HERSCHEL USERS GROUP

MINUTES OF SIXTH MEETING
ESAC, 8-9 APRIL 2013

Members attending: M. Barlow, L. Decin, D. Elbaz, E. Falgarone, P. Hartogh, L. Hunt, M. Meixner (webex), A. Noriega-Crespo, D. Rigopoulou (chair), G. Stacey, A. Weiss (webex)

HSC Staff attending: G.Pilbratt, P. Garcia-Lario, A. Marston, B. Merin, L. Metcalfe, S. Ott, E. Verdugo

SUMMARY

The Herschel Users Group (HUG) continues to be impressed by the high level of performance of the Herschel satellite, the efficient scheduling of observing time, the high standard of community support and continuing improvements to the instrument calibrations and data processing software.

The focus of the 6th meeting centred on two key issues: the functionalities, ease of use and friendliness of the Herschel Science Archive (HSA) and outstanding Data Processing issues that are still holding Herschel Users back from exploiting their data and publishing their work. As we are nearing the end of the active, data collecting, phase of the Herschel mission the focus naturally shifts towards the Post-Operations Plans and ensuring that the final products that will populate the Herschel Science Archive (HSA) are of the highest possible standards and that the tools that will become available will meet the needs of astronomers for years to come.

The main recommendations from the meeting are as follows, the order is roughly the one followed as per the meeting's agenda.

1. Herschel Science Archive Products

The view of the HUG is that the standard pipeline (SPG) products in the archive (available as a tarball) although all-inclusive might pose a challenge for those archive users that are unfamiliar with the structure of HIPE files. Therefore, the HUG makes a series of recommendations on structure, format and content of products in the archive that aim to make the HSA accessible by a broader community (e.g. breaking the multi-extension format files into simpler structures). It must be noted that the recommendations **are not intended to replace the products currently available but should be offered in the HSA in addition to the standard pipeline (SPG) products. The HUG stresses that SPG products must remain unchanged.**

Additionally, the HUG strongly recommends that enough manpower/resources is made available to the Archive Group to sustain the demands and activities of the Group initially in the early phase of Post-Operations.

1.1 For HIFI:

1.1.1 It would be highly desirable to make products (Level 2) also available in formats other than the standard HIPE format (e.g. CLASS).

1.1.2 It would be helpful to make both co-added and fully calibrated without coadding data available in order to have more flexibility in post-processing – this is the standard delivery format of heterodyne data from ground-based facilities.

1.1.3 For level -2 products provide spectra co-added for same position frequency and backend.

1.2 For PACS-P:

1.2.1 To enable less-experienced users to exploit the Herschel Legacy the Level 2.5 product (as the combination of orthogonal scans) should be made available as a standalone product. A separate FITS file should be made available for each PACS band.

1.2.2 The file should be in single-extension format. RMS maps and S/N maps should be provided as additional FITS files. The coordinates of these two products should be in the same units as the main data product (FITS file).

1.3 For PACS-S:

1.3.1 In addition to the standard pipeline products available, a standalone product should be made available. This should be a data cube in FITS format containing spectral data from each of the 25 spaxels. If scans of more than one line were carried out then a FITS file should exist and correspond to each line scan, wavelength range scan or SED-range spectral segment (for instance scans containing spectra of the second order should have their own fits file). All repeats in an AOR should be coadded.

1.3.2 An ASCII format file should be made available containing the spectrum extracted from the central spaxel assuming a point source.

1.3.3 For each PACS line scan, wavelength range or blue/red SED range there should be an associated ASCII spectral file and possibly a link to the ``postcard gallery''.

1.4 For SPIRE-P:

1.4.1 A separate (standalone) product (Level 2) should be made available. There should be a separate FITS format file for each SPIRE band.

1.4.2 The product should be single-extension FITS file with the RMS and S/N maps available as well in FITS format, separately. The coordinates of these two products should be in the same units as the main data product (FITS file).

1.4.3 The appropriate most recently measured beam size and relevant information should be given in the header.

1.5 For SPIRE-S:

1.5.1 Two FITS format data cubes, one each for SLW and SSW should be made available. All repeats in each AOR should be co-added.

1.5.2 Two FITS/ASCII format files one listing the spectrum from the central SLW and one for the SSW detector extracted using a point source calibration. Files should contain the frequency (in GHz), flux (in Jy) and uncertainty of the flux.

1.6 General suggestions:

1.6.1 Information about what has been observed for a given source is not readily available (e.g., HIFI, PACS spectral ranges, filters for PACS photometry, etc.); it would be extremely advantageous to make such information easily accessible.

1.6.2 The possibility to query the true observer name (rather than the abbreviation used in the proposal ID) would be of significant use.

1.6.3 Finally, it would be extremely useful for the users to have the ability to query the archive by name (or coordinates) and create a cut-out image (postage stamps) of a small area around the queried position. The HUG recognises that this functionality is under consideration and will be provided by IRSA in the future. A similar functionality available at the HSA would be highly desirable by the users.

2. Data Processing/HIPE

The HUG welcomes the new functionalities already implemented in HIPE 10.0 and commends the DP and the calibration groups for all the improvements that will be contained in HIPE 11.0 to be distributed in the summer.

The two specialised workshops on ``calibration'' and ``map-making'' issues were well attended. The results of the ``map making'' meeting will appear in the form of a report from the SPIRE and PACS ICCs. The HUG would like to stress the importance of these reports and the fact that the outcomes should appear within a reasonable amount of time and certainly not beyond the summer of 2013. This should be viewed as top priority by both the HSC and the two ICCs.

The HUG does not feel that ``On demand profiles'' in the archive should be given high priority at present. It is best to focus on making simple format products available as soon as possible to enable more scientists to use the HSA effectively especially in view of the upcoming ALMA Cycle 2 deadlines.

The HUG endorses the extension of the DPUG to include members from the ALMA and SOFIA Communities. The HUG is supportive of the HIPE FORUM 2013 (the HUG will be represented at the FORUM) and welcomes the expansion of the FORUM to include Herschel users from the wider astronomical community.

3. Instrument Calibration

The HUG notes with satisfaction the considerable progress towards improving the quality of instrument calibrations. It is necessary however, to continue the efforts in critical areas where improvements are still needed.
The HUG was pleased with the success of the map-making workshop in January 2013 and the calibration workshop in mid-March 2013 that took place at ESAC and, strongly encourages the HSC to continue in the same spirit of bringing together experts from the instrument teams and the community. The HUG would like to recommend that the next specialised workshop be dedicated to issues related to Spectroscopic Observations from the three Herschel Instruments.

4. Instruments -- Priorities

4.1 PACS Imaging

The tests performed during the map-making workshop, in particular for parallel observations, seem to converge on a preferred method to create the final maps to populate the archive. We are aware that the PACS ICC is continuing with some tests and is preparing a report of their findings to be released in the very near future. The HUG appreciates this effort and encourages the ICC to provide ASAP the necessary guidelines for the HSC to carry on such task.

It is also clear that the issue on extended emission calibration can be considered closed. The tests performed by the ICC shown both the useful dynamic range of the MIPS instrument, where the observations from both PACS and MIPS can be safely compared, plus the limitations of the Ge:Ga detectors on this respect.

4.2 PACS Spectroscopy

Once again the results of the calibration workshop have shown quite a big of progress going from a single spaxel calibration to 3x3spaxels calibration, plus a more solid absolute calibration with smaller uncertainties. Using the telescope background for normalization to track response drifts is a very promising approach and it should explored on issues like in-band accuracy. Improving the spectral shape, and pointing correction are already at the top of the ICC list and the HUG supports this effort. Correcting the RSRF in the leaked spectral range (> 190micron) seems quite interesting and promising, and if the ICC resources allow it should also be pursued further.

4.2 HIFI

The HUG notices the many improvements in calibration and data analysis. The HUG notes in particular the continued effort in the ILT model that delivers synthetic maps for all beams. The HUG stresses the importance of the effort and endorses the plan of carrying out the work as part of HIFI Post Ops.

Work continues on standing waves with the aim of creating a database. The HUG recognises the importance of this task and would like to encourage full implementation of models.

Finally, the effort to determine the variation of sideband gain ratios is continuing. The HUG strongly recommends that the changes implemented in the HIFI calibration files as a result of the on-going work are properly documented and the Users are notified in a timely manner.

4.3 SPIRE Photometry

The HUG commends the SPIRE team for providing a refined calibration scheme that incorporates new beam measurements and a new formulation of the colour and extended source corrections. Although the improvements are significant a number of novice SPIRE users may find the new scheme rather daunting. A ``recipe/cookbook'' describing the new technique and the required steps is highly desirable. Additionally, since most sources are

not “infinitely extended”, the concept of an “intermediate” source extension, and the caveats behind such a concept, would help SPIRE users in years to come.

4.4 SPIRE FTS Spectroscopy

The availability of the new RSRF, implemented in HIPE11 has improved overall sensitivity by a factor of 20%. The HUG recognises that this is a major achievement of the team and wishes to commend them on their effort and encourage them to continue work on implementing pointing offset correction and temperature based flux correction in future versions of the pipeline.

5. Community Support and Communication with Users

The HUG continues to be impressed by the high level of support provided to the Herschel Community. The recent workshops that focused on more specialised issues (e.g. Calibration and map making workshops) have been very successful. The HUG would like to encourage the HSC to continue such efforts with the next workshop focusing on Spectroscopy issues. Additionally, the HUG recommends that HSC continue to offer both the standard introductory data reduction workshops (aimed at novice users) as well as the more focused workshops. Both activities are of great importance to the Herschel Community as they provide a Forum for Users to interact with instrument experts and report on their experiences.

6. User Support for Instrument Calibration and Data Processing

The group continues with their activities in disseminating both specialised and general expertise regarding the Herschel instruments and data reduction tools via face-to-face meetings and webinars. The HUG is fully supportive of these activities and encourages the DPUG to continue with updates and introduce regular reminders of such updates through the HelpDesk e-News. In particular the HUG highlights the need for action in the following areas:

HIPE: improve FITS input/output compatibility with other systems. Simplify basic/beginner user workflow in HIPE.

HIFI: provide tools and appropriate documentation on HEB standing wave mitigation and OTF data reduction.

PACS-P: improve the quality of SPG- produced scan maps and provide relevant documentation to address procedures and derived accuracies.

PACS-S: improve the pointing reconstruction and flux calibration of point sources and provide documentation specifically on how to deal with extended sources.

SPIRE-P: improve documentation on point source extraction to reflect recent changes in the way these are determined.

SPIRE-S: provide documentation on cross-calibration with SPIRE-P and other instruments.

1. INTRODUCTION

The Herschel Users' Group (HUG) held its sixth meeting at ESAC on 8-9 April 2013. The format of the 6th meeting was similar to that adopted in previous meetings with the main group leaders for community support, instrument support and calibration, data processing and data processing and Users' Group (DPUG) submitting their reports ahead of the HUG meeting. During the meeting there was extensive discussion based on the presentations. A lot of the discussion was devoted to the HSA, the format of the available products and its ``user-friendliness'', future features and improvements. In addition, the HUG reviewed advances in instrument calibrations and

Copies of the presentations from the Project Scientist, the Mission Manager and leads of the HSC groups can be found on the HUG web pages http://herschel.esac.esa.int/HUG.shtml

2. GENERAL ISSUES AND RESPONSE TO PREVIOUS HUG REPORTS

The 6th HUG meeting took place while Herschel was still actively collecting science data. The HUG was very impressed with the continued excellent performance of the observatory and the fact that its life expectancy had exceeded predictions (both industrial and those based on cryo-cooler analysis). The observatory achieved completion rates of ~100% for KPGT, KPOT OT1p1 and OT2p1, 99.8% of DDT (including ``Must-do'' activity) and 98%/20%/2% for OT1/OT2 p2 (t/m/l tiers). This impressive efficiency has been attributed to the ability of the observatory to carry out science observations for more than 19 hrs throughout its mission.

The HSC/NHSC and the ICCs are ready to enter Post-Operations after the successful review of the Post Operations Phase (POP) plans that took place at ESAC in October 2012. A brief summary of the detailed plans and staffing profiles was presented.

Towards the end of the mission (OD 1375) the PACS red array became unusable. No further action was taken since it was determined that the fraction of observations affected was rather small.

The HSC has been actively encouraging PIs of KPGT and KPOT to make their User-Processed Data Products (UPDPs) available to the community. At present the data (from those Programs that have released their products) reside in repositories but the plan is for them to be ingested in the HSA. The HUG would like to stress the importance of making UPDPs available to the Community and would encourage the HSC to remind all PIs to submit their products in a timely manner.

Prior to the meeting the HUG reviewed action items from previous recommendations and was satisfied that a number of those suggestions had been implemented

3. HERSCHEL SCIENCE ARCHIVE (HSA)

With the end of Herschel's active (data collecting) phase of the mission the Science Archive becomes the focus of the Herschel Legacy. The HSC has already invested in manpower and technology to develop a system that will serve the needs of the astronomical community in the years to come. The HSA has been fully operational and will continue to be the main provider of Herschel products during Herschel Post-Operations and beyond ensuring the lasting value of the Herschel Legacy. A large fraction of the 6th HUG meeting was devoted to discussing issues related to the user-friendliness of the archive and the availability of standalone products that will enable non-expert users to access the Herschel Legacy. All Herschel observations are/will become available through the archive. In addition it is foreseen that the HSA will also contain user-provided products (all KPGT and KPOT programs) as per the original agreements with the teams. Additionally, it may contain products from OT large programs if the PIs are willing to make their end products available and HSC manpower and resources permit. Members of the HSC have been involved in discussions with all KPGT/KPOT teams regarding the release of User-Processed Data Products (UPDPs) e.g. data containing source catalogues constructed by the relevant teams. It is anticipated that the HSA will be populated with user-provided data well before the end of the year (with the release of HSA version 5).

The HUG recognises the importance of the HSA not only in providing Herschel Users with Standard Pipeline Products (SPG) but also in enabling research with other facilities (e.g. the ALMA Observatory). As such the HSA products should cater the needs of experienced Herschel users (SPG products) but also users that are less familiar with the characteristics of the mission. For this purpose the HUG has made a series of recommendations on the contents of the HSA in particular the availability of standalone products in addition to the SGP products that are currently available.

In what follows we describe in detail suggestions for enhancing the range of products available in the HSA. We stress that the products that we suggest to made available should not replace the SGP products but should be offered alongside.

3.1 Suggestions for HIFI Products

HIFI data in the archive is delivered in HIPE format only. For users who wish to analyse their data using a different software package (one that they are more familiar with) it may be beneficial to offer archival data in a different format (e.g. ASCII/FITS/CLASS compatible formats).

Basic level (0.5) product: it would be helpful to make available fully calibrated spectra without any co-adding; this is the standard delivery format of heterodyne data from ground-based facilities.

Level-2 products: provide co-added spectra for same position, frequency and backend.

Data Cubes: should be provided in case of mapping (in FITS format only). The current level 2.5 products deliver 4 cubes (H-USB, H-LSV, V-USB, V-LSB) with H and V polarization being in different data cubes. But in most applications users will combine the H and V polarizations and it would be highly desirable if such a combined cube would also available in the archive.

3.2 Suggestions for PACS Products

3.2.1 PACS-P

As with SPIRE images the data products available in the archive (tarball) contain all the processed products (up to level 2.5 or 3). While this is useful for experienced users, novice users of the Archive may find the various files difficult to handle. Therefore, the HUG suggests that the 2.5 Level Product should be made available as a stand-alone product, alongside the tarball. A separate FITS file should be made available for each PACS band image. The naming convention (blue/red) could perhaps be replaced by the corresponding wavelength so that archival users not familiar with the standard Herschel nomenclature can identify the files.

The current multiple extension format of the products could prove confusing for the novice user. The HUG therefore suggests that the FITS file should have no multiple extensions. Instead the RMS map and a S/N map should be made available as separate FITS files. Until the PACS Level 2.5 product is suitable for both point source and extended source we recommend that two images are made available.

3.2.2 PACS-S

In addition to the standard tarball the following products should be made available in the HSA:
A data cube in FITS format containing the spectral data from each of the 25 spaxels. For each line scan, wavelength range scan, or SED-range spectral segment, there should be a separate FITS file. All repeats in an AOR should be co-added. For each data cube there should be an associated postcard jpg, showing the 5x5 spaxel image obtained at the central wavelength of the scan.

An ASCII format file containing the spectrum extracted from the central spaxels on a point source assumption. This file should have three columns: the wavelength in microns; the flux in Jy; and the uncertainty on the flux. (The user will have to convert these F(nu) fluxes to F(lambda) fluxes if they wish to measure integrated line fluxes).

For each PACS line scan, wavelength range scan or blue or red SED range scan, there should be a postcard image of the spectrum and an associated ASCII spectral file. All repeats in an AOR to be co added. There could be FITS format versions of these point source spectra too, but the ASCII format versions should be the top priority.

3.3 Suggestions for SPIRE products

3.3.1 SPIRE-P

As in the case of PACS-P, a separate product (Level 2) should be made available alongside the tarball. There should be a separate FITS format file for each SPIRE band image that should be easily recognizable (i.e. SPIRE250, SPIRE350 or SPIRE500 instead of PSW, PMW, PLW).

This product should be in single-extension FITS format. RMS map and S/N map should be provided as separate FITS file. In that case the coordinates of the RMS map should be changed to Equatorial.

The appropriate, most recently measured beam size, together with the assumptions used for measuring it (color, source size, etc.) should be given in the header of the FITS file.

3.3.3 SPIRE-S

Two FITS format data cubes, one for the SLW range and one for the SSW range, with separate FITS extensions containing the spectrum from each detector, all with an extended source flux calibration. All repeats in each AOR to be co-added.

Two ASCII-format files, one listing the spectrum from the central SLW detector and one from the central SLW detector, extracted using a point source calibration. Each file should have three columns: the frequency in GHz; the flux in Jy; and the uncertainty on the flux. There could be FITS format versions as well, of these point source spectra, but the ASCII format versions should have the highest priority.

Where possible links should be made between the standalone products that were described and the postcard gallery.

The units in PACS-P and SPIRE-P products should become uniform.

4. DATA PROCESSING

The HUG has been impressed with the overall activity in the area of Data Processing both in terms of improvements in data reduction software but also outreach activities such as meetings designed both for advanced (e.g. HIPE FORUM) but also less experienced users (e.g. PACS and SPIRE map making workshop).

During the workshop a number of map-making tools were compared both those that are part of HIPE as well as those developed by the users for specific applications (e.g. ROMAGAL etc.). The results of these comparisons together with suggestions on which tools to be used for each specific application (e.g. point sources, extended emission etc.) will be presented in reports from the SPIRE and PACS ICCs, respectively. The SPIRE-ICC suggested that a final report on map-making will be made available towards the end of May 2013. The PACS-ICC proposed a slightly longer timeframe, with a preliminary report by the end of May and a final report within a year. Although the HUG recognises that very careful consideration should be given to such a report, the timescale proposed by the PACS-ICC is rather long. The HUG therefore strongly recommends that the final report of the PACS-ICC in map-making techniques should become available much sooner with the timescales to be agreed in consultation with the HSC. The HUG notes that the outcome of both reports is crucial in shaping future DP activities, for instance, the products that will be included as part of the ``On Demand Profiles" to be made available as part of the HSA. The HUG also notes that users be made aware of the various differences the various between map-making tools available but also of the timescales of when the reports will be

made available. Since a significant fraction of PACS users will rely on these recommendations fro the PACS-ICC the HUG feels that the matter should be looked at urgently.

With the aim of enlarging the Herschel community the DP Group has been involved in discussions with the SGS of possible ways of enhancing the HSA products by providing products tailored to specific scientific needs. Among the various suggestions, the ``on-demand'' processing profiles aim to provide products suitable for specific science goals where, for instance, the pipeline is run with a specific user-defined set of parameters. The HUG felt that although such endeavours would be beneficial in the long term, it does not consider that this is high priority. Instead, it was felt that improving the format and accessibility of the current archival data products is more crucial to Herschel's Legacy.

An overview of the new features included in HIPE 10.0 was presented. The HUG notes the many improvements for the various instruments. For SPIRE-P new information from cross calibration with Planck HFI has been included. SPIRE-S now offers a new tool for processing semi-extended sources. For PACS-P a new task has been included that produces error maps for maps produced from high-pass filtered timelines. For PACS-S spectral drizzling for line-scan observations has been added. For HIFI we note the addition of a new tool for comparison of emission in DBS chop positions, among others.

The HUG was also impressed with the new updates/tasks that are foreseen to be included in HIPE11. Highlights of the new version include several improvements in calibration (see Section 5), pointing reconstruction and data reduction pipelines.

A new Forum dedicated to dealing with issues related to the HSA, the Herschel Archive Group (HAG) has been setup. The HUG representative to the HAG is Alberto Noriega-Crespo. The HUG welcomes the setup of the new Group whose aim is to steer the development of the Herschel archive in a direction that maximises scientific utility.

The HUG is also very supportive of the HSC efforts to expand the DPUG groups by inviting members from other communities, such as ALMA and SOFIA. The aim is to look at all aspects of how Herschel archival research can benefit other communities and vice versa.
The HUG also endorses the suggestion of enlarging the HIPE acceptance testing campaigns by including scientists outside of HSC/ICCs/NHSC. Finally, Mike Barlow has provisionally agreed to act as the HUG representative to the HIPE FORUM 2013 that is tentatively scheduled to take place later in the year.

5. INSTRUMENT CALIBRATION

The HUG was very impressed by the considerable progress made on several aspects of calibration of the three instruments. Tony Marston gave a brief presentation during the meeting highlighting the advances made. A detailed account of the improvements in calibration –related issues as well as outstanding items still are discussed in detail.

The HUG was pleased to hear that a specialised Workshop on Herschel Calibration took place in mid-March 2013. The HUG would like to stress the importance of such meetings as it provides a forum for ICC/HSC experts and Herschel users to exchange ideas identify areas for improvement and give useful feedback on calibration documentation. Now that the Herschel mission has reached a mature point it is probably a good idea to hold such meetings with a higher frequency (once or twice a year).

Cross calibration between the three instruments is taking place in earnest now and initial results have been reported at the Calibration Workshop. The HUG is of course supportive of this activity and would recommend that the results of the various cross-calibration tests are made available to the community.

INSTRUMENT SPECIFIC ISSUES AND CALIBRATIONS

5.1 HIFI:

The HUG recognises the effort that has been invested in addressing issues related to aspects of calibrating the instrument and improving the quality of the data. Work is continuing on the standing waves with a lot of effort going into attempting a full optical model to understand the source and strength of the standing waves remaining in the system. Early models show promising results although full testing of the models is necessary. Regarding the electrical waves of bands 6 & 7, the goal is to create a database of standing waves. The HUG endorses the importance of addressing this instrument specific issue within HIPE. Developing physical models, for all HIFI bands, should be the ultimate goal and would give better confidence in the resulting HIFI baselines, especially when looking for faint, wide lines.

Sideband gain ratios: work is continuing on determining the variation of sideband gain ratios. It has been found, for instance, that SBRs can vary even over small LO ranges. Additionally, there exist a limited number of frequency areas where HIFI is sensitive to signal outside of the LSB/USB ranges resulting in signal loss through leakage. This effect has been studied for some bands (e.g. 5a and 3b) and a correction factor has been determined. As work progresses and more insight is gained into how SBRs vary the HUG strongly recommends that changes are implemented into the HIFI calibration files and the findings are properly documented. This will allow the user to judge the possible impact on the calibration error of his/her observations, as variations in the gain ratios remains, in many cases, the main source of the calibration uncertainty. The HUG endorses the continuing efforts in this direction so that SRB variations in all bands are understood and corrected for.

Beam maps: Work is continuing on propagating the ILT model to the sky to eventually deliver synthetic beam maps for all beams. The current plan is to deliver synthetic beam maps as calibration files, the majority of the work will be carried out during Post-Operations. The HUG endorses the plan and stresses the importance of accurate measurements of the efficiencies and beam widths of the bands.

5.2 PACS -PHOT

Extended emission
Work continues on PACS extended emission mapping now that the Spitzer non-linearity has been confirmed. The tests performed by the ICC shown both the useful dynamic range of the MIPS instrument, where the observations from both PACS and MIPS can be safely compared, plus the limitations of the Ge:Ga detectors on this respect. It is also clear that the issue on extended emission calibration can be considered closed.

The recent map-making workshop revealed a number of areas where improvements are still possible which should be identified and implemented in the pipeline. But the most crucial aspect in PACS imaging is the issue of the preferred map-making algorithm. During the recent workshop, various algorithms were compared. The tests performed during the map-making workshop, in particular for parallel observations, seem to converge on a preferred method to create the final maps to populate the archive. We are aware that the PACS ICC is continuing with some tests and is preparing a report of their findings to be released in the very near future. The HUG feels that this is an important issue and should be looked at immediately by the PACS ICC with a view of advising the Users accordingly. Improvements on flux calibration have lead to an overall calibration accuracy of 6% and photometric accuracy of 1% to 2% subject to model used.

5.3 PACS-S
Improvements have continued to take place in this instrument mode. Through accurate measurements of the pointing accuracy (via raster observations of a point source) and jitter corrections, detailed information on beams has now become available. Work is also on –going on developing scripts to propagate the knowledge gained.

The issue of the Red Leak region (190 –220 microns) where two overlapping orders are affecting each other has recently been looked at. As a result spectral features in this area can now be recovered at the expense of accurate continuum measurements.

5.4 SPIRE –PHOT
The SPIRE team has done an impressive job of refining the calibration scheme, both in terms of the new beam measurements and in the new formulation of the colour and extended source corrections. However, the new complexity can be daunting for the un-initiated user, and a simple “recipe” would be highly useful. Also, since most sources are not “infinitely extended”, the concept of an “intermediate” source extension, and the caveats behind such a concept, would help SPIRE users in years to come.

On a related issue we note that it would be beneficial to many novice users to have the SPIRE filter passbands (in ASCII form) easily accessible. Currently, the filter passbands (in ASCII form) are available from within HIPE and linked from the SPIRE Observers Manual. Perhaps a link from the top level Instrument page pointing directly to these files would be helpful to many new SPIRE Users.

5.6 SPIRE-S
The availability of a new and improved RSRF results in an overall improvement in sensitivity of about 20% over the predictions of HSPOT. The new RSRF will become available as part of HIPE 11.0. The overall gains in sensitivity between HIPE 10 and 11.0

are expected to be of the order of 25% especially at frequencies below 600 GHz. The new calibration files have resulted in improved errors in line fluxes, which are now less than 6%. The HUG is impressed by these improvements, which will have a noticeable impact in exploiting faint sources FTS-spectra. Future plans for the FTS pipeline include pointing offset correction and temperature based flux correction that will be implemented in HIPE 12.

6. COMMUNITY SUPPORT AND COMMUNICATIONS WITH USERS

All aspects of community support continue to operate very efficiently. The FAQ facility that has been set up continues to be updated with information from tickets (FAQ jamborees). Helpdesk ticket closures are closely monitored and reviewed every 2-3 months to make sure that no major issues have been overlooked.

Communications with all KPGT/KPOT PIs have been concluded (wrap up telecons) and now every effort is made to encourage PIs to deliver the final products of their programs to the HSC as per the original agreement. At present most user-contributed data reside in ftp repositories but eventually the data will all be ingested in the HSA. At the time of the meeting (early April) 2 KPGT and 1 KPOT had made full deliveries of their data to HSC with the majority of the remaining KPs having made partial deliveries. The HUG notes the importance of such user-provided data products (UPDPs) and the impact they may have in further scientific endeavours by the extended astronomical community and therefore, would like to urge the HSC to ensure that the PIs release their data as soon as possible.

In addition to the user-provided data, it is foreseen that the HSA will also contain ``Highly Processed Data Products (HPDPs). These are user-provided data products that have been provided either by the ICCs directly or that have been scientifically validated by instrument experts. It is anticipated that some fraction of UPDPs will become HPDPs.

The HSC has also started an initiative to collect and make available User Contributed software. This will include tools ranging from simple tasks to complex software (e.g. Scanamorphos) and HIPE plugins. The software collection will also be made available to the community.

Following on from the success of the more specialised workshops that were help during the recent months at ESAC (e.g. calibration workshop and map-making workshop) the HUG would like to encourage the HSC to continue such efforts with the next workshop focusing on Spectroscopy issues. The HUG stresses that the combination of standard introductory data reduction workshops (aimed at novice users) with more advanced and well-focused workshops (aimed at more experienced users) are of great importance to the Herschel Community as they provide a Forum for the Users to report on their experiences and bring possible difficulties to the attention of HSC and the ICCs.

A Herschel publication tool has been made available and it is anticipated that the tool will link publications and OBSIDs in the near future.

7. USER SUPPORT FOR INSTRUMENT CALIBRATION AND DATA PROCESSING

The group continues the dissemination of specialised expertise through Webinars and face-to-face meetings. At present every new HCSS release is accompanied by a dedicated webinar DP session while more specialised session led by instrument experts have been planned for fall of 2013. The quality and completeness of information related to calibration, documentation and data processing is constantly improving. A lot of useful information is already in the public domain under the HIPE Community wiki space.

The HUG encourages the DPUG to continue updating information and regularly remind the community that the information is available either through mass mailings using the DP lists or through the HelpDesk e-News. In particular the HUG highlights the urgent need for action on the following areas:
HIPE: improve FITS input/output compatibility with other systems. Simplify basic/beginner user workflow in HIPE.

HIFI: provide tools and appropriate documentation on HEB standing wave mitigation and OTF data reduction (see also Section 5)

PACS-P: improve the quality of SPG- produced scan-maps and provide relevant documentation to address procedures and derived accuracies.

PACS-S: improve the pointing reconstruction and flux calibration of point sources and provide documentation specifically on how to deal with extended sources.

SPIRE-P: improve documentation on point source extraction to reflect recent changes in the way these are determined.

SPIRE-S: provide documentation on cross-calibration with SPIRE-P and other instruments.

9. HUG MATTERS

The HUG will continue its mission during POP and will endeavour to advice the Project Scientist and the HSC on matters relevant to Herschel users. The frequency of the HUG meetings will drop to once per year or more if necessary. There will be a new Users Survey towards the end of the year (TBC).

The date for the next HUG meeting were provisionally set for mid-October 2013, likely at ESTEC before the start of the Herschel meeting.

10. ACKNOWLEDGMENTS AND THANKS

The HUG wishes to thank Göran Pilbratt, the ICC representatives and the HSC staff for hosting a highly productive and informative meeting.

11. AGENDA OF THE MEETING

Monday 8 April AM

08:15 – Bus depart from NH Aguillera Hotel

09:00 - HUG closed session, internal matters, updates
11:00 - coffee break
11:30 - Herschel report (Project Scientist) and discussion
12:30 - Discussion on presentations/updates from HSC members. These include:
- DP issues (Stephen Ott)

Review of outstanding issues and plans for future HIPE releases
- Calibration issues (Anthony Marston)

Report from the Calibration Workshop / Cross Calibrations
- User's f/b & data processing (Bruno Merin)

Instrument-specific issues / DP interest lists/ interaction with KPs (presumably completed)
- Community Support (Pedro Garcia-Lario)

Statistics on issues raised by users in tickets/outstanding tickets/community support plans for postOps

13:30 - Lunch Break

14:30 - Cont'd discussion
ALL: Herschel Science Archive
PostOps community support
16:00 - coffee break
16:30 - Discussion cont'd
The HUG would like to focus on the following:
-Assess remaining ``open'' actions on items related to Data Analysis Tools
-Herschel Science Archive
-AOB
18:00 - HUG internal session
19:00 - end

Tuesday 9 April 2013

08:15 – Bus departs from Hotel
09:00 - HUG internal discussion
10:30 - coffee break
11:00 - Open Discussion
Continue discussion from previous day, if necessary
Discussion on the possibility of another HUG Survey (?)
Maximise the HUG's role in PostOps

13:30 - lunch break

14:30 – HUG internal
15:30 – end of meeting