



Monthly Progress Report
SPIRE Test Facility and Scientific Support

Contract Number: 9F007-020251/001/SR
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Part 1

1. Is the project on schedule? **No.**

The last quarterly report mentioned a delay in the delivery of flight hardware until mid-summer 2004. During the recent Co-Investigator meeting it was confirmed that first data from the SPIRE imaging FTS will not be available until November 2004. Although the project is currently on schedule, the delay in delivery of SPIRE hardware is beyond our control and causes serious problems since two key Canadian staff are funded only through December 2004. We put forward a proposal to the CSA to extend the current contract and keep Trevor Fulton, the software engineer, and Peter Davis, the project manager employed for 9 months to complete Canada's work packages.

2. Is the project within budget? **Yes.**

3. Is the project free of any areas of concern in which the assistance or guidance of Canada may be required? **No (see above).**

Part 2

Task 3.1: Provide SPIRE Test Facility FTS

- The Test Facility FTS has been delivered to the Rutherford Appleton Laboratory (RAL) in August 2003.
- A small format visible imaging FTS (IFTS) is currently under development to allow us to test the analysis pipeline. We currently develop the control software in IDL© to allow for the control of the interferometer stage and camera system..
- Trouble-shooting for the weather station for the SPIRE test facility has been completed. Issues with power regulation and heat dissipation have been resolved and two relative humidity sensors were exchanged and calibrated. The weather station was tested continuously for a week and no operational problems have occurred. The device was shipped to RAL.

Task 3.2: Provide SPIRE Data Analysis Software

- The Technical Notes on Deglitching and Fourier Transformation were updated to version 1.0 on May 13, 2004. Several members of the SPIRE team provided constructive feedback.
- Data product specifications for spectrometer specific data have been proposed and sent to Jean-Paul Baluteau's group at the Laboratoire d'Astrophysique de Marseille (LAM) for comments.
- A meeting at RAL has been set up for late July to discuss the work packages Deglitching and Fourier Transformation with researchers from LAM, RAL, and Imperial College.
- The work package Deglitching has seen significant development in several areas:
 1. Sample data sets for the different photometer operating modes are available.
 2. A robust deglitching scheme was implemented and tested on BLAST data to flag cosmic ray signatures in the photometer data stream.
 3. A generator for sample spectrometer data is in place, based on John Lindner's (graduate student from the University of Lethbridge) SPIRE FTS simulator.
 4. A glitch generator module was implemented to put the expected impulse response function on top of spectrometer data.

We are currently in the process of downloading test data from the SPIRE qualification model to look for cosmic ray signatures.

- The work package Fourier Transformation has seen first initial steps towards performing an efficient FT on non-uniformly sampled data. A respective C library is currently under development by a mathematics group at the Lübeck University, Germany. While the library has not been officially released yet, the group has provided us with the source code and preliminary documentation. First tests are encouraging and we have established as a baseline that the Iterative Non-uniform FFT performs the FT on uniformly sampled data to the expected accuracy (see appendix). The alternative processing path, to re-grid the data onto a uniform sample grid and use the standard FFT, has been implemented to allow a direct comparison with the NFFT package. In addition, a detailed diagram for the FT task has been developed (see Figure 1).

Flow chart for the work package Fourier Transformation

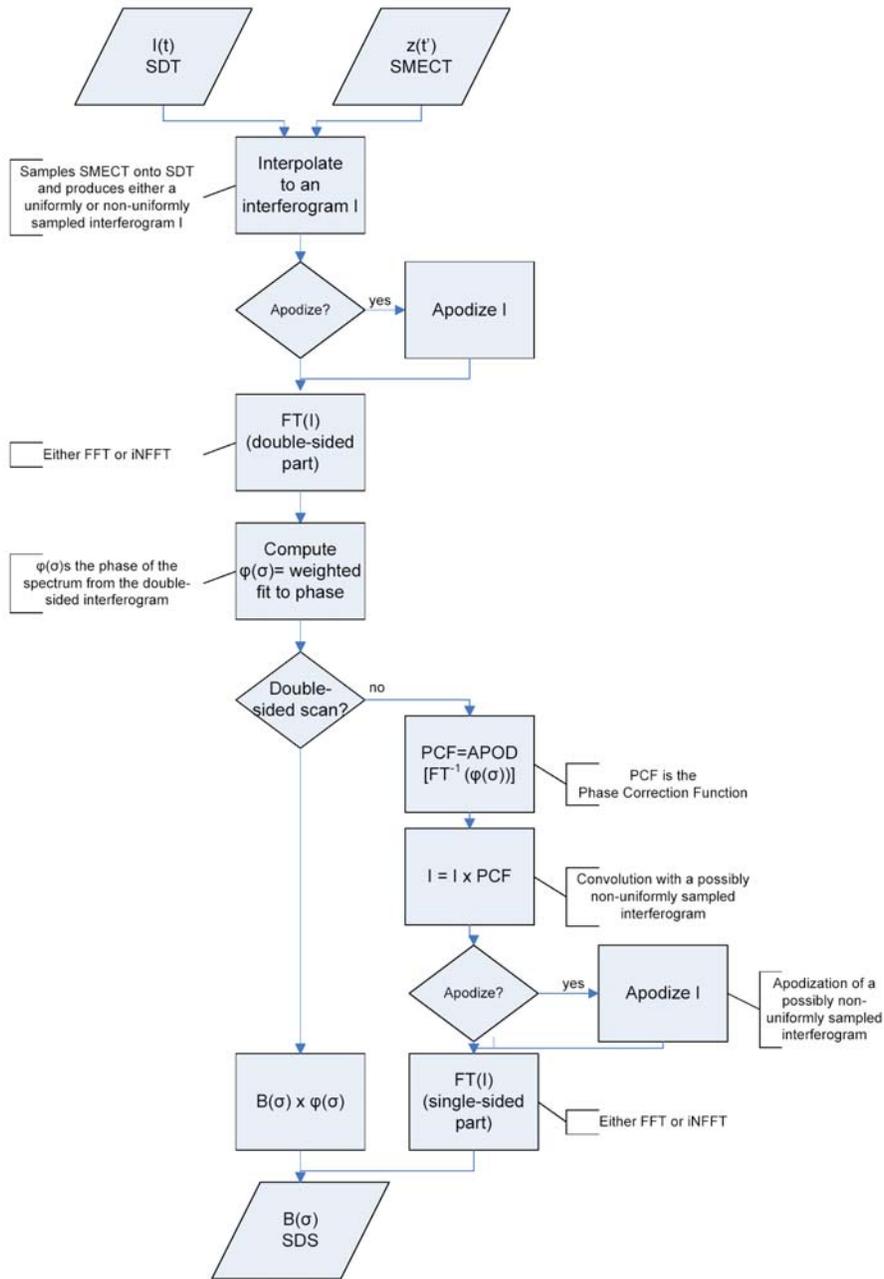


Figure 1: Proposed flow diagram for the data processing task Fourier Transformation (SDT: Spectrometer Detector Timeline, SMECT: Stage Mechanism Timeline, SDS: Spectrometer Detector Spectrum, B: Spectrum)

- The work package Spectral Response currently benefits greatly from Locke Spencer's (graduate student from the University of Lethbridge) involvement in the SPIRE Data Analysis Group. He is exploring the possibility to determine the spectral response by operating the Test Facility FTS at a single black body temperature (see Figure 2) which would reduce the time required to measure the spectral response by half. In addition, the signal of noise is much higher for the measurements with a single black body because it is not necessary to take the difference between two spectra.

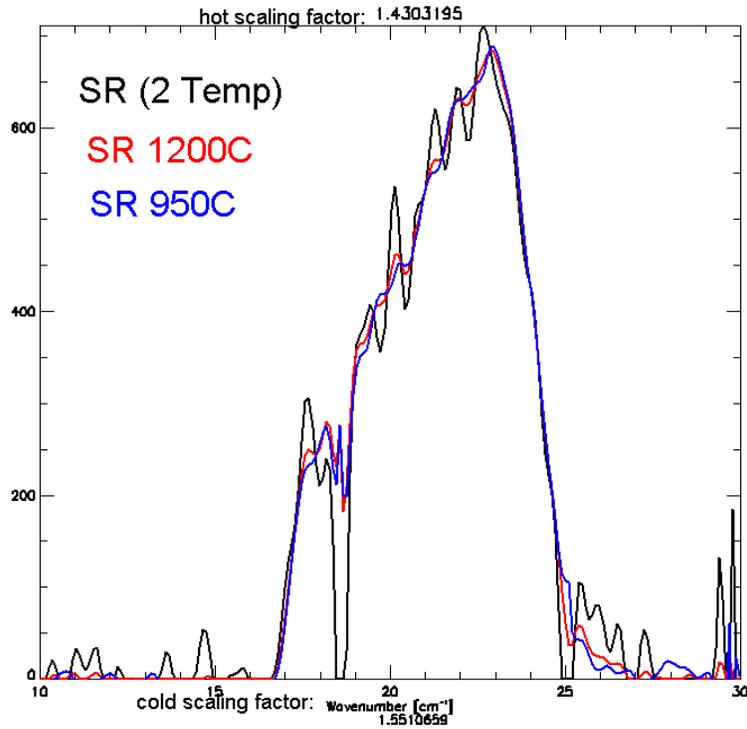


Figure 2: Spectral Response from measurements with one and two black body temperatures

- The updated schedule for the collaboration with LAM is given below:

Time	Task	Progress
May 15	Data Product Definition	First draft currently under review
May 15	Spectrometer Test Data	OK
May 31	Flow diagram for work package FT, v1.0	OK
May 31	Pre- and post-ambles (with extensive data checking)	Under development at LAM
June/July	Implement and benchmark NFFT vs. re-grid & FFT (in C)	Started
June/July	Implement and benchmark deglitching routines (in IDL)	Started on photometer and spectrometer deglitching
July 22/23	Meeting at RAL on Deglitching and FT	Involved parties have agreed to participate and the meetings are prepared
July/August	Implement and benchmark phasecorrection LAM vs. UoL (in IDL)	
Sep/Oct	Implementation in Java	
November (and onwards)	Start testing of pipeline with PFM data, implement changes, finalize tasks	

- Two students have joined the SPIRE effort in May 2004: Todd Atkinson is a physics summer student from the University of Alberta who is working on the deglitching routines. Andres Rebolledo is a computer science coop student from the University of Lethbridge who is supporting the development of the non-uniform FT, and the Java implementation of the data processing tasks.

Task 3.3: Canadian SPIRE Team Support

- The next SPIRE Science Team Meeting will take place at RAL, UK, September 28 – 30, 2004.

Task 3.4: SPIRE ITT and ICC Support

- Asier Abreu, the Canadian member of the SPIRE instrument control team at RAL, has been involved in testing updated software for the next test campaign, due to start June 29, 2004.
- Samuel Ronayette, the Canadian member of the SPIRE test team at RAL, is in the process of analyzing data from the pupil scan tests with the qualification model. He has also been involved in setting up a test that involves directing the beam from a far infrared laser through the Test Facility FTS.

Task 3.6: Public Outreach Program

- The public outreach website has been laid out and is currently being implemented at the University of Lethbridge. It will provide information to students and amateur astronomers on the Herschel/SPIRE mission and Canada's involvement. It will contain sections on Herschel/SPIRE, infrared astronomy, and resources for schools. It will allow visitors to ask questions to an infrared astronomer. Rich multimedia content will be developed for this website, including videos that will be available in English and French and interactive games. The URL of this website will be <http://spire.uleth.ca>.

