Herschel Science Team mtg#9

Minutes of the meeting, held at SRON, Groningen, 20-22 June 2001

1. Welcome and meeting agenda

The following Herschel Science Team members were present, except as indicated:

Peter Barthel, Mission Scientist (PB)
José Cernicharo, Mission Scientist (JC)
Pierre Encrenaz, Mission Scientist (PE)
Jacqueline Fischer, Optical Systems Scientist (JF) (not points 4.5-10)
Thijs de Graauw, HIFI Principal Investigator (TdG)
Matt Griffin, SPIRE Principal Investigator (MG)
Paul Harvey, Mission Scientist (PH)
Martin Harwit, Mission Scientist (MH)
Thomas Paßvogel, FIRST/Planck Project (ThP) (only points 1-4.3)
Tom Phillips, HIFI Co-Principal Investigator (TP)
Göran Pilbratt, Project Scientist (GP)
Albrecht Poglitsch, PACS Principal Investigator (AP)
Laurent Vigroux, SPIRE Co-Principal Investigator (LV)
Christoffel Waelkens, PACS Co-Principal Investigator (CW)

In addition, the following individuals were invited to attend as indicated:

Daniel de Chambure, Herschel/Planck Project (only point 6)
Frédéric Safa, Astrium-SAS (only point 6)
Yves Toulemont, Astrium-SAS (only point 6)

The chairman (GP) welcomed everyone, and especially JF who (being recently appointed the Herschel Optical System Scientist) was attending for the first time, to this the 9th Herschel Science Team meeting (HST#9). A draft agenda was circulated on 18 June 2001, (which incorporated input in response to an email soliciting issues to be discussed), and proposed in the meeting (**Appendix 1**).

The meeting adopted the proposed agenda. Later in the meeting a report by JF was added as point 4.6. The 'Key Project' discussion day will be written up separately from these minutes.

2. FST#8 minutes of meeting

The draft FST#8 minutes - without appendices - were circulated on 16 March 2001. The final minutes - without appendices - were circulated on 2 April 2001, and were put on Livelink on 3 April 2001 with all appendices but Appendix 4, which was made available on 11 April 2001. The meeting approved the FST#8 minutes without discussion.

3. Actions status

The current open actions were addressed (**Appendix 2**).

FST4-A2 is still open. It still should be done. The criteria could affect the spare philosophy possible for the instruments. Both PACS and SPIRE would like to build fully integrated Flight Spares. At the present time the FS is funded for PACS, but not for SPIRE (although the difference in funding profile only starts in 2004). New deadline HST#10.

FST6-A6 is still open. It was reformulated to say that a schedule for how this issue can be resolved should be presented in HST#10.

FST6-A7 is open. AP requested information but has not received information. These gyros are made by SAGEM in France. AP will continue his efforts, new deadline HST#10.

Since **FST6-A7** still is open, and so consequently is **FST6-A8**. New deadline 1 month after completion of FST-A7.

All actions originating in FST#8 either have been closed (**FST8-A2** (18 March 2001) and **-A3** (12 June 2001)), or will be closed in this meeting (**FST8-A1** (email 22 May 2001 and point 10), and **-A4** (point 4.5)).

4. Status reports on Herschel activities

4.1 Herschel / Planck Project

Thomas Paßvogel (ThP) showed the Herschel/Planck Project organigramme (**Appendix 3**). The total complement is 26, not all of whom are in place at this point as indicated in the organigramme. Everyone should be in place be the end of year, and ThP hopes that (almost) everyone will be in place by the System Requirements Review (SRR), scheduled for September 2001. First column spacecraft system, second payload system, third AIV. For the three managers (spacecraft, payload, and AIV) interviews have been held, and the paperwork is presently being handled in ESA HQ.

Industry. Phase B has officially started. Alcatel formally started to work on 2 April 2001. The main subcontractors - Astrium GmbH for the Extended PLM (EPLM i.e. PLM plus telescope and sunshield/-shade) and AleniSpazio for the SVM - formally came onboard in late April early May. A major activity in the coming year leading up to the Preliminary Design Review (PDR) in summer 2002 is to fully define the industrial set-up, determining who is doing what at lower levels. Alcatel will issue a total of approximately 115 ITTs, divided into four batches between July 2001 and March 2002.

The first 6 ITTs that will be issued in July, comprises Herschel PLM helium valves, the Planck telescope structure, Herschel and Planck SVM structures,.... This is handled by Alcatel, but overseen by ESA which is involved to ensure adherence to the applicable rules to ensure fairness, competition etc.

Initial trade-offs. Major trade-offs e.g. passive or active nutation damping for Planck are underway.

Further work on the design as proposed in the proposal is underway in preparation for the SRR in September 2001. The objective of the SRR is to verify that all necessary requirements are in place. The following review is the PDR, which will take place next summer.

Agreements between industry - instrument consortia - ESA, the so-called the ‘Partnership agreements’. In the ESA ITT to industry certain tasks, e.g. the day-to-day management of instrument interfaces, including schedule, were delegated to industry. The ‘Partnership agreements’ attempt to formalise this. ThP stressed that anything and everything that is agreed upon between industry and instruments has to be approved by ESA.

TdG stressed that it is important that these relations are clear. ThP reminded that the intention was to bring instruments and industry closer to each other.

MG asked about the spacecraft level CQM tests, there was a meeting planned which has been delayed or cancelled, but the issue remains. ThP had the meeting delayed because industry is not yet ready for it. ThP wants industry to present a well thought out concept of the goals and conduct of these activities to the instrument consortia, but industry is not yet at this stage. The usefulness of these tests have been questioned by the instruments, however, ThP is convinced that these tests will be useful, but they need to be properly designed and be adequately representative.

IIDRs. Each instrument should identify the 'top 3' (or 5) topics/issues that should be successfully resolved on timescales of a couple of months, together with the payload engineers. Two topics will be mass and power budgets, another one will be schedule. Information will be sent to the instrument teams shortly.

Telescope. After agreement by the IPC for direct negotiation with Astrium-F for the provision of the Herschel telescope a RFQ was issued. The proposal from Astrium-F is expected on 22 June, and the it is foreseen that Kick-Off of the telescope development will take place in the 2nd half of July 2001.

The Optical System Working Group met for the first time 19 June 2001. It will meet again in connection with the SRR. A number of other WGs are still in place, such as contamination and EGSE. The CPPA needs to be signed.

4.2 PACS consortium

Albrecht Poglitsch (AP) presented the PACS status (**Appendix 4**). Points noted and/or discussed included:

Optics. Calibration optics will use a ultra-pure silicon lens, as it offers superior uniformity of illumination. TP asked about lab measurements of the transmission of silicon for PACS wavelengths.

FPU. The mechanical design has been improved, lowest eigenfrequency is now ~124 Hz. Need confirmation of the thermal aspects of using steel feet to attach to the optical bench. Ligthweigthing in structure and even mirrors, mass now 72 kg.

Ge:Ga arrays. Cryovibration of Ge:Ga detector models produced cracks in kapton tubes, the failure has been identified as a thermal/mechanical design flaw. The bias concept has been changed, now a short circuit on either the signal or bias side for a single pixel will affect that pixel only, and not the entire module. This will also lead to a change in the IMEC CREs leading to an overall CRE delay of approximately 3 months. Production of the new design will take place in July. ANTEC will test the QM detector arrays with lab electronics.

Bolometer arrays. Delivery of first complete detector arrays (red and blue) in September 2001. The readout scheme has been slightly updated, and the BOLA JFET design (with dissipation <0.2 W) has been confirmed.

Missing specification of the system background, i.e. the optical incident power on the bolometers is an open issue. PACS wants knowledge of this level within factor of <2 by end 2001. This is unlikely to be achieved. Industry, assisted by the Optical System Scientist and Project Optical System Engineer should establish a budget identifying all the contributors to the optical load, even if actual figures cannot be assigned on this timescale. PACS should analyse the consequences of a background higher and lower compared to the assumed (=designed for) one.

Cryocooler. Discussion related to whether both PACS and SPIRE are confident that all there requirements are known to the cryocooler supplier.

Grating. The Hyperfine company has been sold, before a contract with them had been placed; the end result is that at the moment PACS does not have a grating supplier. Parallel effort (Thermo RGL for QM and Zeiss for FM) in place to recover, funded by the Prodex office.

DPU. The problem with Carlo Gavazzi Space (CGS) unexpectedly announcing a significant delay is serious. Especially since the visibility of the activities of CGS is low.

ICC. Downlink 'wrapping' question, what exactly is happening, how does it affect the attainable data downlink rate. QLA to be implemented in Java for starting point for transfer for IA. IA access data in Java window, transfer them into IDL (ION) where the interactive analysis is performed, then back into the Java environment for storage in HCSS.

Schedule. Reworking development plan, full recovery not possible in the light of recent delays, presently the delivery dates are: QM 09/2003, FM 08/2004. Need to discuss integrated test plan, instrument level vs. system level tests for the QM.

Personnel. Difficult to keep good people, presently the system engineer for warm electronics, a key person, is now leaving, difficult to attract good replacements.

Partnership agreement. PACS is generally happy with latest redlined version, except that insight into relevant parts of the contract between ESA and Alcatel is necessary.

4.3 SPIRE consortium

Matt Griffin (MG) presented the SPIRE status (**Appendix 5**). Points noted and/or discussed included:

Structure still on critical path, critical design review 31 July, not expected to be entirely successful.

Recent modelling of the SMEC pivots has revealed a buckling problem with random launch vibration levels, three potential remedial solutions are being looked into by LAM.

Late delivery of the DPU is now on the borderline for affecting the SPIRE development schedule.

Thermal modelling and FET dissipation. JFET dissipation in photometer mode is ~50mW (up from 33 mW which is still the goal). Even with pessimistic assumptions about JFET noise vs power performance, operation at 33 mW is preferable, no special provisions/actions will be taken.

Telescope background power. The issue of not accurately knowing the optical incident power onto the bolometer detectors is less severe than feared. If the actual incident power is different from the one designed for we still benefit or loose to almost the same extent as if we had designed for the higher or lower level in the first place. Getting the background down is important, and should be strived for at all times; we will benefit even if we do not know in advance.

Photometer band change considered 250, 350, ~600 (instead of 500) micron. MG is not sure whether the advantages outweigh the disadvantages, the most important one likely being the increase in confusion limit due to the lower angular resolution. No change for CQM. Technical and scientific trade-offs will be performed.

Spectrometer band change considered, 200-350 (was -300), and 350- (was 300-) 670 micron. Better overall optimisation of performance across full band, at the price of some compromise to short wavelength performance. Is being implemented.

ICC User Requirements have been consolidated from the SIRD and URDs. Digestible SIP will be delivered by end of June. Ken King remains PM and will be the ICC Development Manager.

Schedule. As reported in IIDR, realistic CQM delivery is Oct 2003, PFM delivery on time. STM delivery schedule driven by structure, on schedule. DPU board delay not (yet) impacting SPIRE. MG 'worried' about IBDR in November, it certainly cannot take place earlier.

PI institute is now Cardiff University.

4.4 HIFI consortium

Thijs de Graauw (TdG) presented the HIFI status (**Appendix 6**). Points noted and/or discussed included:

HIFI consortium meeting in May, missing ESA presence interpreted as full trust in the HIFI consortium...

IF bandwidth for HEBs considered to be changed to 2-6 GHz.

WBS and HRS are now well defined, but cost of components is a major issue, as are qualification and delivery times.

The DPU issue re delays of Carlo Gavazzo ICU (DPU for PACS and SPIRE) is becoming important for HIFI. The ICU is the only computer in HIFI.

ICC. Requirements documents for specific HIFI end-user products and HIFI IA are being generated. For IA the CLASS package has been preliminary selected. SIP and WP evaluation in July, may take longer.

Some observing modes allow lower data rates. TdG made arguments for variable downlink times. Detailed HIFI observations in various modes are being generated, including pointing modes.

HIFI successfully passed IIDR (HIFI PDR). AIV is the third main HIFI challenge, in addition to mixers and local oscillators.

The JPL meeting end November is about band 6 implementation, followed by assessment of mixers for all bands.

HIFI science workshop 15-19 October 2001, Leiden (HIFI consortium only plus invitees). Herschel preparatory workshop 22-26 October 2001, Leiden. Organised by Xander Tielens.

Schedule. Nothing new, 'same schedule now for 3 years'. FM delivery is 1 Dec 2004, however, the HIFI CQM delivery is 1 April 2002 (PACS 1 Sep, SPIRE 1 Oct), if all are going into the same cryostat for system level tests, then there is a 'wait' involved for HIFI which will cause a delay in the FM development.

4.5 Herschel Science Centre

Göran Pilbratt (GP) presented (**Appendix 7**) the background to and current status of the Herschel Science Ground Segment development in general, and the Herschel Common Science System (HCSS) development in particular. Points noted and/or discussed included:

Some of the originally 'adopted truths' may need rediscussion. TdG and MG disagree with the statement that pipeline processing (as performed for ISO) is not a good idea and a waste of resources.

Concerning the community support, LV argued that in practice it will be difficult for the HSC to 'shield' the ICCs from this task as intended. TdG argued that community support ('Helpdesk') staff ought to be located in the ICCs.

The meeting agreed that, as presented in the 'Timescales - a Herschel challenge' viewgraph, the objective vis-à-vis of data reduction is to be able to reduce data well by the end of the PV phase, i.e. about 4 months into the mission.

The meeting decided to start the 'Observation in data out' activity as proposed. TdG remarked that HIFI 'commonality' in data products etc. is linked to other instruments like SOFIA and ALMA, rather than the other Herschel instruments. In AOT design the trade-off is to work from the two sides 'what does the astronomer want?' and 'what is the instrument capable of?' at the same time, and to make them meet in an appropriate fashion.

The meeting also decided to start the 'Calibration (and instrument signatures?)' activity as proposed. It was considered especially important to define a top-level approach to calibration philosophy.

The group will be chaired by Ana Heras, furthermore it was agreed that the European Mission Scientists will be members of the group, and that all MSs will have standing invitations to participate in its activities, and be on the relevant mailing list(s).

The activities of this group will be (at least paretly) linked to the 'Observation in data out' activity, therefore Timo Prusti should also be a member of the 'Calibration' group.

It was generally agreed that it is indeed very difficult to get ground observing time for 'calibration' purposes. MG suggested that it would be a waste of time even to try for the JCMT, to be successful proposals need to be well written and address 'real' scientific goals.

One important goal of the 'Calibration' group activity should be to transfer the ground calibration to the initial inflight calibrations.

Regarding the issue of IA/QLA it was felt that yes we should have a common 'system', but the 'bits and pieces' i.e. the relevant data processing modules will be instrument specific.

4.6 Optical System Scientist report

JF introduced the requirements from the AO to which she responded, and what she emphasized in her proposal. In a meeting at JPL a number of areas where she suggested to put her effort had been identified ***(Please check this Jackie!)*** : 1. mirror emissivity: coating thickness, scattering; 2. structure: straylight model; 3. shape of scatter-cone; 4. primary-secondary spacing at operating temperature, cold test; and 5. a colder telescope. She also reported from the Herschel Optical System WG meeting that took place in ESTEC on 19 June.

5. Toledo meeting

GP displayed the summary status (**Appendix 8**) of the received Toledo meeting papers for the conference proceedings. On the assumption that JP, ThP, and GP deliver next week, 6 invited talks will unfortunately be missing in the proceedings. (In chronological order these are the talks given by: Genzel, Puget, Melnick, Guélin, Barlow, and Tielens.) One of the Panel reports is still missing, however, PE ensured it would be delivered.

The production of the proceedings will commence next week, when ready the printing will take about a month, so the proceedings are expected to finally be circulated by the end of the (this!) summer.

6. Toulouse meeting

The 'Infrared and Submillimeter Space Astronomy', an international colloqium in honour of the memory of Guy Serra was held in Toulouse 11-13 June 2001. GP was there, as was LV for the first day only. It was a well organised and pleasant meeting, and a fitting tribute both to the achievements of as well as to the person Guy Serra - a humanist and a Catalan astronomer.

7. Telescope presentation

Frédéric Safa, Astrium-SAS (Toulouse, France), gave a presentation (**Appendix 9**; actually this is the presentation made to the Herschel Optical System WG held in ESTEC on 19 June, due to a tight time constraint the presentation given to the Science Team was a shorter version). He was accompanied by Daniel de Chambure from the Herschel/Planck Project, and by Yves Toulemont, also from Astrium-SAS. Points noted and/or discussed included:

Most critical manufacturing steps were stated to be the grinding in preparation for the brazing together of the segments to create a monolithic mirror. Second most critical step is the grinding/polishing of the reflecting surface.

The SiC material is porous, but the porosity is 'closed' and has a length scale is ~1-2 μm, the material does not 'absorb'. The fraction of the surface affected is ~3%, this fact was argued to be insignificant from an

emissivity point of view. Two glossy Astrium brochures (Appendix 10) describing the silicon carbide technology were circulated.

The emissivity of the front surface is not the driver for the temperature of the telescope. The emissivity in the thermal infrared is much the same as in the operating range, i.e. very low.

8. ESGAC meeting

Peter Barthel reported from the 3rd European Space/Ground Astronomy Coordination (ESGAC) WG meeting that took place in Vilspa, Spain, on 5 June 2001.

The ESGAC WG was set up by the ESA Director of Science in 1999, in order to maximize the scientific return of ESA missions, given that many missions will need follow-up and/or preparation with ground-based telescopes.

While the recommendations of the working group are generally followed up by ESA and ESO, it was felt that the science teams are not up to date with ESGAC recommendations and that the minutes should therefore be also systematically circulated to these teams.

Implementation of co-ordinated ESA/ESO Observing Programs for XMM/Newton, as proposed by ESGAC, is well advanced. Recall that similar programs are also running on SIRTF/NOAO and SIRTF/ESO. They will certainly be invited for Herschel.

ESGAC made several recommendations related to ground-based preparation for Herschel and Planck. These will undoubtedly be distributed to the science team(s). ESGAC also expressed concern with the disadvantage that European astronomers have w.r.t. their American colleagues, regarding resources made available to successful space observing time applicants. It was felt that ESA should find a way to take this issue up to the EU.

9. Date of next two meetings

It was confirmed to hold **HST#10** as planned on **15-16 November 2001, in ESTEC**. The provisional date and venue for **HST#11** is **12-13 March 2002, in ESTEC.** Furthermore, it is foreseen that **HST#12** will take place in the **June 2002** timeframe in **Garching.**

10. AOB

Mission scientists. GP asked the European mission scientists to produce short reports and prepare to make presentations of their activities as Mission Scientists for the next Science Team meeting. This is in connection with the renewal of their contracts.

Action 1: Write reports and prepare presentation of activities. **Actionee:** PB, JC, and PE. **Date:** HST#10.

Potential Les Houches Herschel summer school. Possibility for 2004 or 2005. The Science Team is very favourable to the idea, but thought that a period of order 4 weeks may to prohibitively long.

ESA/ESTEC/SSD reorganisation. GP had discussed this point during the very nice dinner organised by HIFI the evening before (A big thanks to HIFI for the invitation!) so given the time of the day further discussions were not felt necessary.

After the formal end of the meeting, some members of the Science Team took the opportunity to learn more about the HIFI work ongoing in SRON, to have a look at the facilities, and talking to the people involved.

List of Appendices:

Appendix 1: Proposed agenda

Appendix 2: Action status

Appendix 3: Herschel / Planck Project organigramme by Thomas Paßvogel

Appendix 4: PACS consortium status presentation by Albrecht Poglitsch (separate file)

Appendix 5: SPIRE consortium status presentation by Matt Griffin (separate file)

Appendix 6: HIFI consortium status presentation by Thijs de Graauw (separate file)

Appendix 7: HSC status presentation by Göran Pilbratt (separate file)

Appendix 8: Toledo meeting proceedings summary by Göran Pilbratt

Appendix 9: Herschel SiC telescope presentation by Frédéric Safa (separate file)

Appendix 10: SiC brochures from Astrium (separate file)

List of Actions:

Remaining open actions:

FST4-A2: Draft Go-NoGo criteria 'philosophy'. **Actionee:** GP. **Deadline:** FST5 meeting. **New deadline:** HST#10.

FST6-A6: (Reformulated.) MG already has an action from the SPIRE ISVR to perform further analysis of the potential benefits of a parallel/partner mode. MG will interact with AP/PACS in performing this action. The result of this action should be a timescale to be submitted to the HST for how to close this action. **Actionee:** MG. **Deadline:** HST#10.

FST6-A7: Provide information on the SOFIA gyros to ThP (manufacturer, model, available data, etc.). **Actionee:** AP. **Deadline:** 31 December 2000. **New Deadline:** HST#10.

FST6-A8: Look into the potential use of the SOFIA gyros for FIRST. **Actionee:** ThP. **Deadline:** 31 January 2001. **New Deadline:** HST#10 + 1 month.

New action:

HST9-A1: Write reports and prepare presentation of activities. **Actionee:** PB, JC, and PE. **Deadline:** HST#10.

HST#9 - Appendix 1

DRAFT proposed AGENDA for the HST#9 meeting

Wednesday 20 June 2001, Zernike Building room 124 (ZG124), SRON, Groningen

1.	09.30	Welcome and agenda
2.	09.40	FST#8 minutes
3.	09.45	Action status
4.		Status reports of Herschel activities in ESA and instrument consortia
4.1	10.00	Herschel/Planck project
	11.15	*c o f f e e*
4.2	11.30	PACS
	13.00	*l u n c h*
4.3	14.00	SPIRE
	15.30	*c o f f e e*
4.4	15.45	HIFI
	17.15	*e n d*

Thursday 21 June 2001, Zernike Building room 124 (ZG124), SRON, Groningen

All day reserved for the Topical meeting on Key Projects

Friday 22 June 2001, Zernike Building room 124 (ZG124), SRON, Groningen

4.5	09.00	HSC
	10.30	*c o f f e e*
5.	10.45	Herschel Toledo meeting - proceedings status
6.	11.00	Toulouse meeting report
7.	11.15	ESGAC meeting report
8.	11.30	Dates of next two HST meetings
9.	11.45	AOB
		SSD reorganisation
10.	12.00	Herschel telescope presentation /discussion
	14.00	*e n d*

HST#9 - Appendix 2

HST#9 - Current List of Actions:

FST#4:

FST4-A2: Draft Go-NoGo criteria 'philosophy'. **Actionee:** GP. **Deadline:** FST5 meeting. **New deadline:** 1 June 2001.

FST#6:

FST6-A6: MG already has an action from the SPIRE ISVR to perform further analysis of the potential benefits of a parallel/partner mode. MG will interact with AP/PACS in performing this action. The result of this action should be submitted to the FST. **Actionee:** MG. **Deadline:** FST#8.

FST6-A7: Provide information on the SOFIA gyros to ThP (manufacturer, model, available data, etc.). **Actionee:** AP. **Deadline:** 31 December 2000.

FST6-A8: Look into the potential use of the SOFIA gyros for FIRST. **Actionee:** ThP. **Deadline:** 31 January 2001.

FST#8:

HST8-A1: Look into the existence of documentation about the SiC technology, and/or organise a presentation for next Science Team meeting. **Actionee:** GP. **Deadline:** 21 June 2001.

HST8-A2: Propose a division of work for 'encouraging' plenary speakers to submit their contributions to the Toledo proceedings. **Actionee:** GP. **Deadline:** 16 March 2001. (done 18/3)

HST8-A3: Collect background material and prepare an agenda for the discussion on the 'Key projects' to take place on 20 June 2001. **Actionee:** CW. **Deadline:** 8 June 2001. (Done 12/6)

HST8-A4: Define in writing the charters of these two groups and present in HST#9. **Actionee:** GP. **Deadline:** 21 June 2001.

HST#9 - Appendix 3

Herschel / Planck Project organigramme by Thomas Paßvogel

HST#9 - Appendix 4

PACS consortium presentation by Albrecht Poglitsch

(separate file)

HST#9 - Appendix 5

SPIRE consortium presentation by Matt Griffin

(separate file)

HST#9 - Appendix 6

HIFI consortium presentation by Thijs de Graauw

(separate file)

HST#9 - Appendix 7

HSC presentation by Göran Pilbratt

(separate file)

HST#9 - Appendix 8

Toledo meeting proceedings summary by Göran Pilbratt

HST#9 - Appendix 9

Herschel SiC telescope presentation by Frédéric Safa

(separate file)

HST#10 - Appendix 10

SiC brochures by Astrium

(separate file)