

## The SPIRE Photometer Interactive Analysis

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The Herschel Common Science System (HCSS) (Ott 2010, Ott et al. 2006) is a substantial software package written in Java, that accompanied the development of the Herschel Mission (Pilbratt et al. 2010), supporting all of its phases. In particular the reduction of data from the scientific instruments for instrument checkout, calibration, and astronomical analysis is one of its major applications. The data reduction software is split up in modules, called "tasks". Agreed-upon sequences of such tasks form data reduction pipelines that deliver well defined standard products for storage in a web accessible Herschel Science Archive (HSA). In a perfect world this would be all that is needed. However, as astronomers and instrument scientists continue to characterize known instrumental effects and find new ones, astronomers already need to publish scientific results and may not have the time to acquire a sufficiently deep understanding of the scripting language that accompanies the data. There is a need for intermediate level analysis tools that offer more flexibility than rigid pipelines, but do not require the astronomer to master the full complexity of the Jython scripts that the pipelines encompass. The task framework within the HCSS and the highly versatile Herschel Interactive Processing Environment (HIPE) together with the rich set of libraries provide the necessary tools to put together GUI-based interactive analysis packages for the Herschel instruments. The SPIRE Photometer Interactive Analysis (SPIA) package proves the validity of the concept for the SPIRE instrument, breaking up the pipeline reduction into logical components, making all relevant processing parameters available in GUIs, and providing a more controlled and user-friendly access to the complexities of the system. The demonstration will show an example of how an astronomer would retrieve and work with a Herschel SPIRE photometer dataset using the task GUIs available through HIPE and SPIA.

### The Three Data Analysis Choices

- Pipeline processing
  - Easy and straight forward
  - No flexibility
- Editing and running a script
  - Sophisticated and long learning curve
  - Full flexibility
- Interactive analysis with GUIs
  - Relatively easy to learn
  - Limited flexibility
- Straight pipeline results may be good enough for science analysis at a future date, **but not yet**.
- For astronomers with limited resources to learn the system, the GUI IA seems to be the optimal choice

### Generalized Interactive Analysis (IA) Steps

- Load data
- Inspect data
- Reprocess data
- Inspect results
- Change processing parameters
- Reprocess again and inspect again etc...
- Go to next major step of reduction
- Select results to keep
- Save results for later
- Save results to continue processing with something else

### Requirements for a GUI IA

- Simple data retrieval from HSA
- Data inspection tools at all levels
- A split of the general workflow into smaller pipelines (modules)
- Interactive access to parameters
- Management of observations and results
  - Simple saving of observations into PAL pools
  - Simple retrieval of observations from PAL pool
  - Output of results formatted for other applications

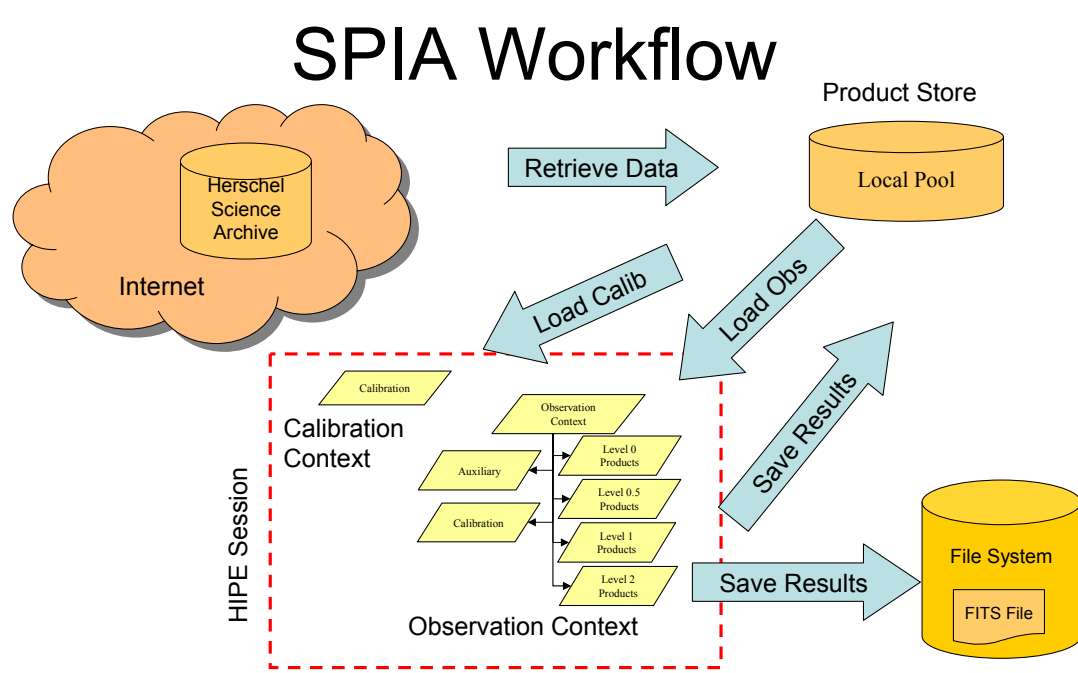


Fig. 1. The workflow in the SPIRE Photometer Interactive Analysis. Data is retrieved from the Herschel Science Archive (HSA) into a local pool database on your own disk. The observation context and the calibration context are loaded into the session and can now be subjected to various processing and analysis tasks. In the end the result is saved back into the local pool or into FITS files.

### The SPIRE Photometer Interactive Analysis (SPIA)

- Attempt to integrate available HIPE "plumbing"
- No need for sophisticated SWING programming
- Built around the observation context
- Makes full use of HIPE features
  - Task GUIs, Views, Perspectives, Context Viewer, TablePlotter, Map Display, etc...
- Processing modules are tasks that work on the observation context
- Session oriented

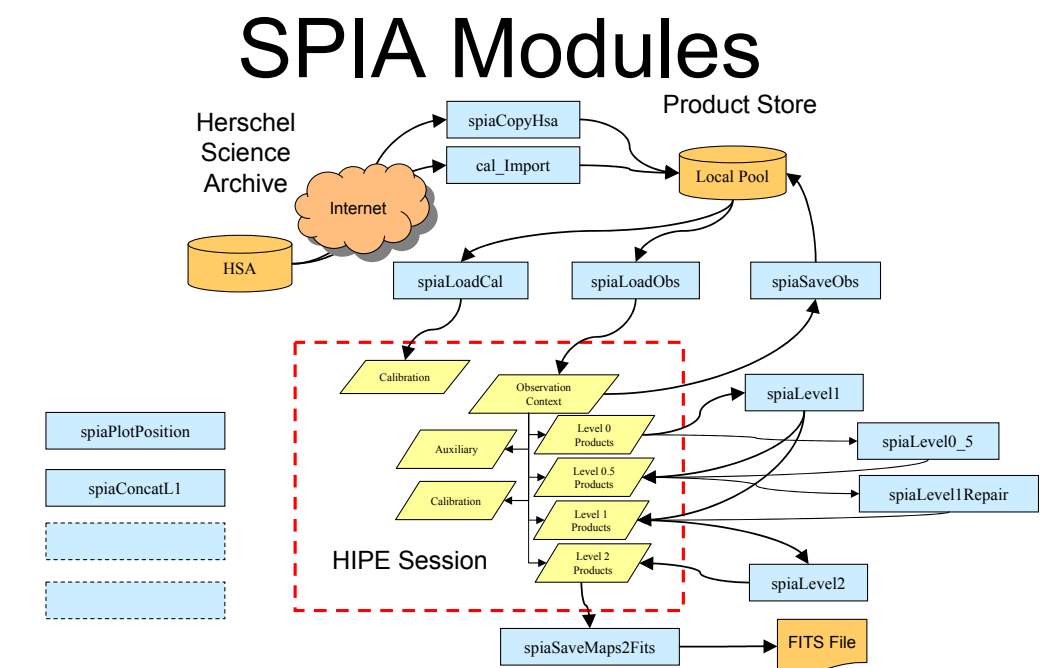
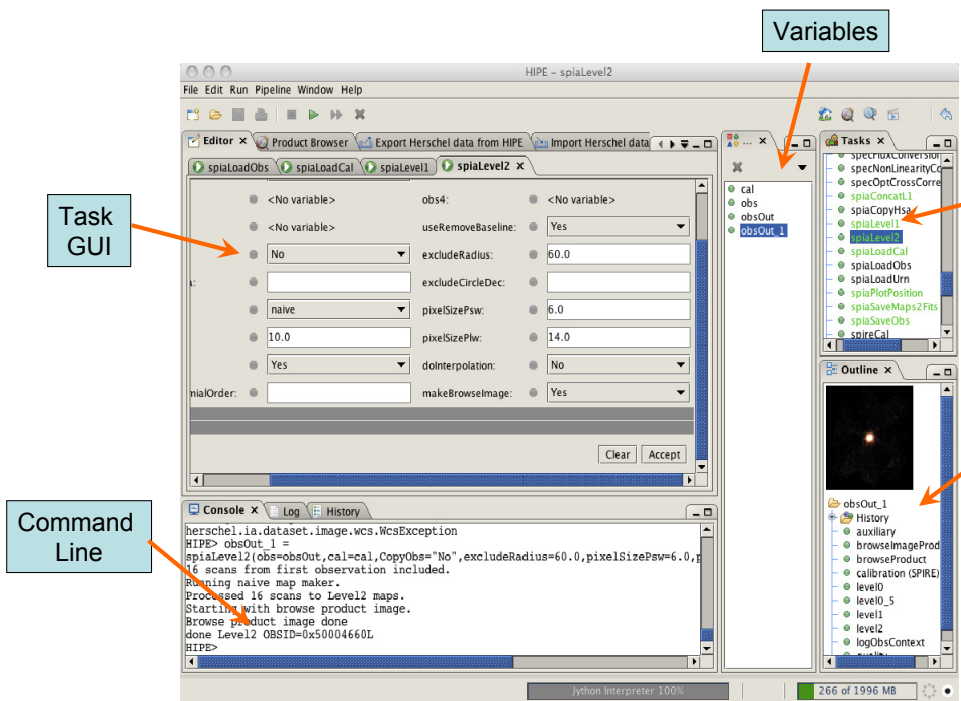
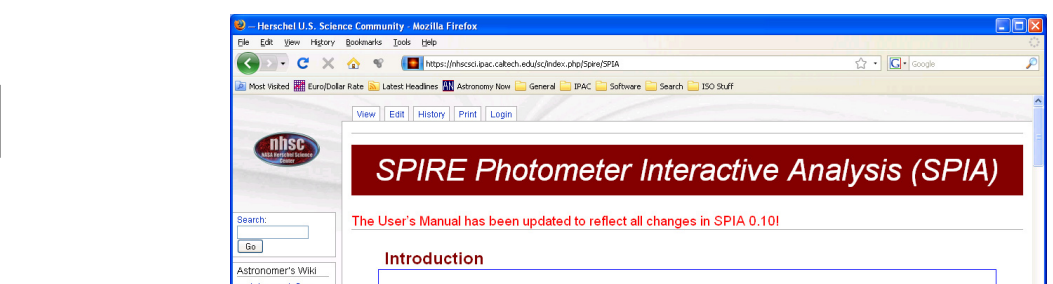
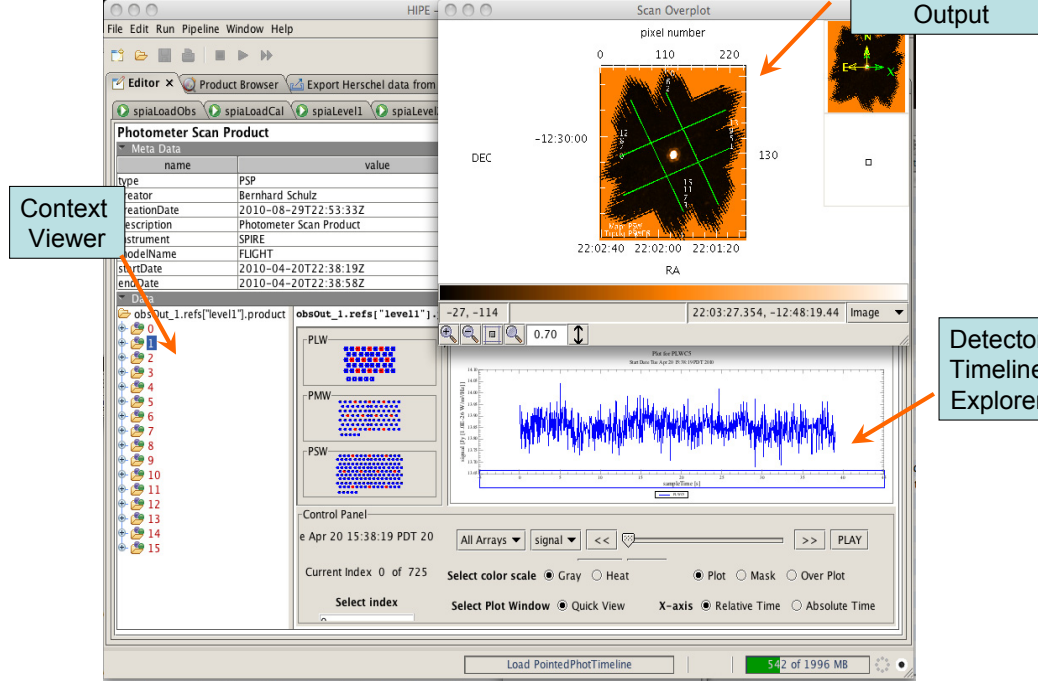


Fig. 2. The SPIA tasks are represented by blue boxes and are mostly applicable to the observation context, except for those that retrieve data from the HSA. The task framework of the HCSS provides automatic GUI interfaces for the input and output parameters that greatly simplified the implementation of SPIA.

### Screenshot of SPIA Session



### Another Screenshot



### Distribution via NHSC Wiki

- Python script
  - Simple
  - Easy inspection of the code
  - Must be run at begin of each session
- HIPE Plugin
  - More convenient
  - Persistent after installation
- User's Manual

### LINKS

**Herschel Science Center**  
<http://sci.esa.int/herschel>

**NASA Herschel Science Center**  
<http://www.herschel.caltech.edu/c>

**SPIA Download**  
<https://nhscsci.ipac.caltech.edu/sc/index.php/Spire/SPIA>

### References

Ott, S. 2010, in *Astronomical Data Analysis Software and Systems XIX*, ed. Y., Mizumoto, K.-I. Morita, & M. Ohishi, ASP Conf. Ser., in press  
 Ott, S. Bakker, J., Brumfit, J., et al. 2006, in *Astronomical Data Analysis Software and Systems XV*, ed. C. Gabriel, C. Arviset, D. Ponz, E. Solano, ASP Conf. Ser., 2006, 516  
 Pilbratt, G., et al. 2010, *A&A*, 518, L1  
 Griffin, M. et al. 2010, *A&A*, 518, L3

### Acknowledgements

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