



SPIRE Spectrometer Pipeline Status

Jean-Paul Baluteau

Laboratoire d'Astrophysique de Marseille , Marseille, France

Trevor Fulton

Blue Sky Spectroscopy, Lethbridge, Canada

David Naylor

University of Lethbridge, Lethbridge, Canada

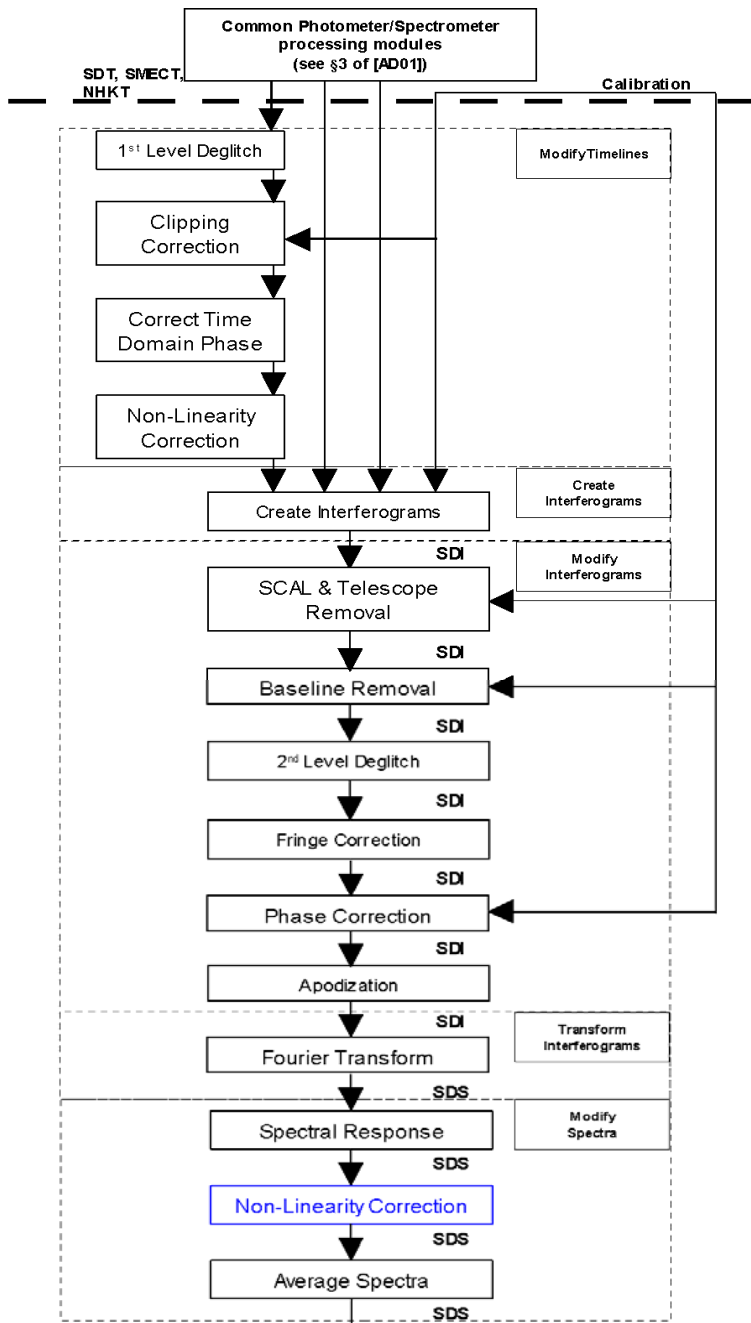
SPIRE Science Verification Review 3

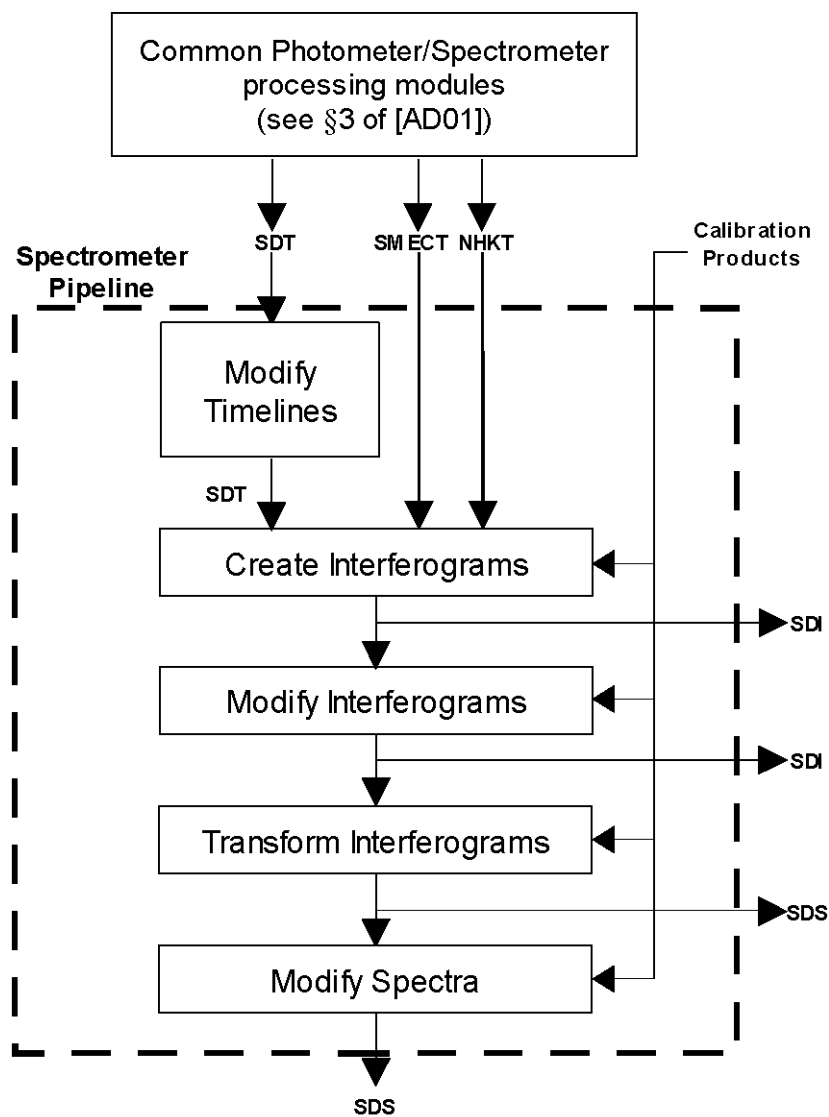
Stockholm, October 30, 2007

FTS Pipeline Status

History

- **Spectrometer pipeline modules have been under development since PFM1 test campaign.**
- **ILT test results have pointed to the need for some extra modules and some changes to earlier versions of other modules.**
- **Development has focused on SPG pipeline. Two end-to-end tests have been performed on the SPIRE spectrometer pipeline (Summer 2006, Spring 2007).**
- **Major review undertaken in May 2007 with FTS “gurus”. Version 1.5 of pipeline document as submitted for SVR-3 reflects the decisions taken at this review.**





FTS Pipeline Status

FTS Pipeline Status

- **Modify Timelines**
- **Create Interferograms**
- **Modify Interferograms**
- **Transform Interferograms**
- **Modify Interferograms**

FTS Pipeline Status

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- **Modify Timelines**
 - First Level Deglitching
 - Clipping Correction
 - Time Domain Phase Correction
 - Non-Linearity Correction
- **Create Interferograms**
- **Modify Interferograms**
- **Transform Interferograms**
- **Modify Interferograms**

Modify Timelines

First Level Deglitching

- Algorithm: Defined
- I/O: Defined
- Code: Version 1 Implemented
- Calibration Products: N/A
- Future Development:
 - Determination of optimal settings for glitch detection
 - Implement Glitch removal

Modify Timelines

Clipping Correction

- Algorithm: Defined
- I/O: Defined
- Code: To be written
- Calibration Products: N/A
- Future Development:
 - Impact of $n_{\text{clip}} > \text{Nyquist}$

Modify Timelines

Time Domain Phase Correction

- Algorithm: Defined
- I/O: Defined
- Code: Implemented
- Calibration Products: Defined and populated with values from ILT. Procedure for updating products with flight data has been written.
- Future Development:
 - Study the effects that the source strength has on the thermal time constant.

Modify Timelines

Non-Linearity Correction

- Algorithm: TBD
- I/O: TBD
- Code: To be written
- Calibration products: TBD
- Future Development:
 - Study the effects that the source strength has on the detector response.
 - Determine optimal location for this module within the spectrometer pipeline

FTS Pipeline Status

FTS Pipeline Status

- **Modify Timelines**
- **Create Interferograms**
 - **Interferogram Creation**
- **Modify Interferograms**
- **Transform Interferograms**
- **Modify Spectra**

Create Interferograms

Interferogram Creation

- Algorithm: Scanning Defined, Step and Integrate to be written
- I/O: Identified
- Code: Scanning Defined, Step and Integrate to be written
- Calibration Products: Defined and populated with values from ILT. Procedure for updating products with flight data has been written.
- Future Development:
 - Timing/Memory tests
 - S/C Pointing

FTS Pipeline Status

FTS Pipeline Status

- **Modify Timelines**
- **Create Interferograms**
- **Modify Interferograms**
 - SCAL and Telescope Removal
 - Baseline Removal
 - Second Level Deglitching
 - Fringe Correction
 - Phase Correction
 - Apodization
- **Transform Interferograms**
- **Modify Spectra**

Modify Interferograms

SCAL and Telescope Removal

- Algorithm: Defined
- I/O: Defined
- Code: Version 0.1 Implemented, combined correction to be written
- Calibration Products: Defined, cannot be implemented with non-trivial values until flight.
- Future Development:
 - Determination of the number of off-source observations required.

Modify Interferograms

Baseline Removal

- Algorithm: Defined
- I/O: Defined
- Code: Implemented
- Calibration Products: Defined, population with values from ILT data TBD.
- Future Development:
 - Study the reproducibility of the vignetting curves from ILT data
 - Baseline as secondary output

Modify Interferograms

Second Level Deglitching

- Algorithm: Defined
- I/O: Defined
- Code: Implemented
- Calibration Products: N/A
- Future Development:
 - Optimization of detection parameters.

Modify Interferograms

Fringe Correction

- Algorithm: Defined
- I/O: Defined
- Code: To be written
- Calibration Products: TBD.
- Future Development:
 - Investigate the magnitude of channel fringes when interferograms are well-compensated

Modify Interferograms

Phase Correction

- Algorithm: Defined
- I/O: Defined
- Code: Version 1.0 Implemented
- Calibration Products: Band edges populated with ILT data. Optical phase TBD.
- Future Development:
 - Quantify the optical phase per pixel. First indications are that this phase is consistent and can therefore be calibrated.

Modify Interferograms

Apodization

- Algorithm: Defined
- I/O: Defined
- Code: Implemented
- Calibration Products: N/A
- Future Development: N/A

FTS Pipeline Status

FTS Pipeline Status

- **Modify Timelines**
- **Create Interferograms**
- **Modify Interferograms**
- **Transform Interferograms**
 - **Fourier Transform**
- **Modify Spectra**

Transform Interferograms

Fourier Transform

- Algorithm: Defined
- I/O: Defined
- Code: Version 1.0 Implemented
- Calibration Products: N/A
- Future Development:
 - Finalize consistent wavenumber grid output for the various AOTs.

FTS Pipeline Status

FTS Pipeline Status

- **Modify Timelines**
- **Create Interferograms**
- **Modify Interferograms**
- **Transform Interferograms**
- **Modify Spectra**
 - Spectral Response
 - Average Spectra

Modify Spectra

Spectral Response

- Algorithm: To be written
- I/O: Defined
- Code: To be written
- Calibration Products: TBD
- Future Development: Implementation of version 0.1

Modify Spectra

Average Spectra

- Algorithm: Defined
- I/O: Defined
- Code: To be written
- Calibration Products: N/A
- Future Development:
 - Add median clipping as automated process.

Summary

	Algorithm	I/O	Code	Calibration Products		
				Defined	Algorithm	Populated
1st Level Deglitching						
Clipping Correction						
Time Domain Phase Correction						
Non-Linearity Correction						
Create Interferograms						
SCAL/Telescope Correction						
Baseline Correction						
2nd Level Deglitching						
Fringe Correction						
Phase Correction						
Apodization						
Fourier Transform						
Spectral Response						
Average Spectra						

FTS Pipeline Status

Future

- **End-to-end pipeline test 3 (November 2007)**
- **Formalize requirements documents for each module (December 2007)**
- **Science review of the pipeline products (Winter 2007)**
- **Complete outstanding development/calibration products (Spring/Summer 2008)**
- **Interactive analysis.**