

## MINUTES OF FIRST MEETING

20 – 21 October 2010

**Members Attending:** E. Falgarone, P. Hartogh, R. Kennicutt (Chair), L. Kristensen, J.-F. Lestrade, M. Meixner, A. Noriega-Crespo, D. Rigopoulou

**HSC Staff Attending:** G. Pilbratt, (via telecon) P. Garcia-Lario, A. Marston, B. Merin, S. Ott

### 1. SUMMARY

At its first meeting the Herschel Users' Group (HUG) discussed the progress of the Legacy programme and the "first-year" impressions of observers, based on the experience of their teams and a large number of other teams who were canvassed prior to the meeting. Overall the mood of the community is very positive, with excellent data being obtained and a large volume of scientific results published in the first year. The entire Herschel team, including the science team, the instrument teams and ICCs, the HSC staff, and the NHSC are to be commended for a superbly operating spacecraft and a productive first year.

With the focus of the project turning to routine science operations and the first general observer cycle, the Committee has focussed its attention on identifying areas which the users regard as high priorities for maximising the science return of Herschel. A number of these are discussed in the minutes, with the following identified as being of the highest priority:

- 1.1 A well-organised set of web pages for observers, including up-to-date information on calibration data with associated uncertainties, users' manuals, reduction software and cookbooks, and contact information. Whenever possible it would be helpful if instrument-specific content were organised together.
- 1.2 For PACS and SPIRE imaging, the most urgent need is for information, calibrations, and documentation for observations of extended diffuse emission. In contrast to the situation for point source observations relatively little information is available. We recommend that the HSC consider organising a calibration workshop devoted specifically to this problem, which would bring together selected experts from the ICCs, HSC, and a few Key Programmes.
- 1.3 For PACS and SPIRE spectroscopy, progress in completing calibrations and reduction pipelines (not unexpectedly) is behind that for imaging, and consequently data already obtained are standing idle awaiting user-ready software and calibrations. Observers should have the ability to perform end-to-end reductions in most spectroscopic observing modes before the OT2 AO, if Herschel is to achieve its full scientific potential for spectroscopic science.
- 1.4 For HIFI the highest priority identified by observers is continued ease of conversion of HIPE data to FITS and formats that can be used by the CLASS package for post-processing analysis.

- 1.5 The Committee encourages the HSC to tap the expertise of KP teams by promoting a limited number of "tiger teams" of instrument team members, HSC experts, and experts from the KP teams to help characterise and solve selected problems. The problem of diffuse emission provides an excellent example which might benefit from this approach. Another might be optimizing processing of PACS/SPIRE spectroscopy.
- 1.6 The Committee welcomes the broadening of the Data Processing Users' Group (DPUG) to include members of the KP teams, and the plans by the DPUG to conduct a survey of users. Both the DPUG and the HUG would benefit from regular communications and coordination, including regular reports from the DPUG chair at HUG meetings.

## **2. INTRODUCTION, PREPARATIONS FOR MEETING, AGENDA**

The current HUG consists of 8 members selected from the Guaranteed and Open Time Key Programmes. It will soon be expanded by 4 additional members from the OT1 projects. The Terms of Reference for the HUG can be found on the Users' Group web page. As the only fully independent committee advising the Herschel Project Scientist, the Committee considers all aspects of the project which affect the observer community.

The NHSC operates its own users' group (NUG), and its Chair (Margaret Meixner) also is a member of the Herschel Users' Group. As such NHSC-specific issues fall outside of the charge of this Committee. Nevertheless it is worth noting that many of the U.S.-based teams were effusive in their praise for the support received from the NHSC. It is clear that this Centre is making a major contribution to the Project through its collaboration with the HSC and ICC and its products which are available to all Herschel users. The experiences of its users are very positive.

The Committee met by telecon on 24 June 2010 to discuss how to organise its activities and to plan the agenda for the first face-to-face meeting. In order to obtain a broader familiarity with issues affecting the users, members of the Committee contacted PIs of most of the other Key Programmes by email or telephone, to discuss their experiences, impressions, and concerns. In all contacts were made with approximately 80% of the projects. In addition the Committee Chair separately contacted the Project Scientist and members of each of the instrument teams for their observations. Informal notes from these conversations were collected and the issues raised formed the core agenda for the meeting.

Due to difficulties in scheduling a meeting when meeting space was available at the HSC, this first meeting was hosted by the Institute of Astronomy in Cambridge (future meetings will be held at ESAC whenever possible). The meeting agenda is included as an appendix to these minutes. The Project Scientist presented a project update, information on how community support is organised at the HSC, and documentation on the state of completeness of the various Key Programmes.

Most of the first day of the meeting was devoted to discussions of specific areas including observing support and scheduling, general observer support, general data processing, and instrument-specific sessions. The Project Scientist participated in these discussions, and the group was joined by the relevant HSC staff leads (Pedro Garcia-Lario, Tony Marston, Stephan Ott, Bruno Merin) as appropriate. On the second day the Committee considered more general issues and issues relating to the HUG itself and how it should interact with the broader Herschel observer community. The meeting was interspersed with closed sessions where the findings and recommendations of the Committee were formulated.

The remainder of these minutes record the main issues discussed. Many of the issues raised by users in our interviews already have been addressed by the project, and the more significant of these are minuted below. The minutes also contain many findings and recommendations by the committee. These are summarised at the end of each section. In addition our half-dozen highest-priority recommendations are highlighted in the report summary above.

### **3. COMMUNITY SUPPORT**

#### **Helpdesk and General Community Support**

Most of the projects we contacted gave high marks to the Herschel Community Support Group and the Helpdesk for their responsiveness and helpfulness when questions arose with their programmes. The commercial Helpdesk client drew mixed praise but most teams are now becoming accustomed to the ticketing system. A frequently cited criticism is the lack of a mechanism for sending copies of ticket text to other email recipients. The Committee was told that this is a hard-wired feature of the system and probably cannot be implemented, but if a simple fix can be found it would be welcomed by all users.

Users were also very complimentary of the HSC and NHSC staff for their organisation of the many Herschel Data Processing Workshops (and to the HIFI team for organising a student training visit on processing for that instrument). One suggested minor tweak would be to follow up with participants by email if major changes to instrument modes or data processing occur after the workshops.

Pedro Garcia-Laria discussed the statistics of Helpdesk queries and the general range of topics raised. As one would expect pressure increased dramatically in the run-up to the OT1 proposal deadline, and the team introduced round-the-clock servicing of the Helpdesk during this period. Generally most observers report that queries are answered quickly, often within 24 hours. However a small fraction of tickets remain unanswered after weeks and some have never been answered. In at least a few cases repeated follow-ups have also not been acknowledged. This appears to have happened most often when the relevant staff members were on leave when a ticket arrived, or when a query has no immediate answer. Nevertheless the Committee believes that the Support Group should set as a requirement that all Helpdesk tickets at least be acknowledged within a reasonable time (1 week at most), and that a backup system be put into place to cover for staff absences. The Committee was told that such guidelines are being established by the group, and it looks forward to see them implemented.

The general praise given to the Community Support Group by the observers themselves should be tempered by the recognition that most of the Key Programmes have members of the instrument teams and their ICCs on their teams, and most report that they often have relied on their ICC contacts to obtain key information and documentation. This situation is understandable for the early phase of a new mission, but it also testifies to the inadequacy of the on-line documentation in spite of the official discouragement of such contacts and information (Section 3.4 below). A considerable fraction of the OT1 observers will not have the benefit of such inside contacts, so the Support Group should expect a heavier support load in dealing with those observers, above and beyond the increased workload from the much larger number of projects.

## **HSpot and Programme Status**

Observers generally reported satisfaction with HSpot, no doubt in part to the experience of many with the Spitzer SPOT programme. Several users did comment that there seemed to be no way to obtain a programme summary including information on number of hours observed. Such utilities apparently are available (PHS web page and astronomers database), but their existence is not well known in the user community. It would be helpful to make these pages more visible and publicise them to the user community.

## **Programme Scheduling**

In the Committee's interviews with the KP teams it became clear that much confusion exists about how observations are prioritized for scheduling, and why many observations have not been executed during their first one or two visibility windows. In his report the Project Scientist described the scheduling process. Scheduling efficiency has steadily improved through the mission lifetime and ~50% of all approved programs have been scheduled. The distribution of programs was even across instruments but program completions ranged from 0 to 100%. Most of these variations can be attributed to scheduling constraints and visibility and the disruptions to the instrument schedule caused by the delayed commissioning of HIFI and other instrument modes (e.g., PACS unchopped line scans). The Committee is convinced that scheduling is being conducted in a way that achieves the primary goals of helium efficiency, maximum time on sky and a balance across instruments and programme areas. However observers would benefit from more information on how this is done.

Several teams asked whether any provision was made for prioritising the final few hours of observations for a programme when it neared completion. This cannot be implemented into the scheduling software without over constraining the process (the same reason why observers cannot prioritise their AORs), but the Community Support Team is beginning to take notice of these situations. The Project Scientist noted that the long-term schedule shows that most KP programmes should be completed within the original 18-month time frame, with the possible exception of a few regions of sky where the visibility space is heavily subscribed. KP programmes will have priority over OT1 programmes until they are completed.

Currently information on observing schedules and logs are posted on the Herschel website. However PIs are not notified when their observations are scheduled, nor are they notified when their observations enter the data archive; it is up to the users to check the web pages every few weeks to see if data are being taken. This was an irritation for the KP teams, but will be a major headache for OT1 observers, many of whom will have only single observations, which may take a year or more to be executed. The Committee was told that an automated system of email alerts could be implemented with relatively little effort, and we recommend strongly that this be done. What cannot be implemented easily are automated reports which include information on problems with observations. These are relatively rare and the Committee agrees that those should continue to be handled on an individual basis.

## **Web Pages and Documentation**

Although Herschel observers returned very positive comments about the support they receive from the Community Support staff and the Helpdesk, nearly all cited the inadequacy of the current on-line documentation. Observers are unable to find the basic information on a website to calibrate and evaluate the data: e.g. beam area sizes and flux calibration uncertainties. This has arisen partly from the rapid changes to these parameters early in the mission. Nevertheless the websites are poorly organised, making it difficult to find pertinent information.

When discussing this topic the Committee made an effort to identify those items which are most crucially needed. Details for individual instruments and for general data processing are minuted in the following sections. Generally speaking critical items include:

- A well-organised and cross-linked set of observers' web pages, to provide "one-stop shopping" at the top level with subcategories organised by proposals, observing, the individual instruments, data processing, and data archive. The Spitzer website provides an excellent example. A search tool might be useful, but simply a well-laid out list of links to the documents astronomer need for calibration, reduction, and analysis would serve as a much-needed starting point.
- Instrumentation documentation including current observing manuals, (including or separately) the most up-to-date calibrations. A minimum list would include: - key calibration files/factors by instrument mode - absolute flux calibration factors and uncertainties with the applicable flux ranges - PSFs/beam profiles and models - aperture corrections - instrumental sensitivities (1-sigma, 5-sigma) - bright source saturation limits for instrument modes - filter response functions - spectral response functions - cross-calibration comparisons with other datasets when available - documentation on known limitations and caveats - guidance on uncertainties on data pushed through pipelines e.g., flux calibration for extended sources vs. point sources
- Data processing documentation including links to current HIPE user release and release notes, compact release history, reduction manuals and "cookbooks", links to scripts, page for user-contributed software.
- Compact (single page?) summaries of each instrument, including information on instrument properties, e.g., FOV, bands, pixel size, observing modes, updated to in-flight specifications. "Pocket guides" and "flyers" already exist but could be made more accessible and visible.
- In terms of the presentation of information the Committee offers the following observations (while recognising that it is not the job of the HUG to offer detailed guidance):
- Considerable information is currently available if observers are prepared to navigate deeply into the web pages (for example data processing cookbooks and training information can be accessed from the January 2010 Data Workshop pages, but these should be organised and linked (as well) from the top-level data processing pages).
- Information ideally should be organised according to Science Instruments, or at least under instrument modes, with cross-links to documentation, data processing, and data products as needed.
- Link to information in many different places, to ease accessibility of information.
- Old documentation from previous workshops can be maintained, but should be flagged as having been superceded.

### **Summary of Recommendations:**

- 3.1 The observer web pages need to be reorganised and consolidated, and populated with up-to-date instrument manuals and calibrations, data processing documentation, and links to proposal and observing information.

- 3.2 All Helpdesk submissions should be acknowledged within a few days as a requirement, even if the issues raised cannot be addressed immediately.
- 3.3 Establish automated emailing of programme PIs when observations are scheduled, and when data enter the archive (reporting of observations with data quality issues can still be handled on an individual basis). - Improve visibility of tools for viewing programme AOR summaries and programme status.
- 3.4 If possible, enable email copying of Helpdesk tickets

#### **4. DATA PROCESSING**

The feedback the Committee received from users was varied, with relatively few problems reported for some reductions (e.g., SPIRE scan maps, basic HIFI processing), and many more problems encountered for other observing modes (e.g., PACS imaging of extended sources, PACS and SPIRE spectroscopy, some modes of HIFI). Instrument-specific issues are discussed below; general data processing issues are discussed here.

##### **HIPE**

HIPE is being used by most teams for basic processing (i.e., removal of instrumental signatures), using both the host programmes and user-generated scripts. For post-processing analysis many teams are migrating the maps and spectra to external packages which operate outside of the HIPE environment (e.g., CLASS). As a result the transportability of HIPE products to other environments (e.g., via FITS format data) is important. Many teams have reported that HIPE is slow and computer-intensive but they have been able to run it successfully, with exceptions including very large-area maps where customised software or scripts are needed.

The HSC issues a new User Release of HIPE approximately every three months, but also maintains a developer's build which is updated almost daily. Both sets are available to observers, and many rely on the developer version to have the most up-to-date software. The inevitable presence of bugs in the developer releases and the ever-changing package have led to some confusion and complaints about instability. However the effort that would be required to document the daily releases would be inordinate. The Committee endorses the practice of making all HIPE versions available, but recommends a few guidelines for their distribution and documentation (which are close to current practice):

- The major User Releases should be fully documented, with accompanying release notes which summarise all changes since the previous version, and advise when reprocessing of earlier versions of data is recommended. The release notes provided with HIPE Version 4.2 set a good example.
- Observer access to developer build versions should continue, but effort should not be diverted to document these releases beyond what is currently provided. Users should be made aware that they use these at their own risk.

##### **Scripts, User Manuals, and Other Materials**

When the Committee quizzed teams on which other information was most valuable, a frequent response was step-by-step guides to processing observations and the scripts needed to carry out the reductions. Part of this need is being met by the SPIRE and PACS data manuals which are available on the Herschel website. Users also have cited the Spitzer Data Analysis Cookbook as an good example; this provides step-by-step guidance on specific reduction tasks along with links to the relevant scripts. The Committee recognises that compiling a complete "cookbook" is a long-term project, requiring continuing updating of

content, but it recommends this approach to consolidating the data processing information for users. In any case the web pages ought to include a library of scripts for the different data calibration/analysis problems, which work with the most recent official HIPE version. Over the past year many of the KP teams have developed their own software and scripts and the Committee also suggests that a Contributed Software page be established on the Herschel website, which would contain links to user-written packages. It is understood that the HSC should not support these packages, but it would be responsible for maintaining the listings and organising them sensibly by instrument and application.

### **Data Processing Users' Group (DPUG)**

The Herschel Project has a standing committee, the Data Processing Users' Group (DPUG), which is charged with coordinating and prioritising data processing development activities. Until recently this group was primarily populated by instrument experts and other scientists within the Project, but recently it has expanded its membership to include observers. Nevertheless the committee has a very low profile in the observer community (for example it is not mentioned on the data processing webpage), and the DPUG priorities may, perhaps unavoidably, have reflected interests of its previously limited (but now increasingly broadening) membership. Likewise members of some of the ICCs have remarked that they receive relatively little feedback from observers about needs and problems encountered with the existing software and documentation.

The DPUG is developing an observer's survey which is aimed at obtaining feedback on the experiences and needs of the user community. Our Committee strongly supports this effort, and we offer to assist the DPUG by reviewing the poll questions before they are circulated. We also hope that the DPUG will share the results of the survey with our Committee at a future HUG meeting. More generally, coordination of activities between the two committees would benefit both groups. This will be met, in part, by inviting the DPUG Chair to report to the HUG at its meeting.

### **Data Processing Interest Groups and "Tiger Teams"**

The Committee discussed at some length whether the current set of groups and committees (ICCs, DPUG, HUG) is sufficient to address the need for communication of data processing issues among observers and between observers and the HSC. The HSC has also organised 7 Data Processing Interest Groups (DPIGS), which are basically wiki sites for posting notes and discussing specific processing areas (PACS and SPIRE point sources, large PACS and SPIRE maps, PACS and SPIRE spectroscopy, spectral mapping, and HIFI point sources and spectral scans). However these discussion groups do not appear to have met the need for better coordination and communication between teams and between observers and the HSC.

The Committee considered whether a separate Users' Group devoted to data processing issues in general would be effective, but we were not convinced that a group with such a broad charge would be effective. Instead we believe that some of this function can be addressed by closer coordination between our Committee and the DPUG. What clearly is needed however is a more effective mechanism for focussed interaction between the Herschel scientists and expert observers to address specific "bottlenecks" in processing, which affect large numbers of projects and are holding up major volumes of Herschel science. A prime example of such a problem is the fidelity of PACS (and possibly SPIRE) maps of extended sources, which has been mentioned earlier and is discussed in Section 7.1. Other examples of such challenges might include full-area spectral mapping with SPIRE or full-range spectroscopy with PACS. For such problems a short-term focussed effort involving a few individuals from selected KP teams along with members of the instrument teams and the HSC could help to break these bottlenecks, by providing user input on the nature of the problems and testing and assessment of algorithms and beta versions of software.

The Committee recognises that unless administered carefully such "tiger teams" could add rather than subtract from the burden already borne by the ICCs and HSC, so they should adhere to a few basic principles. The scope of a given effort should be focussed on a specific problem, and the groups involved should remain small, ideally with experts contributed from the KP teams who have experience in the problem area and can commit time to solving the problems. Such teams ideally would be promoted but not run by the HSC.

For more general communications in this area the Project may wish to rethink the nature and functioning of the DPIGs. In principle these could provide an effective mechanism for "self-help" by users, but they do not seem to have taken hold. It is unclear to the Committee whether this is a reflection of lack of interest by the teams or simply poor organisation. If the DPIGs they are to function effectively they should be reconstituted (perhaps by inviting teams to nominate members once again), assigned chairs and terms of reference, and possibly reorganised to reflect current user priorities for data processing.

Apart from the mechanisms cited above the Committee is gratified to learn that HSC and NHSC are continuing their programme of data processing workshops. These will serve as invaluable introductions for new Herschel observers, and ought to continue as a priority so long as demand remains high.

### **Summary of Recommendations**

- 4.1 In addition to the current standing committees and discussion groups, the HSC should consider facilitating a small number of working groups or "tiger teams" to solve specific data processing and/or calibration problems which are imposing science bottlenecks for many projects. These teams should be limited in size, comprising expert members of a few KP teams along with experts from the instrument teams and/or the HSC.
- 4.2 The Committee endorses the current policy of the HSC to support the user releases of HIPE as the primary software for observers, while making available the developer releases on a shared risk basis. User releases should be documented with release notes which summarise all changes and advise on which types of data should be considered for reprocessing. More complete documentation for the developer releases is not practical.
- 4.3 The current web pages on data processing should be expanded to include data processing manuals for all of the instruments, "cookbooks" providing guides to the most commonly used scripts, and a page with links to user-contributed software.
- 4.4 The Committee welcomes the expansion of the DPUG to include outside Herschel users, and the planned user survey. The HUG is prepared to assist by reviewing the survey questionnaire and discussing the results with the DPUG Chair at all future meetings.
- 4.5 Regular communication between the DPUG and this Committee should be established, with regular reports and from the DPUG Chair at the HUG meetings, and possibly with the appointment of an outside DPUG member to the HUG.
- 4.6 The HSC might review the status of the Data Processing Interest Groups (DPIGs), and either reinvigorate the groups or disband them (in which case their functions will need to be addressed elsewhere). The data processing workshops remain a highly valued activity by the observer community, and should continue as long as demand remains.



## 5. HIFI

HIFI observers in general are very impressed by the data being delivered by HIFI, which in terms of quality often exceeds expectations.

The Committee commends the HIFI ICC for taking the initiative to train HIFI KP PhD students in Groningen by reducing and analysing PV data, both in August/September 2009 and again in February 2010. This allowed the PhD students to go back to their respective KPs as true data reduction experts, while also allowing them to keep contacts with the HIFI ICC.

The following issues were discussed. The HUG is aware that many of these issues are already being worked on, but they are provided here as a guideline for priorities as provided by the observers.

Many observers perform the basic reduction of data in HIPE, before exporting data to the CLASS software for further reduction and analysis.

### Recommendations

- 5.1 An important issue raised by users is the continued support for exporting data to other formats, in particular the CLASS software which is widely used for reduction and analysis of heterodyne sub-mm data. Such an export is recommended to be provided for all observing modes, including deconvolved spectral scans.
- 5.2 Currently, a number of observations are affected by baseline ripples. In specific high-continuum, line-rich sources it is nearly impossible to remove such ripples, since no clear baseline is present in the observations. It is recommended that further work is being put into removing these ripples in the Level 1 products.
- 5.3 The absolute instrument calibration is currently limited by the sideband gain calibration. For bands 1, 2 and 5, this calibration causes uncertainties of less than 10%, while it is <30% for the diplexer bands 3, 4, 6 and 7. The calibration of these bands is based on what was obtained from ground tests, and it is recommended that more effort be put into calibrating these bands. If the target calibration uncertainties have evolved since the pre-launch target of 3%, it would be helpful to pass on the information to observers.

## 6. SPIRE

### SPIRE Imaging, Scan Mapping

Observers generally expressed satisfaction with SPIRE imaging observations, in terms of data quality, ease of processing, and availability of documentation (for the instrument itself and for data processing). This is reflected by the strong representation of SPIRE scan mapping observations in the SDP issue and subsequent publications. Users did raise a few specific concerns, including difficulty in using HIPE to process very large scan maps, issues about the astrometric accuracy of these large maps, and the treatment of the map borders in the processing. Questions remain about the reliability of the calibrations and fidelity of large maps of extended sources.

### SPIRE FTS Spectroscopy

As might be expected the calibrations and processing software for SPIRE FTS spectroscopy are less fully developed. Scripts for processing scans of point sources (single pixel observations) are available and have produced considerable science, but issues with the calibrations (especially at the longest wavelengths) and reproducibility of the data remain and

are being addressed by the SPIRE team. Early observations in this mode were affected by limited availability of dark sky observations, but the Committee was told that these have been addressed and no longer pose a problem. A major outstanding challenge is FTS spectral mapping of extended sources. This may be a problem for which the "tiger team" approach organised either via the HSC or the SPIRE team might be beneficial. Faint target point source spectroscopy is another challenge being addressed by the team. The surprisingly high sensitivity of the SPIRE FTS has attracted much heavier use of the instrument in OT1, and we hope that this will result in higher priority being placed on calibration processing with this mode.

## **Summary of Recommendations**

- 6.1 The highest observers priority for SPIRE is improved calibrations and data processing for FTS spectroscopy, for single-pixel and fully sampled mapping applications.
- 6.2 Processing and calibration of SPIRE scan maps is in a relatively mature state, but a priority for many projects is improved calibrations (with uncertainties) and tests of mapping of extended diffuse emission.

## **7. PACS**

### **PACS Imaging, Scan Mapping**

The impressive images obtained by PACS, either in parallel mode with SPIRE or on its own, testify to the outstanding performance of the instrument. Nevertheless, PACS is a complex instrument, and not surprisingly users have identified a number of issues that are affecting the scientific exploitation of their observations. These include:

- The calibration of maps of diffuse extended emission. At least three different teams report systematic discrepancies of up to 50% when compared with non-linearity-corrected MIPS observations. The source of this discrepancy is not well understood, though it is now thought to possibly arise from a combination of beam-profile effects (extended emission not included in the point-source calibration zeropoints) and the HIPE data processing (e.g., removal of true signal during the  $1/f$  noise correction). This problem is being actively pursued by the PACS ICC, but for now it has delayed or halted scientific analysis of the data for a number of large Key Programmes.
- Reduced images from scan maps still display significant striping and other artefacts, which suggest that the full performance of the instrument is yet to be achieved in the reduced maps.
- There is a perception that reduced images obtained from PACS using a mini-scan strategy have not reached their optimal performance, even when processed by very knowledgeable and skilled individuals. Further improvement to the final data reduction and Level2 post processing may be needed to address this issue.
- Some issues remain with observations of moving targets, including elongated images which appear to be artefacts of the data processing as opposed to the observations themselves.

Members of the Committee are well aware of the complexity of the PACS detectors and the unique challenges presented by the imaging, especially for extended sources. However this is an area where expertise drawn from the KP teams may be able to help address the problem. These groups have a strong vested interest in achieving optimally-calibrated maps and are prepared to contribute expertise and effort to sharing information and addressing the issues.

### **PACS Spectroscopy**

As is the case with SPIRE the calibration and development of data processing pipelines for PACS spectroscopy has lagged behind that for imaging. An effort within the PACS ICC was devoted to developing a new (understandably) unchopped line scan mode as a replacement for the wavelength switched AOT. The new AOT was released recently, and is welcomed by the projects which use this capability.

Apart from this development many if not most of the PACS spectroscopic observations taken to date remain unpublished, awaiting calibration information and user-available reduction software. As with the imaging observers have identified a few top-priority needs:

- Basic calibration information for full-range scans, including the instrumental spectral response function (ISRF) and the absolute zeropoint calibrations. Currently this information only exists for the central pixel of point sources.
- A documented pipeline that allows users to perform end-to-end processing of full-range spectroscopic observations. This is not yet possible, and it is not yet possible for users to determine whether their observations were designed in an optimal way.
- Only central-pixel observations currently are well calibrated. Calibrations for spectral mapping of extended sources are needed.

This Committee is well aware of the competing demands that are placed on an overstretched Herschel staff, but in this case there is particular cause for acting soon. During our interviews prior to this meeting several respondents reported that the inability to reduce PACS spectra has discouraged individuals from proposing to use this instrument. If this perception is widespread then the long-term scientific impact of Herschel could be compromised. The Committee believes that Herschel should set as an objective the implementation of end-to-end processing (with the necessary calibrations) of PACS (and SPIRE) spectroscopy by the OT2 AO, so the full scientific potential of the instrument can be reflected in the Herschel observing programme.

### **Summary of Recommendations**

- 7.1 The highest priority for PACS imaging is the calibration and external validation of mapping of extended emission. This problem might well benefit from the "tiger team" working group approach recommended earlier.
- 7.2 The highest priorities for PACS spectroscopy are the release of scripts and software for the end-to-end processing of spectra (full-range scans in particular), and the associated calibrations, including flux and spectral response calibrations. Calibration and processing of areal spectral mapping is also needed.
- 7.3 Other important priorities for PACS imaging include improved removal of artefacts including striping from scan maps and astrometric issues (elongated images) for moving target observations.

- 7.4 In order to ensure full exploitation of the spectroscopic capabilities of PACS and SPIRE the Project should endeavor to enable end-to-end processing of calibrated full-range spectra with both instruments (if possible in 2D) in advance of the OT2 AO call.

## **8. ORGANISATION OF HERSCHEL USERS' GROUP AND ACTIVITIES**

### **Herschel Users' Group Membership and Meetings**

In the Terms of Reference for the HUG it was suggested that the Committee meet approximately twice per year. The coming year is a critical period for Herschel, with the anticipated completion of the Key Programmes, the startup of OT1 observations and the increased workload on the HSC, and the preparations for the OT2 AO. This will be the last opportunity for actions which will influence the observing programme for the Observatory. As a result the Committee decided to meet three to four times in the coming year, with the first meeting scheduled for late February 2011 and the second meeting for early to mid-May 2011, prior to the OT2 AO release. Both meetings will be held at ESAC, to maximise interactions with the HSC staff.

With the recent announcement of OT1 time allocations the Committee will be enlarged by 4 members taken from the OT1 teams. This will be done in time to allow the new members to attend the next meeting in February. In addition to items arising from this meeting, the Committee will discuss user feedback from the recently completed time allocation process.

### **Communications with General User Community**

For this Committee to be effective its activities need to be disseminated to the broader observer community, and mechanisms for users to communicate with the Committee are needed. To address these needs the Committee and the Project Scientist agreed to set up a dedicated page on the Herschel website (visible from the top-level menu) which will contain:

- names and contact information of the Committee members
- copies of the meeting minutes and the Terms of Reference
- copies of presentations from HSC to the Committee
- Committee meeting schedules
- a utility to enable observers to contact the Committee by email

The Committee also decided to organise informal "Town Hall" discussions over the next two years at conferences which attract considerable numbers of Herschel observers (one such discussion was held at the "Stormy Cosmos" meeting in Pasadena in November 2010). These will provide an opportunity for members of the user community to communicate their views and concerns to members of the Committee.

### **Acknowledgements**

The HUG wishes to express its thanks to the Herschel Project Scientist for frank discussions and to the Institute of Astronomy for hosting the meeting. Special thanks are due to Mrs. Jeannette Gilbert at the IoA for her superb logistical support.

# Herschel Users Group Meeting

## AGENDA

20 – 21 October 2010

Hoyle Committee Room  
Institute of Astronomy

### Wednesday October 20

9:15am Introductions, Logistics

9:30am Executive Session

10am Project Scientist's Report (Göran Pilbratt)

- status of Herschel, instruments
- statistics on instrument use (allocated vs scheduled)
- status of Key Programmes, completion statistics
- Cycle 1, status and plans
- issues from the Project's perspective

11am Morning coffee

11:30am Telecon with User Support Group (w/Pedro Garcia-Lario)

- basic HelpDesk statistics (numbers of tickets, response time)
- issues raised by users
- experiences with Cy 1 proposers, plans for increased pressure
- general comments, input for UG
- questions/answer session with UG

12:15pm Observing, User Support (w/Garcia-Lario)

- availability of AORs, programme status
- scheduling
- notifications
- any other issues raised by teams

1pm Lunch

2pm Instrument-Specific Discussions (w/Tony Marston, Bruno Merin)

- PACS and SPIRE Imaging
- PACS and SPIRE Spectroscopy
- HIFI

3:30pm Afternoon tea

4pm Data Processing (w/Merin)

5pm Role of the HerschelUG, Website

5:20pm Executive Session

6pm Adjourn

7:30pm Dinner: 22 Chesterton Road.

Thursday October 21

9:15am General Issues (including science meeting recommendation)

- Carry over Discussion from Day 1

10am Executive Session

- discuss findings, recommendations

11am Morning coffee

11:30pm Briefing with Project Scientist

12:30pm Executive Session

- plan write-up, writing assignments

1pm Lunch

2pm End of meeting.