SPIRE|GMW|M|0041.10

Minutes of SPIRE FTS Group Meeting
Saclay, 29 May 1998

Matt Griffin
2 June 1998

Present: Colin Cunningham, Walter Gear, Louis Rodriguez, Guy Michel, Pierre Cox, William Duncan, Peter Ade, Matt Griffin, Bruce Swinyard

Note: The summary below does not conform exactly to the agenda for the meeting, but the same points are addressed.

1. FSEC recommendations for the FTS:

The main recommendations of the FSEC were:

(i) lower R to ~ 100 (0.4 rather than 0.04 cm^{-1});
(ii) recover the factor of 2 loss at the input polariser;
(iii) demonstrate that the on-board data processing can be solved or reduce the number of detectors.

2. Discussion of these recommendations

Lower resolution:

Technical advantages/simplifications arising from reducing R:

- Less mirror movement
- Double-sided interferogram (Peter Ade said that this was not a significant advantage)
- Smaller beamsize
- Lower mass and power dissipation
- Easier on-board processing

Scientific losses:

- Extragalactic: It was agreed that not much would be lost for the most important extragalactic programmes.

- Galactic:
  Spectroscopic surveys and imaging: higher resolution would be obviously be better:
  - reduced line blending
  - better sensitivity for line surveys if position of lines not known – better contrast.

It was agreed that simulating such effects using LWS spectra would be a good way to quantify and demonstrate the differences in scientific capabilities of R = 0.04 and 0.4 cm^{-1}

Action: Bruce, Sarah Unger, Pierre Cox and Peter Hamilton to do some modelling using LWS data to estimate how much better we can do (compare 0.04 vs. 0.4 cm^{-1})
Deadline: end July

3. On-board data rate

Methods of reducing data rate:

- Don't use filled arrays
- Restrict the field of view to 1 x 1 instead of 2 x 2 – save factor of 4.

It was agreed that the default option wold be that we do not descope the instrument but write a convincing case showing that the required level of processing is feasible.

2 **Action: SPIRE consortium to do this (MJG to coordinate). Peter Hamilton's note provided for this meeting (attached) is a good starting point.** ***Deadline: end July***

4. Future plans:

An amplitude splitter is a bad solution to the problem of the 50% light loss at the input polariser. The gain in efficiency is not that much and a fatal problem is that the wavelength coverage would be severely reduced. It was agreed that the "New (2)" design as on the viewgraphs (two back-to-back roof-top mirrors) is worth looking at. Possible problems with shear and fov and control of pupil imaging need to be studied.

3 **Action: Kjetil Dohlen to study Peter Ade's version of this option (as on final viewgraph). Bruce to provide him with the necessary information and parameters.** ***Deadline: 12 June for initial report.***

5. CIRS FTS experiments and simulation

Guy Michel made a presentation on the sampling of interferograms with an LVDT based on Cassini CIRS experience and on simulations done to investigate the effects of LVDT no0n-linearity on the spectrum with and without correction – see attached note.

4 **Action: Bruce Swinyard to send base-line FTS spec to GM so that he can simulate it.** ***Deadline: June 3.***

6. FTS final optics

The long wavelength band (300 – 670 μm) for the SPIRE FTS is too broad to be single-moded or to achieve optimum coupling to the pixel over the whole band for any implementation of the focal plane. Peter Ade said that a few-moded Planck HFI-type horn might be able to cover the band, but there may be problems with its manufacture and accommodation. The achievable bandwidth with the resonant absorbers in the filled array options may also be too small.

5 **Action: Walter Gear will define a new baseline design for the horn option and analyse the variation of sensitivity with wavelength across the band.** ***Deadline: end July.***

6 **Action: Matt Griffin will study the behaviour of sensitivity as a function of wavelength for the filled array options.** ***Deadline: end July.***

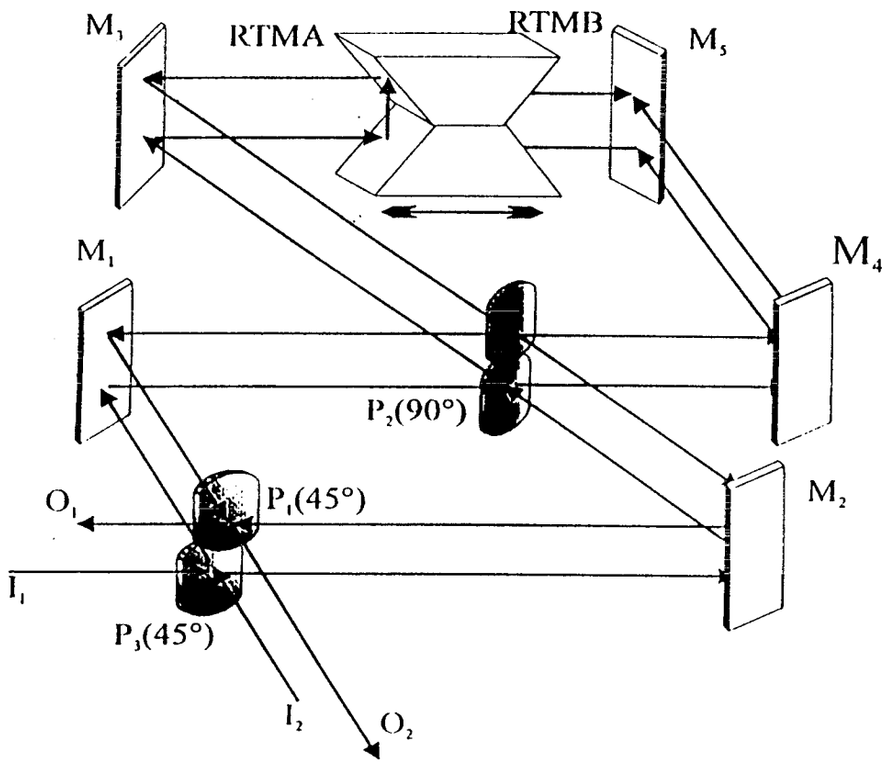
Appendix to minutes:

Kjetil,

A dual beam interferometer to recover the lost 50% signal. The attached 3-D figure shows the basic idea from Bruno Carli's group working on the REFIR instrument. Peter Ade has come up with a scheme that allow this to be stretched in one dimension. Do you think think you could look at the implication s of these for the optical latout of the FTS, or do you have your own scheme that would achieve the same ends?

Cheers B.

New(2) polarising interferometer configuration with a single piece containing 2 back-to-back roof-top mirrors



Legend:

P_1=Input/Ouput polariser

P_2= Polarising beam-splitter

RTMA/RTMB=Moving roof-top mirrors

$M_1/M_2/M_3/M_4/M_5$= Mirrors

I_1/I_2=Input port

O_1/O_2=Output port

SCHEME FROM BRUNO CARLI'S GROUP.

FIRST PETER ADE'S 1-D SCHEME.