

User- and expert-provided Data Products for PACS spectrometer

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Exploiting the Herschel Science Archive



Outline



1. User Provided Data Products (UPDPs)
2. PACS Spectrometer Highly Processed Data Products (HPDPs)
3. PACS Spectrometer Ancillary Data Products (ADPs)



User Provided Data Products (SPG)



- To date, 4 Key Projects/consortia holders of PACS Spectrometer data have provided products corresponding to 329 obsids:
 - **KINGFISH:** Key Insights on Nearby Galaxies: a Far Infrared Survey with Herschel (*KPOT_rkennicu_1, SDP_rkennicu_3*)
 - **DIGIT:** Dust, Ice, and Gas in Time (*KPOT_nevans_1, SDP_nevans_3*)
 - **FOOSH:** FU Orionis Objects Surveyed with Herschel (*OT1_jgreen02_2*)
 - **VNGS:** Physical Processes in the Interstellar Medium of Very Nearby Galaxies (*KPGT_cwilson01_1*)
- Product data formats are either:
 - Spectra
 - Cubes
- UPDPs can be downloaded:
 - as a whole .tar ball, via the HSA User Interface or the repository at <http://www.cosmos.esa.int/web/herschel/user-provided-data-products>
 - in an obsid-per-obsid basis via the HSA User Interface



Highly Processed Data Product Provision



- The Herschel Science Archive should eventually serve the following PACS Spectrometer Highly-Processed Data Products:
 - Red-leak products (by end 2016)
 - Pointing Offset Corrected spectra (2017 first quarter)
 - Blue (non-flux calibrated) products (by end 2016)
 - Unchopped observations with continuum removed (2017 first quarter)
 - Non-standard AOTs (e.g. calibration, repeatability) processed with SPG infrastructure (2017 second quarter)
 - Isolated observations not processable by the standard pipeline, and that will be generated with ad-hoc processing by instrument experts (2017)



Highly Processed Data Product Provision

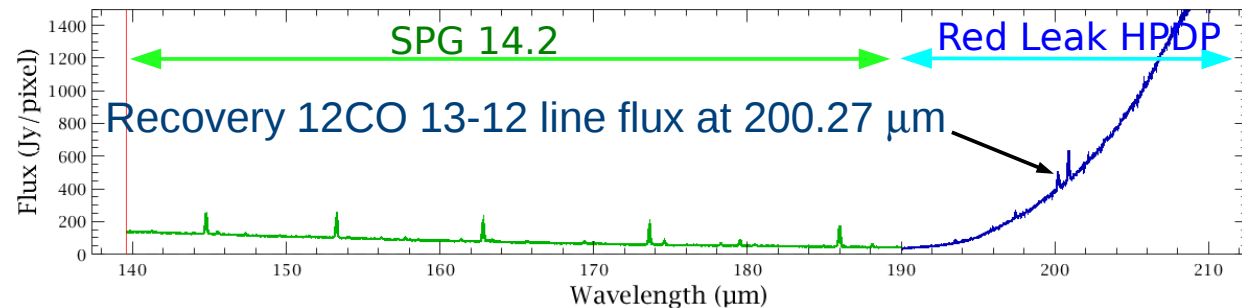
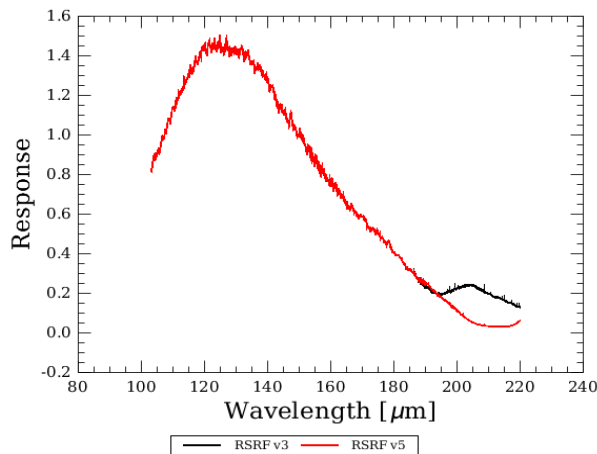


- The Herschel Science Archive should eventually serve the following PACS Spectrometer Highly-Processed Data Products:
 - Red-leak observations (for line emission at wavelengths >190 μm)
 - Pointing Offset Corrected spectra for a subset of single-pointed observations
 - Blue (non-flux calibrated) spectra for line inspection
 - Unchopped observations with continuum removed
 - Non-standard AOTs processed with SPG infrastructure.
 - Isolated observations not processable by the standard pipeline, and that will be generated with ad-hoc processing by instrument experts



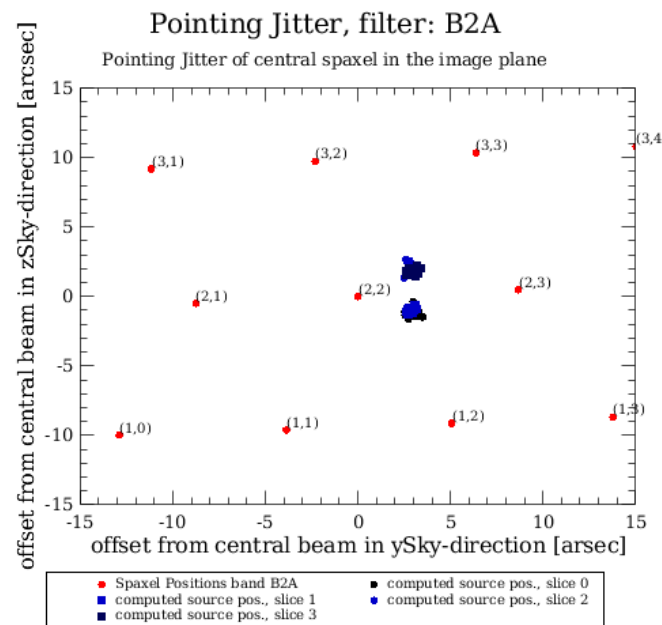
- Level 2 products longward of 190 μm , suffering from order 2 leak in R1 band. Leaks: Order superimposition due to finite steepness of the sorting order filters (dichroics) edges.
- Documented in Sec. 4.1 of the PACS Spectrometer Calibration Document
- V5 RSRF in HIPE 14.2 (calibration file version 77) enables calibration **for the order 1 line fluxes** within the leaked spectral range (continuum is still uncalibrated)
- Requires an alternative absolute flux calibration scheme (using calibration block +v5RsrF1) for chopNod observations.

RSRF comparison



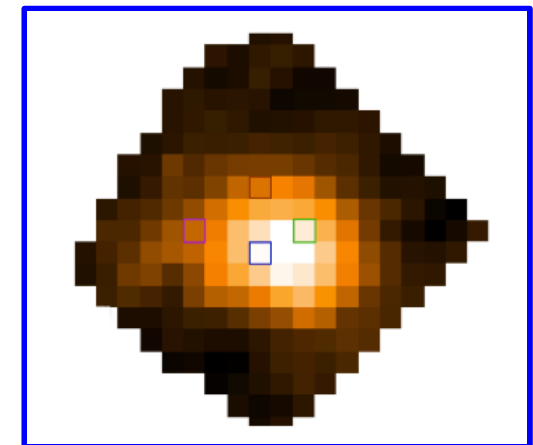
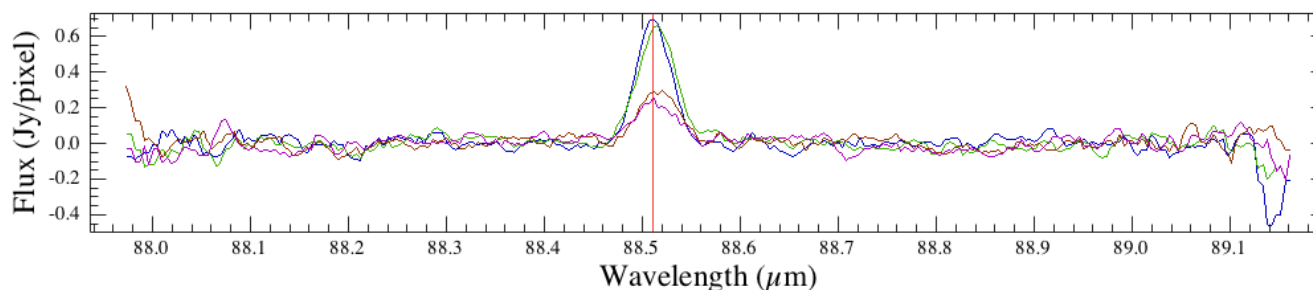
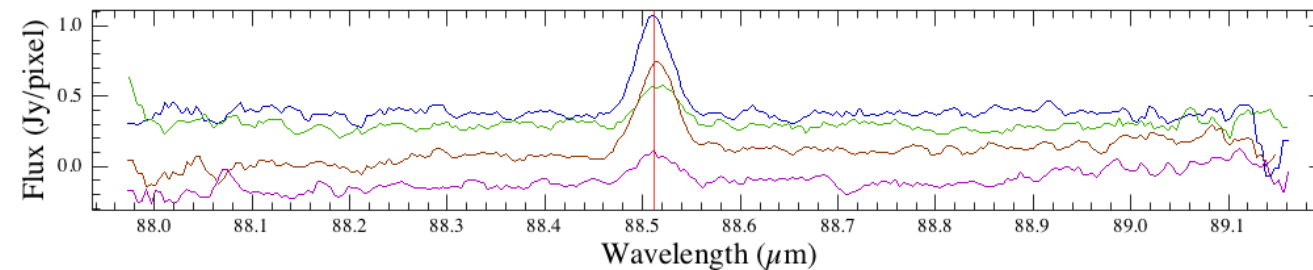
Pointing offset correction

- Mitigates flux loss of point source spectra due to pointing offsets/jitter, calculating a correction to the telescope pointing by comparing the flux distribution to the telescope beams.
- Script calculating a median offset per nod (i.e. per slice), applicable to sources even fainter than 40 Jy
- Applied to chopNod, single-pointing, range scans and SEDs



Continuum subtraction in unchopped

The continuum in un-chopped observations is usually not well calibrated and unreliable – the most practical products is that with continuum-subtracted spectra



Ancillary Data Product Provision



- The Herschel Science Archive should eventually serve the following PACS Spectrometer Ancillary Data Products:
 - PACS Spectrometer beam efficiencies
 - SEU monitoring
 - Trend Analysis Data Products



PACS Spectrometer beam efficiencies



- Produced on Neptune raster maps
- Beam efficiencies are provided for each of the 25 PACS modules at 14 wavelengths (1 in B3A, 3 in B2A, 4 in B2B and 7 in R1).
- contains 375 FITS files.

