



1. INTRODUCTION

1.1 Purpose of this Document

The purpose of this document is to provide the inputs required by HSC for SPOT phase 1 proposals for the point source observing modes of the SPIRE photometer. The document will also provide an example to help the definition of these input parameters for the other SPIRE observing modes.

There is a **deadline** of 10th October for these input details to go to ESTEC for all instruments and modes. It is thus urgent that those with responsibility for map and spectrometer mode AOTs produce a similar document by then.

1.2 References

Note on defining SPOT OR input for Delivery to HSC, by Sarah Leeks (7 Sept. 2004);
AOT Status Review, by D.L. Clements (11 August 2004);
SPIRE PHOT AOT Definition, by M. Fox, S. Leeks, D. Clements (Draft 1.1, 10 Aug 2004);

2. SPOT PARAMETERS FOR POINT SOURCES

2.1 Front End Options

The first choice to be made by a SPIRE observer will be the basic observing modes:

PHOT **or** SPEC – the choice between these is exclusive, one or the other. Button opens PHOT or SPEC window. Choices for other instruments will likely also be available in this menu.

Once PHOT has been chosen, decisions are then made on the basis of source type:

Point Source **or** Map – the choice is exclusive, one or the other. Radio buttons.

If Map is chosen then the Mapping OT decision tree will be needed (Vaccari in preparation). If Point Source is chosen then we follow the point source decision tree (see Fox et al.).

2.2 Point Source Mode

At this stage we are treating 7-point-jiggle-maps as the default mode for point source observations. In this mode small uncertainties in position, whether inherent to our knowledge of the source or as a result of telescope pointing, will have no effect on the observations. However, stare-and-chop might be later reinstated, so at this stage the observing mode name to be returned should simply be **point-source-photometry**. This is sent as a string to CUS or the translator.

For the first version we assume a set of default parameters and sensitivities which will be used to estimate the integration time. Once point source mode is selected there are no other choices to be made.



2.3 Point Source Details

To proceed the user should now supply the position of the source. Normally this will just be an issue of giving RA and DEC, but there must be options to enter proper motion, non-standard equinoxes and solar system objects. For solar system objects the option of entering sources not currently in the JPL database will be necessary in case that new, proprietary objects (eg. a newly discovered comet) are to be observed.

The user should eventually be able to enter a database of point sources and then associate observing details with them, or set up observing information and then associated point sources with that.

2.4 Visualize Observation and set Observing Constraints

At this point the observation can be visualized, with target, and chop/nod reference beams displayed. Any observing constraints necessitated by sources in the reference beam are applied at this point.

Set Constraints: option button – chopper avoidance angle from <value> to <value> (given in degrees clockwise to North in <option> Equatorial or <option> Galactic coordinates.

The allowed chopper angles should then be reflected in the visualisation.

The details needed for the visualisation (footprints, sizes and distances between visualization objects etc.) are TBD.

2.5 Set Integration Time

Display boxes for all 3 photometer bands, **250, 360 and 520 microns**. User types into the dialogue box of their selected primary band. Each box has three labelled fields: **flux, S/N, time**, and a calculate button.

Astronomer enters two of the fields, presses calculate, and the third is calculated.

Eg. Enters flux and desired S/N, required time is calculated.

Eg. Enters flux and desired integration time, resulting S/N is calculated.

Eg. S/N requested and the time to be taken, the flux that will be reached with this S/N in the time is calculated.

When the calculate button is pressed, the fields in all three bands are updated. The time value is copied across to the other bands, the S/N in these bands is set to 1, and the corresponding 1 sigma sensitivity goes into the flux field.

A fourth field will be needed in the dialog box for each band to show the total time taken by the observation, including overheads and slew tax etc. This field cannot be modified by the user.



Technical Note

SPIRE SPOT OR Input: Point Sources D.L. Clements

Ref:	SPIRE-ICS-NOT-002142
Issue:	Draft 0.4
Date:	7 th October 2004
Page:	3 of 5

SPOT will need to pass the following parameters out to the time calculation programme when the 'calculate' button in a given channel box is pressed:

Mode string (in this case 'point-source-photometry')

Band string (PSW|PMW|PLW corresponding to 250, 360 and 520. Any other string should cause an error)

Flux double (expected source flux in mJy)

S/N double (signal to noise ratio)

PntTime double (observation time on source in seconds)

Only the entries in the box where the calculate button is pressed are sent. One of flux, S/N or time will have no value set by the astronomer, and is thus the value we need to find. If the astronomer should set all values, we will assume that time is what he wants to calculate.

The time estimator will then return the following parameters for each of the three channels, copying the values that were input, and delivering the 1 sigma sensitivities for this observation time in the other two bands. It should also return a flag for each channel which is set to TRUE when a channel's sensitivity is below the confusion limit. A warning should then be displayed in the channel if the observation is below the confusion limit.

For each channel we thus need to return values for:

Flux double (source flux in mJy)

S/N double (signal to noise ratio)

PntTime double (observation time)

TotTime double (total time tasken for observation, including overheads)

ConfFlag Boolean (indicates if confusion might be a problem)

3. FINALISING AN OBSERVATION

Once the observer is happy with their observation they should press a button called 'commit observation'. This uploads the current observing description, with the total observing time fixed, to the scheduler and for CUS conversion. The controlling quantity at this point is the observation time, since this is what is scheduled. The flux and S/N parameters will also need to be stored so that we can monitor the effects of changes in sensitivity on the programme, but the time taken for the observation will be what controls the scheduling and allocation of time.



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Ref:	SPIRE-ICS-NOT-002142
Issue:	Draft 0.4
Date:	7 th October 2004
Page:	4 of 5

4. ONCE OPEN ISSUES

Looking at the example input descriptions supplied by S. Leeks, there would appear to be a lack of uniformity in how information is going to be supplied to SPOT. Actions common to all instruments should be done in the same way – SL is in charge of sorting this out.

Some projects will be aimed at a large number of specific targets. There should be a way to input a pre-prepared file of targets into SPOT so that they don't all have to be directly typed in, leading to errors and an overly dull user experience – This can be done with SPOT.

In general I am worried that there is a lack of coordination on common tasks for Herschel-SPOT, which will lead to confusion and frustration for the end users – SL is in charge of sorting this out.



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Ref: SPIRE-ICS-NOT-002142
Issue: Draft 0.4
Date: 7th October 2004
Page: 5 of 5

