

Monthly Progress Report
SPIRE Test Facility and Scientific Support

Contract Number: 9F007-020251/001/SR
Prepared By: Peter Davis

Date: November 4, 2004
Period: October 2004

Part 1

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

Although the project is currently on schedule, an anticipated delay in delivery of SPIRE hardware is beyond our control. First data from the SPIRE imaging FTS will not be available until January 2005. This will cause serious problems since two key Canadian staff are funded only through December 2004. A proposal was presented to the CSA at the JCSA meeting in Winnipeg 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. CSA requested an updated statement of work and budget which was supplied.

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 is currently under development to allow us to test the data analysis pipeline. A suitable CCD chip was now taken from the most recent production run. The supplier is in the process of flashing the camera with the customized read-out software.
- Trevor Fulton and Locke Spencer are working on the processing of the data from the post-vibration test campaign on the Cryogenic Qualification Model (CQM). First comparisons of low-resolution measurements of selected pixels have shown that the detection band of the instrument model has not shifted during vibration tests. The accuracy of the alignment of the telescope simulator has been questioned as power is seen on pixels which should not be lit. Also, the central pixel appears to show unusual behavior in showing reduced power at long wavelengths after vibration. All other pixels measured so far detect more power in the relevant region (see Figure 1).

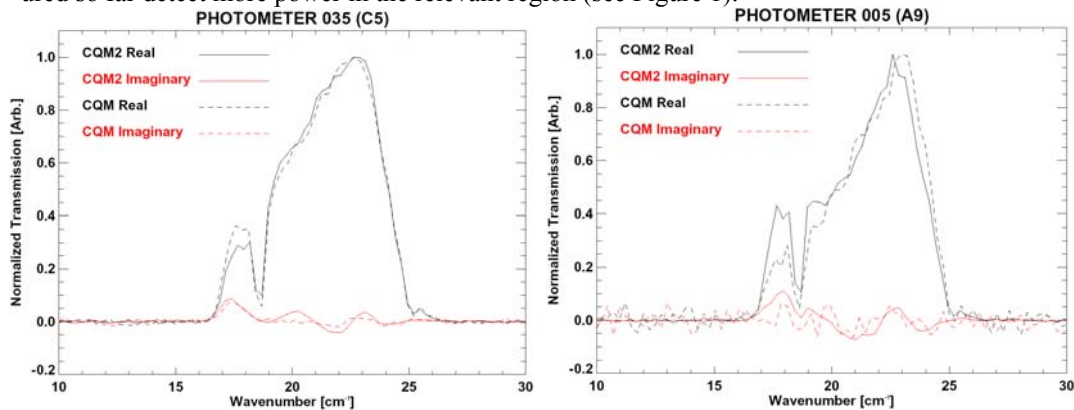


Figure 1: Measured spectrum for the central pixel C5 (left) and a corner pixel (A9)

- More detailed results from the test campaign will result from the currently on-going, more careful data processing. The first meeting of the SPIRE Data Analysis Group will be held later in November 2004.

Task 3.2: Provide SPIRE Data Analysis Software

- The University of Lethbridge is responsible for three work packages: Deglitching, Fourier Transformation, and Spectral Response.
- Andres Rebolledo, a computer science student from the University of Lethbridge, has implemented the main steps for a complete series of data processing steps. For single- and double-sided scans, the Java code is now ready to interpolate the raw data onto a regularly sampled interferogram, adpize, phase-correct, and FFT it into a spectrum. A more accurate interpolation algorithm using a sinc/Gauss function will be implemented for the upcoming test campaign. The goal is to also supply tools to average interferograms and spectra and a method to take out drifts in the interferograms' baselines.
- Trevor Fulton has found an answer to the question why the non-uniform discrete Fourier transform of complexity $O(n^2)$ yielded results with inconsistent accuracy. The irregularly sampled data do not satisfy the orthogonality requirement for the Fourier transformation. This undermines the basis for the transformation. Similarly, any schemes involving sinc-interpolation are computationally far more complex than anticipated for irregularly sampled data. However, first tests have shown that a workable solution for the sinc-interpolation appears to be feasible if not as straightforward as expected.

The updated schedule for the collaboration on spectrometer-related work packages is given below:

Time	Task	Progress
October 1	Model SPIRE case: decision on FT processing	For PFM1, a one-step interpolation with cubic spline and a sinc/Gauss convolution will be implemented. An iterative algorithm will follow next summer.
	Update note on Deglitching	Cleaning up work in the code still to be done.
October 15	Finalize data product specifications	The data formats for the Spectrometer Detector Timeline have been finalized. Proposals for the Stage Mechanism Timeline are under discussion.
	Detailed specifications of FT task	The required functionality for the WP FT has been defined.
	Define and prepare required test data	Astronomically motivated test data is available. John Lindner prepares the SPIRE Imaging FTS Simulator as part of his Master's thesis.
November 1	Integrate pre-/post-ambles from Marseille group into code	A revised version of the pre-/post-ambles is used for the FT task.
November 15	Have version 1.0 of FT and Spectral Response tasks and detailed documentation available	A complete chain of data processing steps can be executed to turn raw data into spectra. Respective documentation is prepared during development.
	Prepare code for PFM data analysis	The required functionality has been defined.
November 29 – December 3	Test meeting in Marseille	The meeting has been arranged. SPIRE developers from Padova, Italy and London, UK will join this meeting.
December 20	Revise code and prepare version 2.0 of FT and Spectral Response	

Task 3.3: Canadian SPIRE Team Support

- The Canadian Associate Scientists have been informed in detail about the results from the SPIRE Steering Committee on the hold-back time and the division of time between the Specialist Astronomy Groups (SAGs). Further activity is now expected for the SAGs while the next SPIRE Science Team meeting is planned for fall 2005.

Task 3.4: SPIRE ITT and ICC Support

- Asier Abreu, the Canadian member of the SPIRE instrument control team at RAL, is involved in the design and implementation of the Herschel/SPIRE time estimator. He is testing flight model components and their integration with the test facility.
- Samuel Ronayette, the Canadian member of the SPIRE test team at RAL, is analyzing and interpreting data from the post-vibration test campaign (beam scans, beam peak up, pupil scans). He will also be involved in preparing test scripts for the functional tests with the flight model. His future in the SPIRE project is still pending on his current job search. His contract currently runs through March 2005.

Task 3.6: Public Outreach Program

- The public outreach website has been finished. It is publicly available at <http://spire.uleth.ca/newsite/>.
- Mark Huff, an applied study student from the University of Lethbridge has started to prepare a stand-alone trifold on the Canadian contribution to Herschel/SPIRE and two programs for the Nature Centre in Lethbridge.
- Promotional material (pens, mugs, posters) has been ordered to advertise the public outreach website.