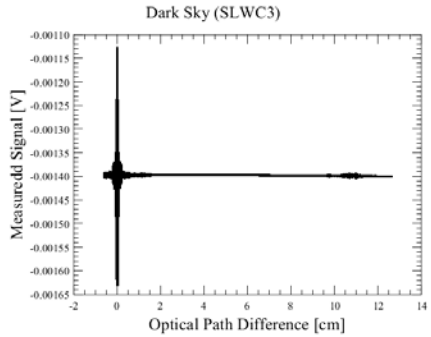
Modify Interferograms – Calibration Files



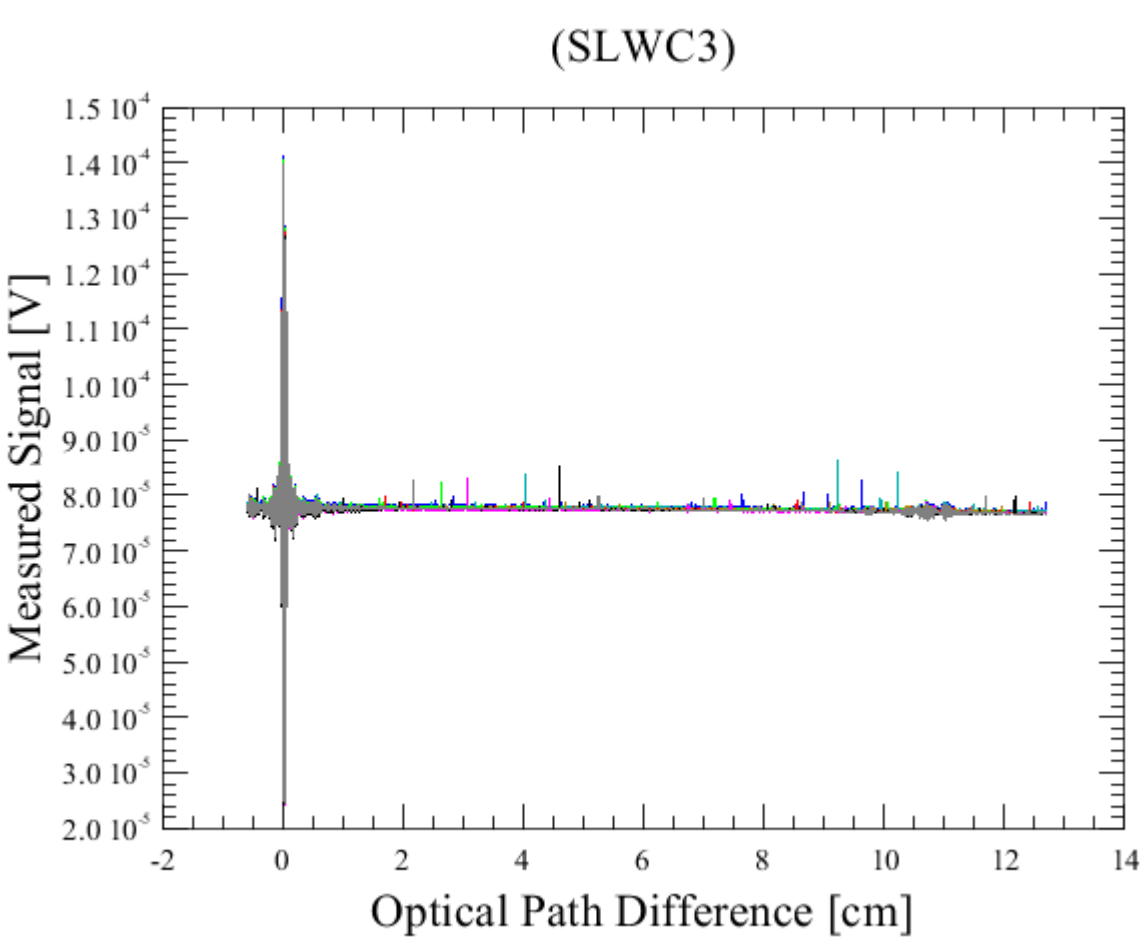


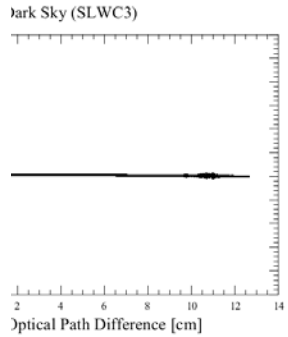
Reference Subtraction



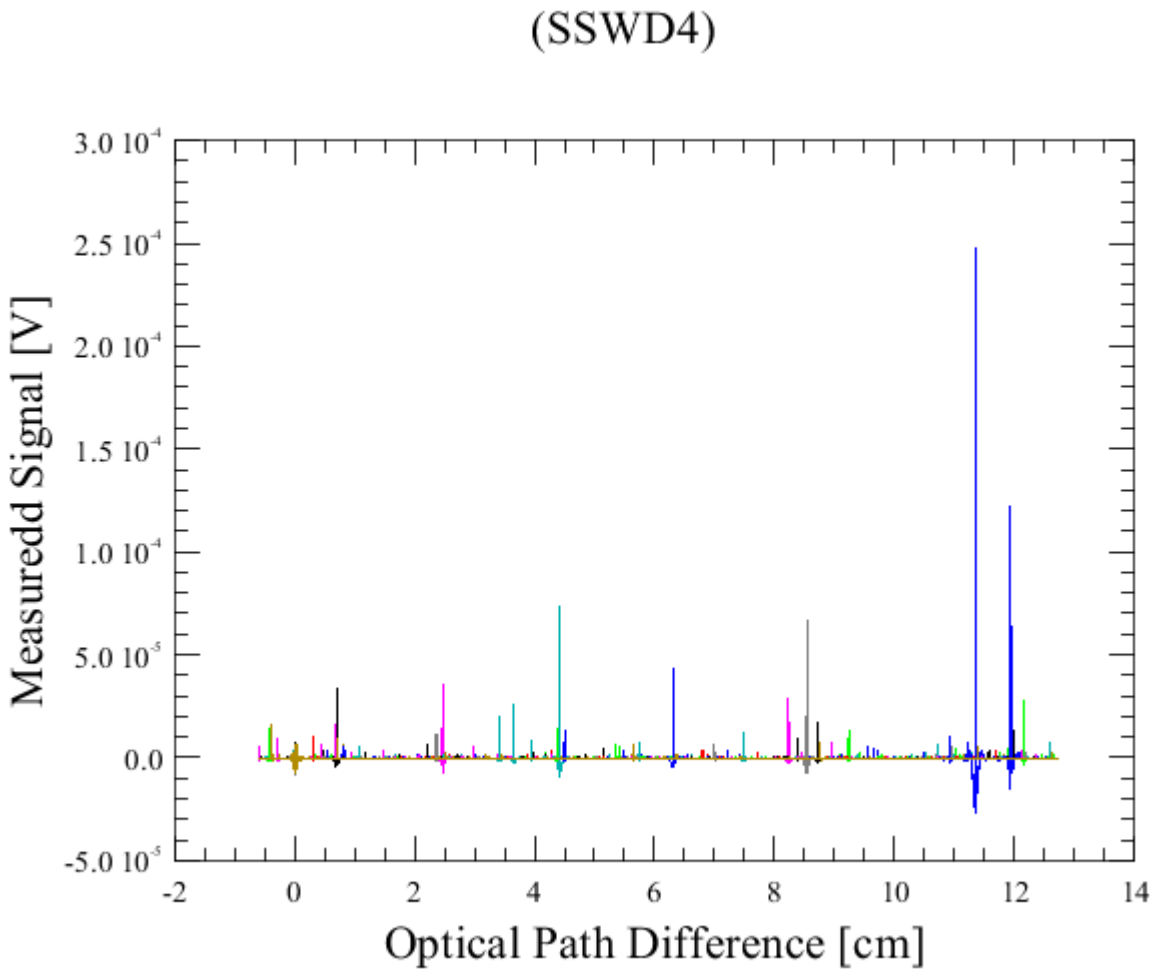


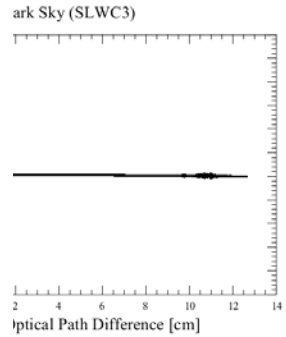
Reference Subtraction



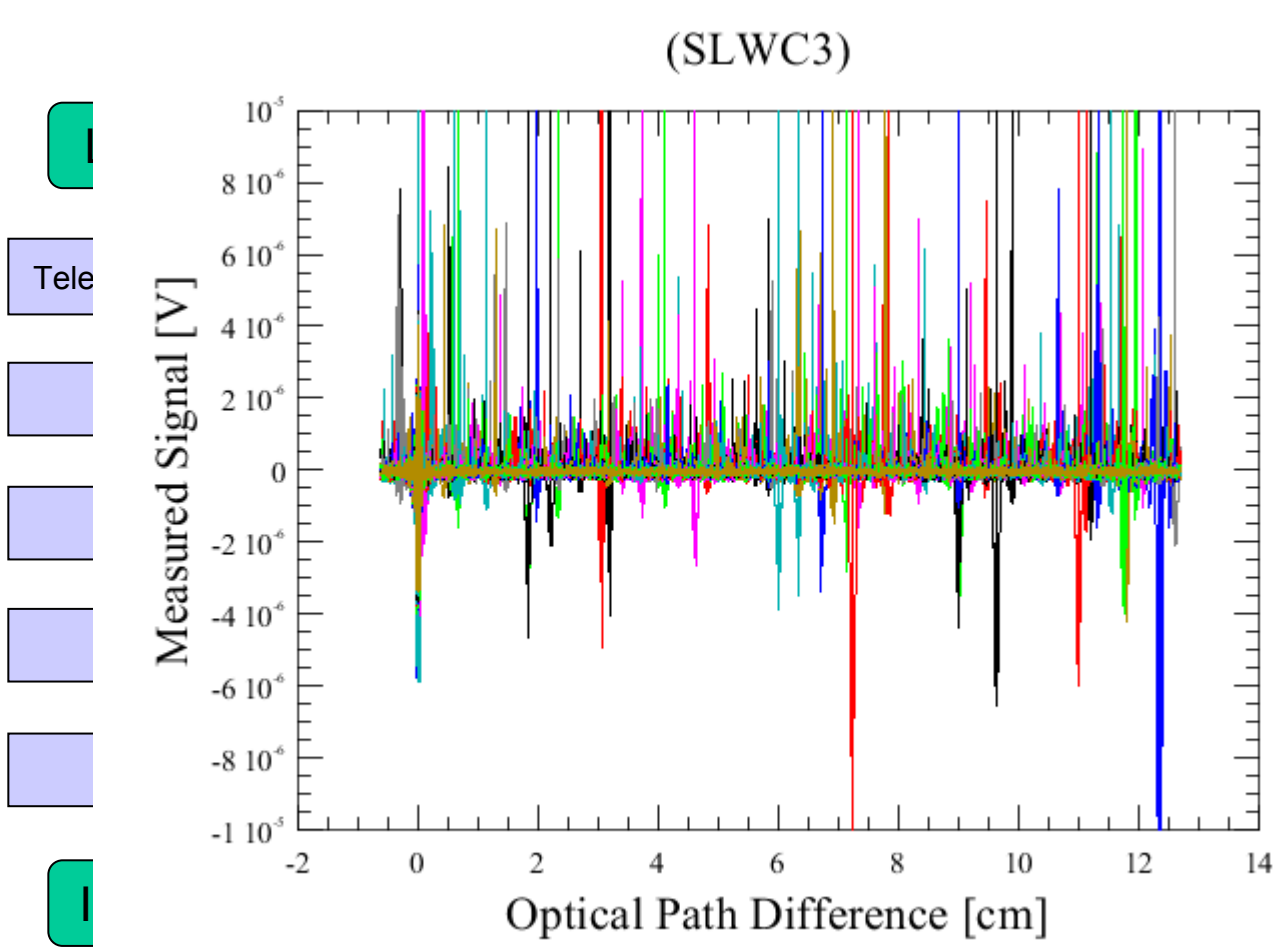


Deglitching

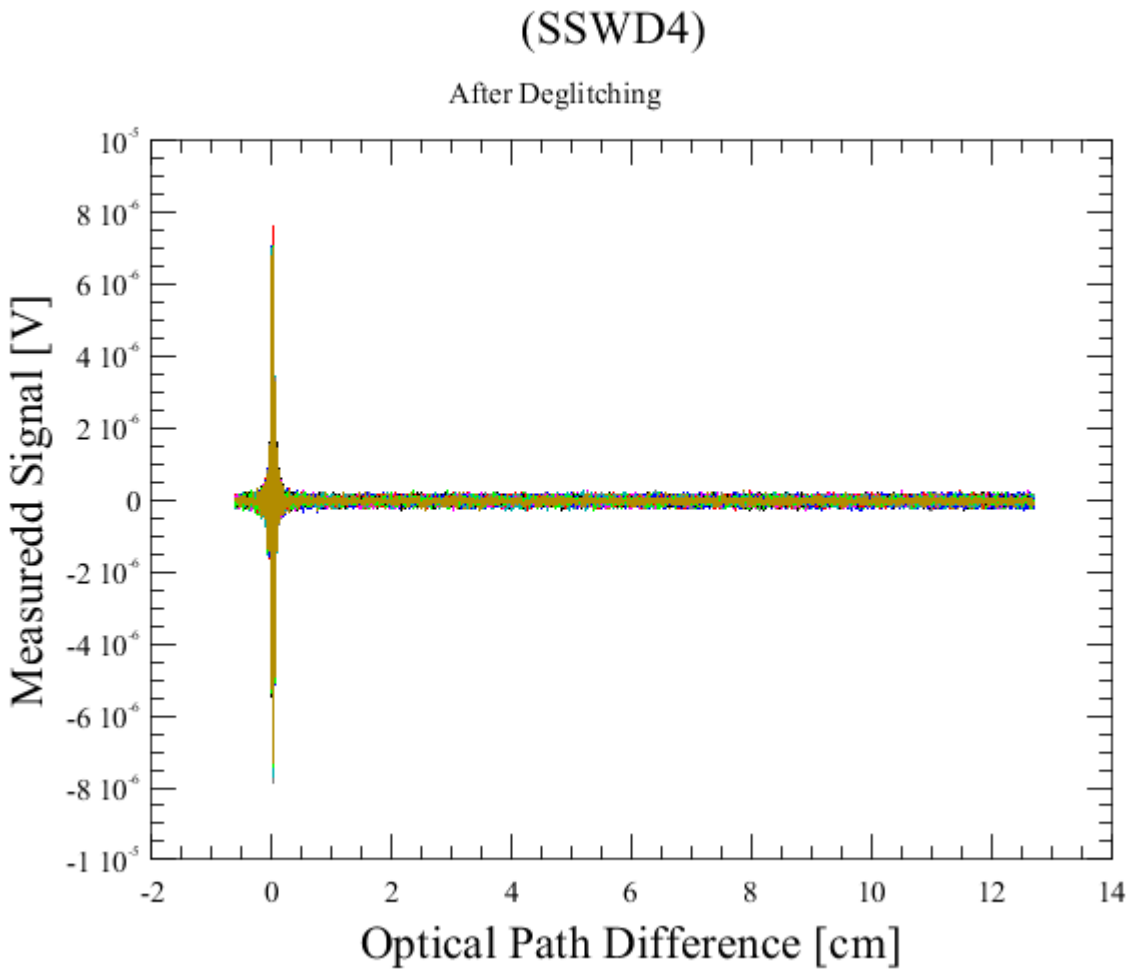


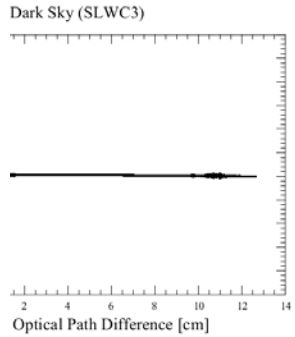


Deglitching

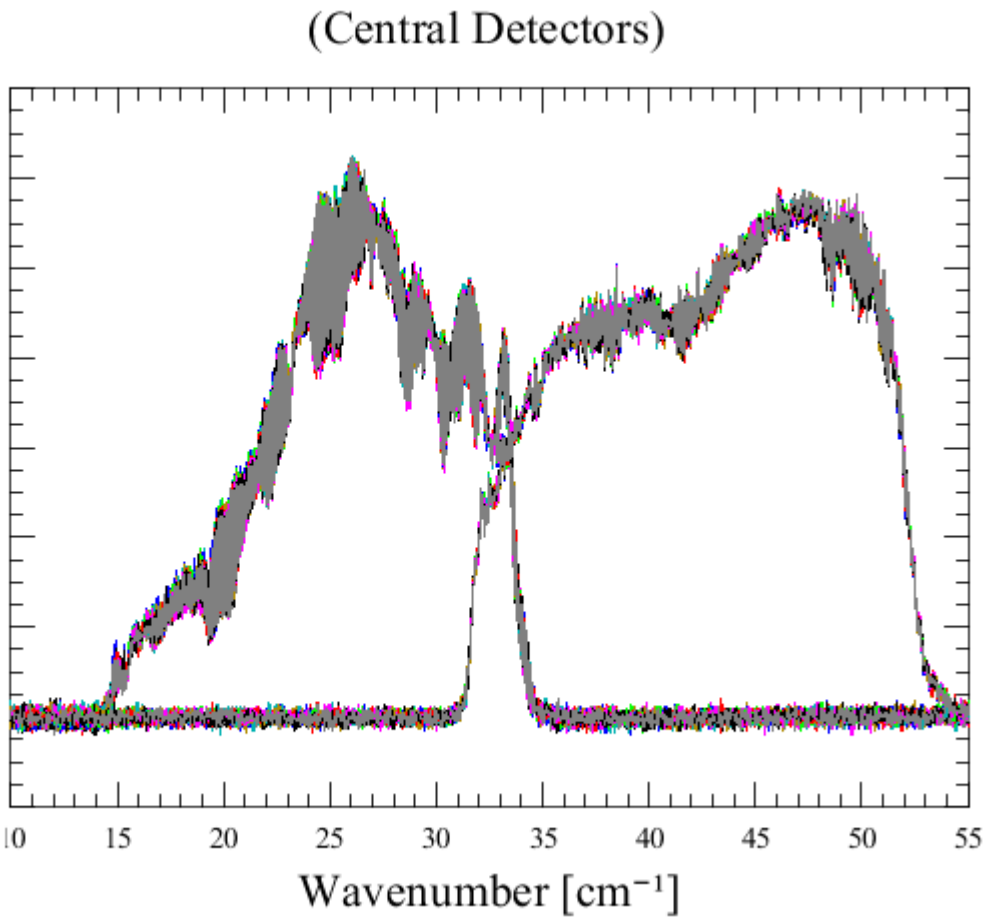


Deglitching





Transform Interferograms



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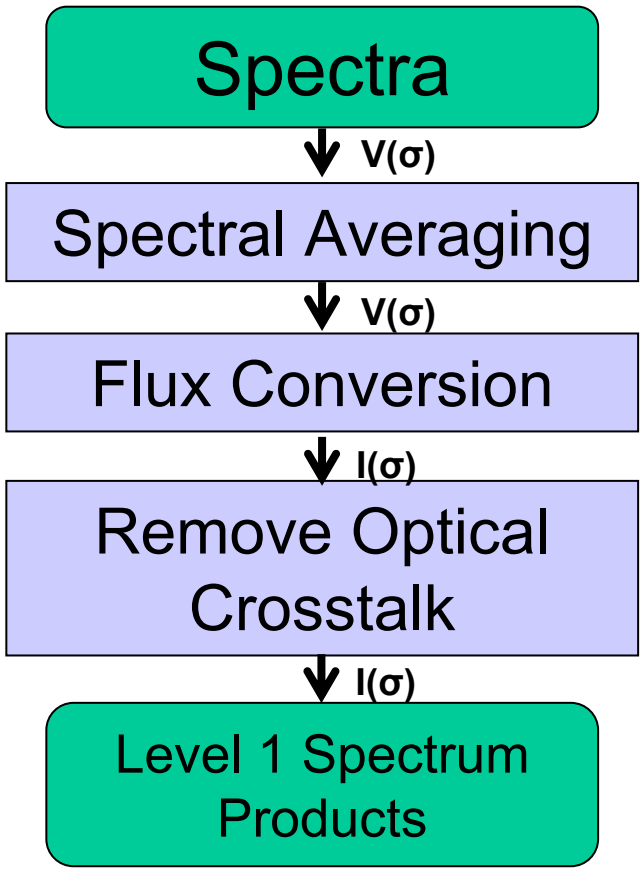
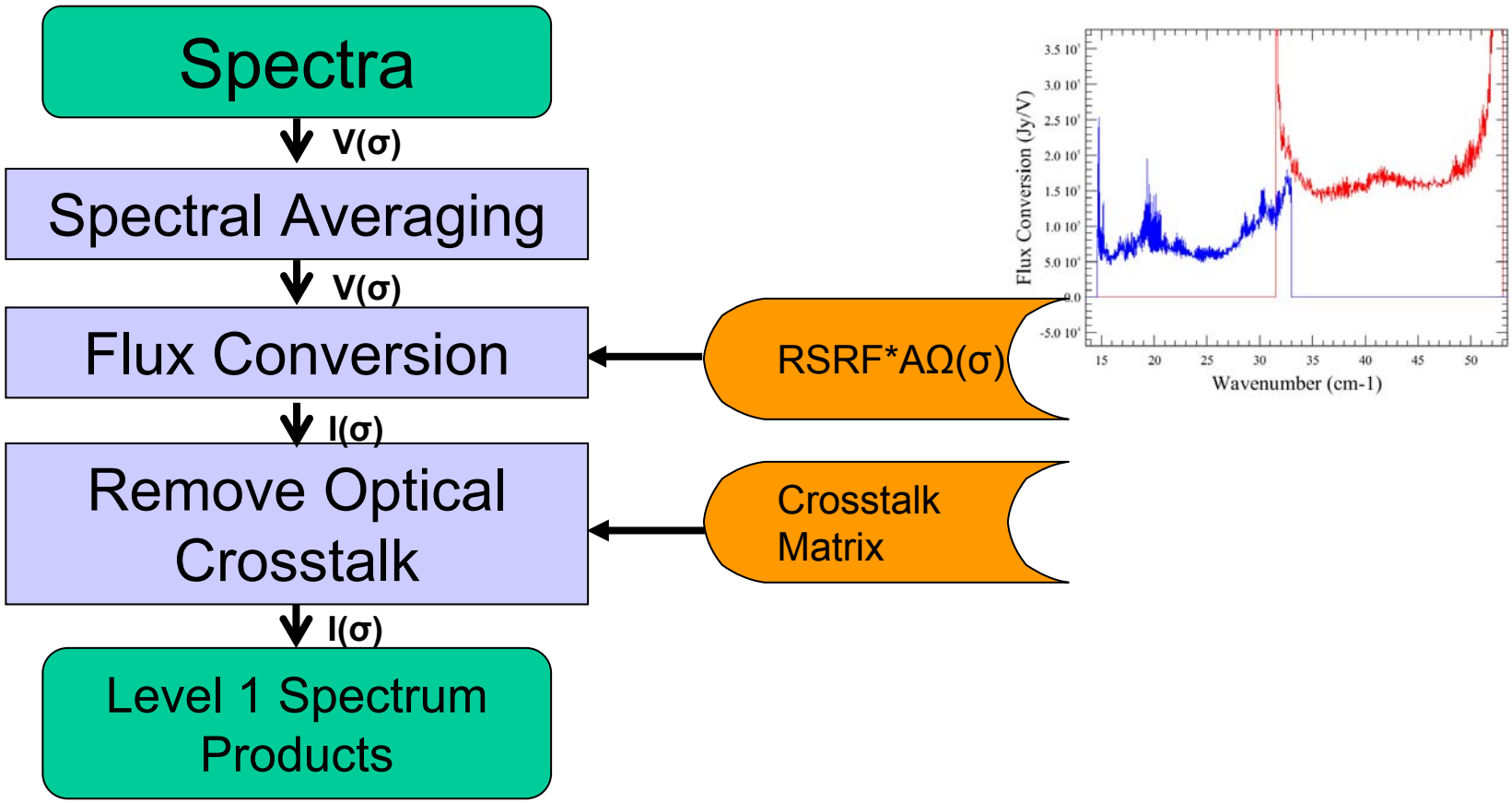
Modify Spectra

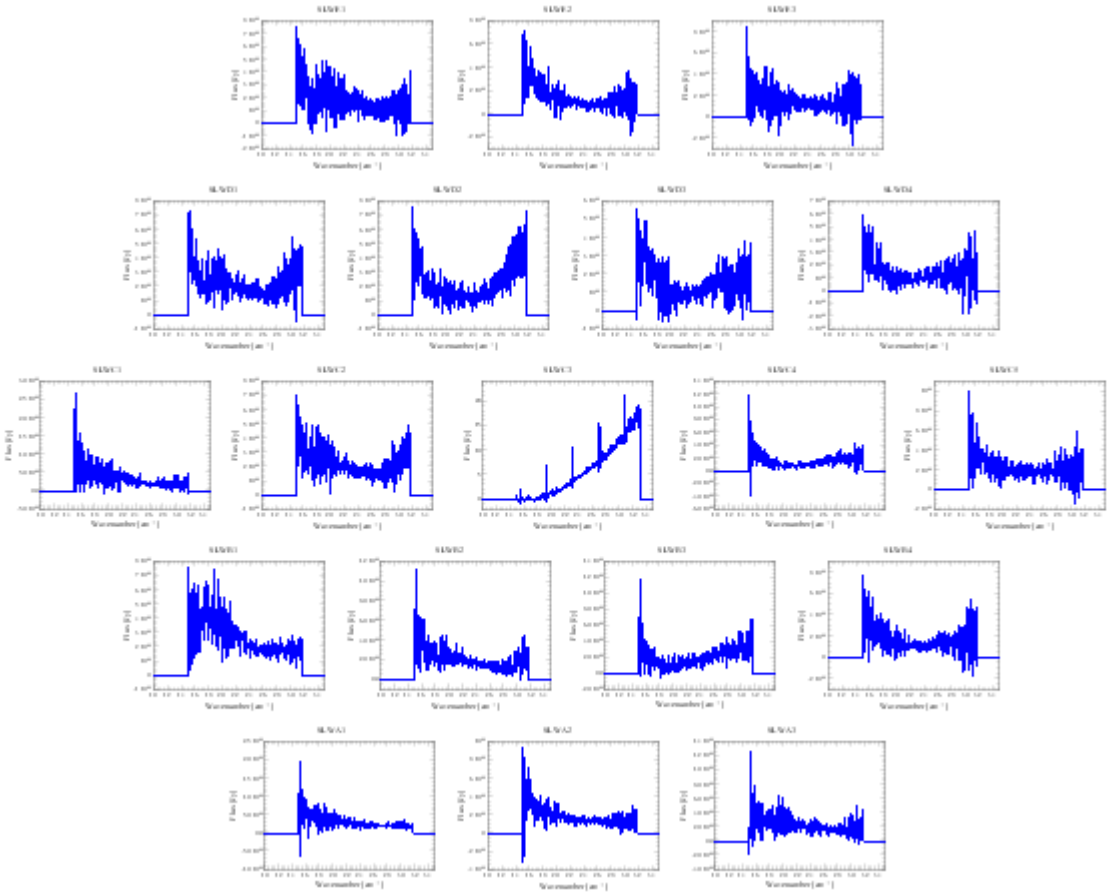


The steps in this section of the pipeline are best applied in the spectral domain.

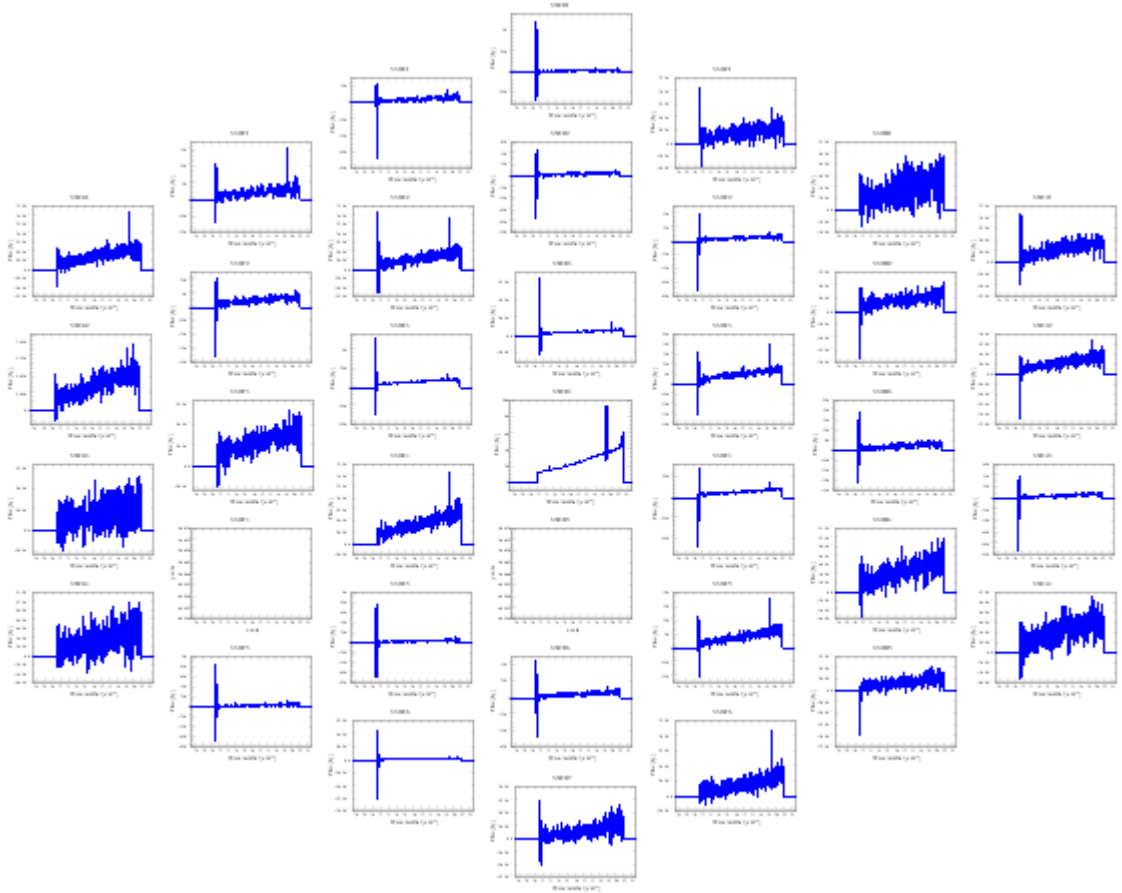
Modify Spectra



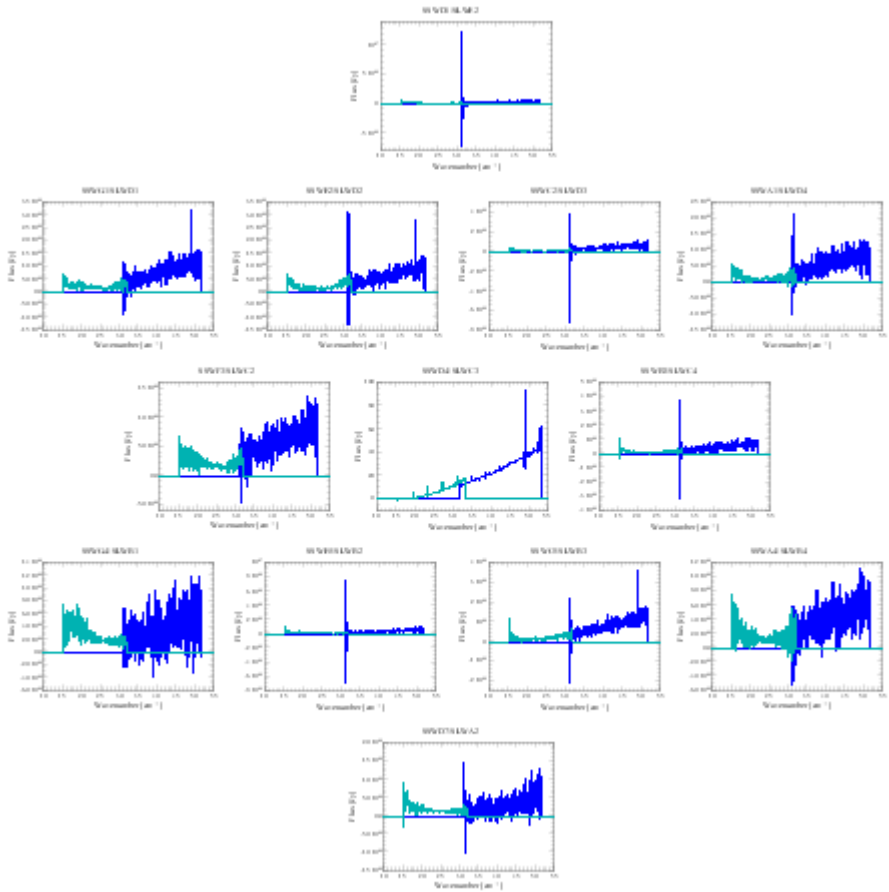
IC 342: All SLW Spectra



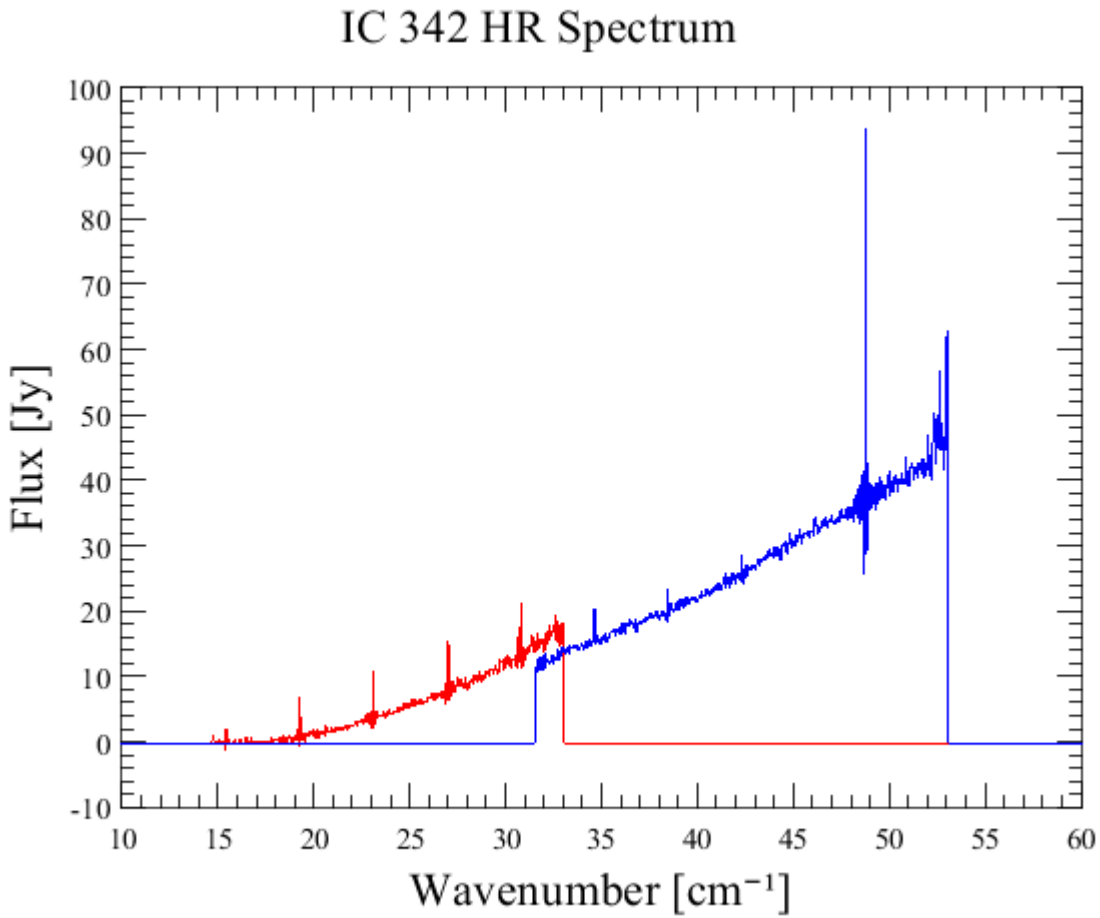
IC 342: All SSW Spectra



IC 342: All Co-aligned Spectra



IC 342: Central Detectors



Final Spectra are great!