



# **NHSC/PACS Web Tutorials**

## **HIPE Essentials**

### **PACS-105**

### *PACS Calibration Framework*



# Introduction

This tutorial introduces PACS Calibration Framework

## Pre-requisites

You should have completed the following tutorials:

- ***PACS-101: How to use these tutorials***



## What is Calibration Framework?

The calibration framework is a set of software that provides definitions and access tools for calibration products

The starting point in this framework from a user perspective is the *calibration tree*, also known as *calTree*. The calibration tree is a simple tree-like structure which points to all the calibration products as leaves.

For more detailed description, see:

[http://herschel.esac.esa.int/twiki/pub/Pacs/PacsCalibration/  
The\\_PACS\\_Calibration\\_Framework\\_-\\_issue\\_0.13.pdf](http://herschel.esac.esa.int/twiki/pub/Pacs/PacsCalibration/The_PACS_Calibration_Framework_-_issue_0.13.pdf)



## The PACS Calibration Tree

PACS calibration tree has **three branches**: **common**, **spectrometer** and **photometer**. The *spectrometer* and *photometer* branch each contain the calibration products that are specific for that instrument. The *common branch* contains *all the* calibration products which are shared between the different units in the instrument and those which do not fall easily within one of the two other branches.





Photometer  
branch shows the  
calibration  
products with  
their version  
number.  
FM=Flight Model

```
HIPE>
HIPE>
HIPE>
HIPE>
HIPE>
HIPE>
HIPE>
HIPE>
HIPE>
HIPE> print calTree.photometer
PacsCalPhot Calibration Products:
absorption           : FM, 2
apertureCorrection   : FM, 2
arrayInstrument      : FM, 6
badPixelMask        : FM, 6
calSources          : FM, 1
clSaturationLimits  : FM, 1
clTransferFunction   : FM, 1
coolerRecyclingTimes : FM, 5
corrZeroLevel       : FM, 3
crosstalkMatrix     : FM, 2
detectorReadoutTimeShift : FM, 1
detectorSortMatrix  : FM, 3
diffCS              : FM, 3
filterTransmission  : FM, 1
flatField           : FM, 3
gain                : FM, 1
invntt              : FM, 1
invnttBL            : FM, 4
invnttBS            : FM, 4
invnttRed           : FM, 4
masks               : FM, 1
noisePerPixel       : FM, 1
nonLinearCoef       : FM, 1
photometricStabilityThreshold : FM, 1
responsivity        : FM, 6
satLimits           : FM, 2
subArrayArray       : FM, 5
timedep             : FM, 32

HIPE>
HIPE>
HIPE>
```

## How to retrieve the Calibration Tree?

- From a HIPE session – default calTree, the latest version of the calibration tree

```
HIPE> calTree = getCalTree()
```

- From an observation – the calTree associated with a Herschel observation (obs) when it was processed, but not necessarily the latest version

```
HIPE> calTree = obs.calibration
```

- The preferred way - load the proper calibration products and make sure time dependent products are chosen for the given time

```
HIPE> calTree = getCalTree(obs=obs)
```

```
HIPE> calTree = getCalTree(time=frames.startTime)
```



## How to retrieve the Calibration Tree? –continued

- Difference between following two statements

```
HIFE> calTree=obs.calibration
```

```
HIFE> calTree=getCaltree(obs=obs)
```

The first returns the calTree that was used during processing of that observation with SPG. This calTree is the version which was active for the SPG version at the time of processing. If you want to reprocess the observation the same way as done by SPG **at that time**, this is what you need.

The second returns the latest and most up-to-date calTree from your local machine (make sure the updater was used). The obs argument is used for time dependent calibration products, currently only Siam, where the time of the observation is used to select the correct version of the time dependent calibration product. This is what you want to use to reprocess an observation with the latest knowledge in PACS calibration.





## The version of the Calibration Tree

- Check the version of your calTree

*HIPE> print calTree.version*

- Getting an older version of the calTree

*HIPE> calTree\_v3=getCaltree(version=3)*

Please note that the version of a calTree is different from the version of a calibration product.

## How to retrieve Calibration Products?

- Use dot-notation

```
HIPE> resp = calTree.photometer.responsivity
```

- Some calibration products are time dependent due to instrument evolution and aging
- Access an older version of a calibration product

```
HIPE> ai = getCalProduct("spectrometer", "arrayInstrument", 1)
```

How to use this calibration product:

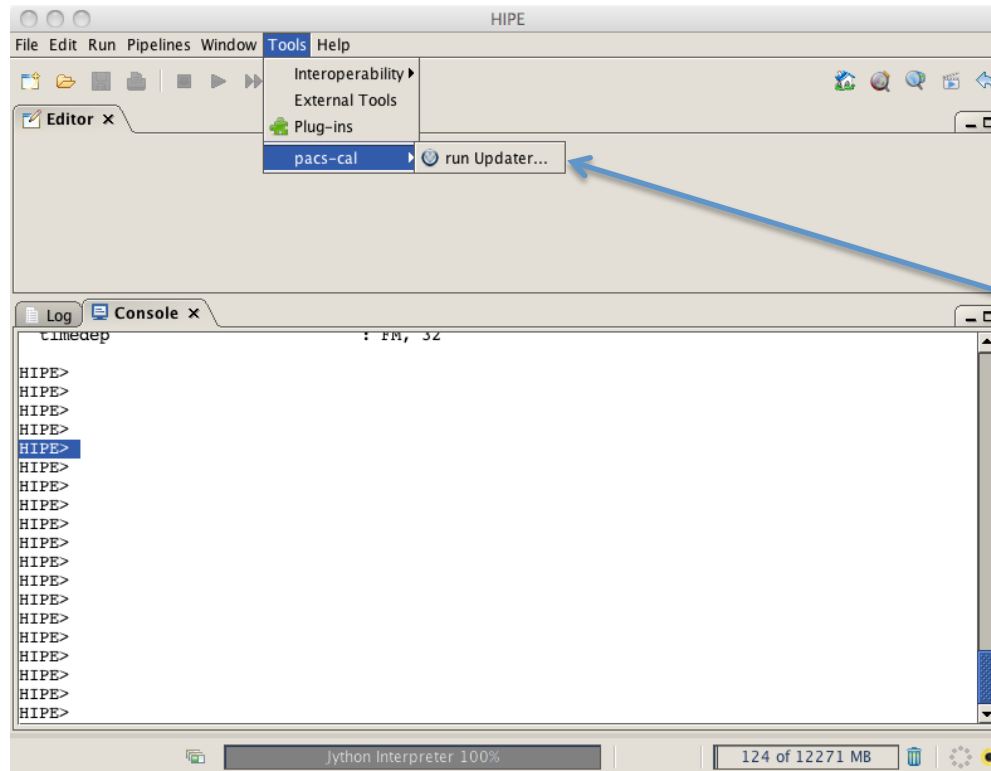
```
HIPE>frames = specAssignRaDec(frames, arrayInstrument=ai)
```

```
HIPE>calTree = getCalTree()
```

```
HIPE>calTree.spectrometer.arrayInstrument = ai
```

# Update Calibration Products

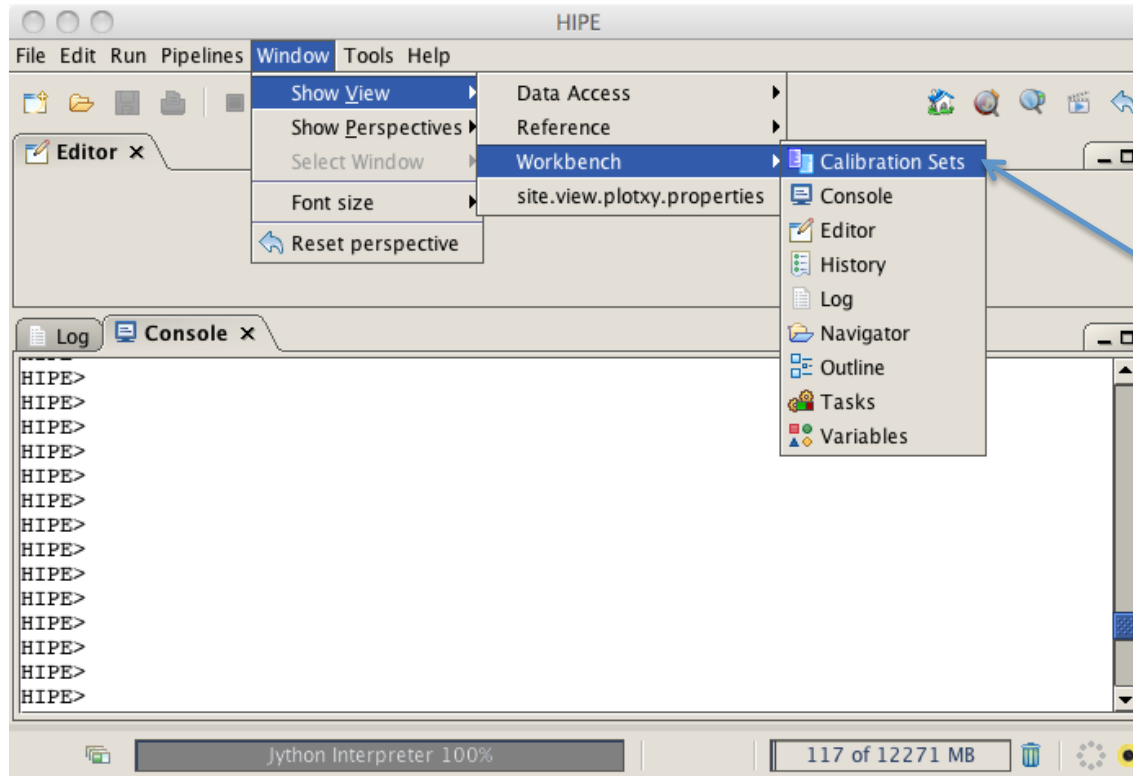
- Calibration products need to be installed on your local disk when using HIPE for the first time.



Running this will show a progress bar analyzing if there are any products need updating. Follow the instructions.

# Inspecting Calibration Products

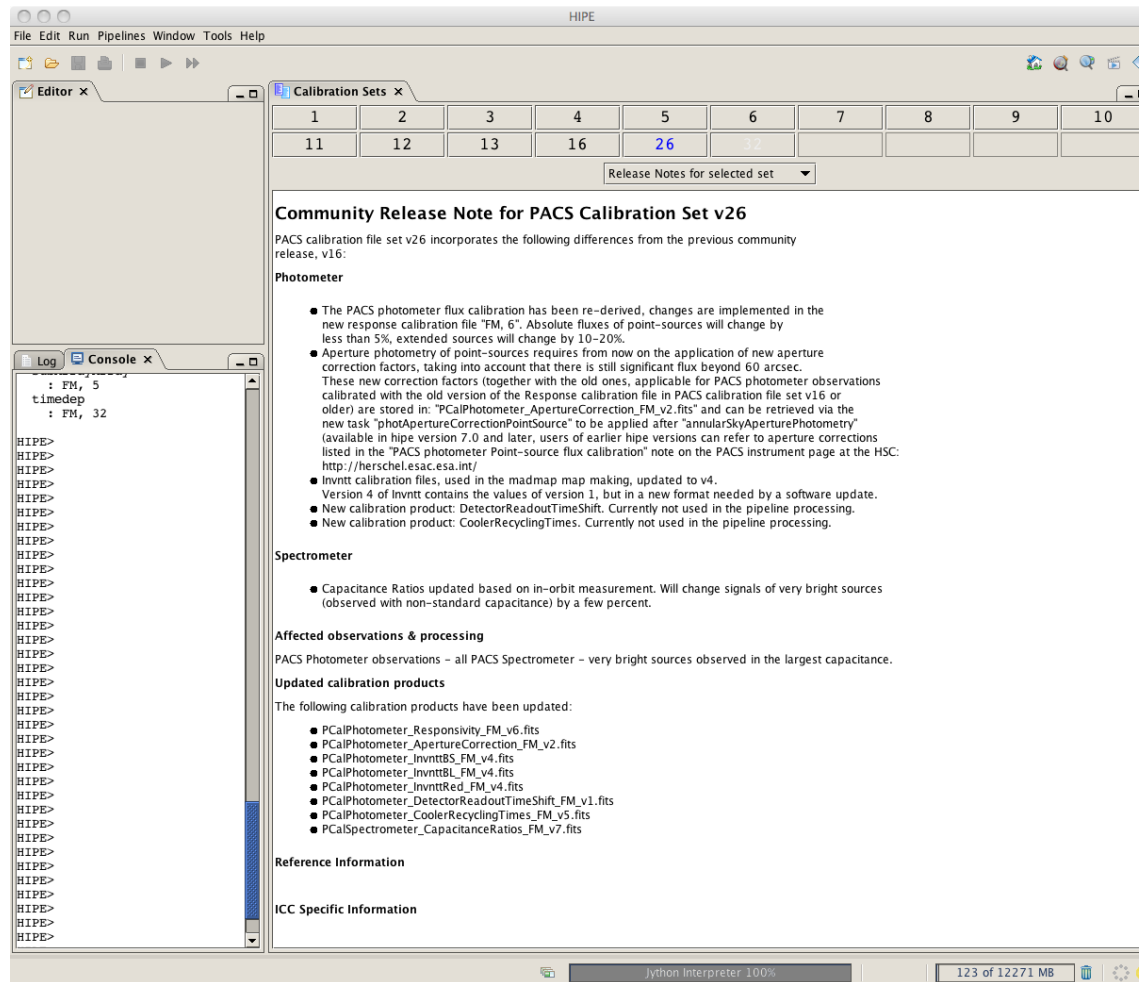
- The calibration sets View allows you to inspect the calibration sets that have been installed on your system



Go to the Calibration Sets view

# Inspecting Calibration Products – continued

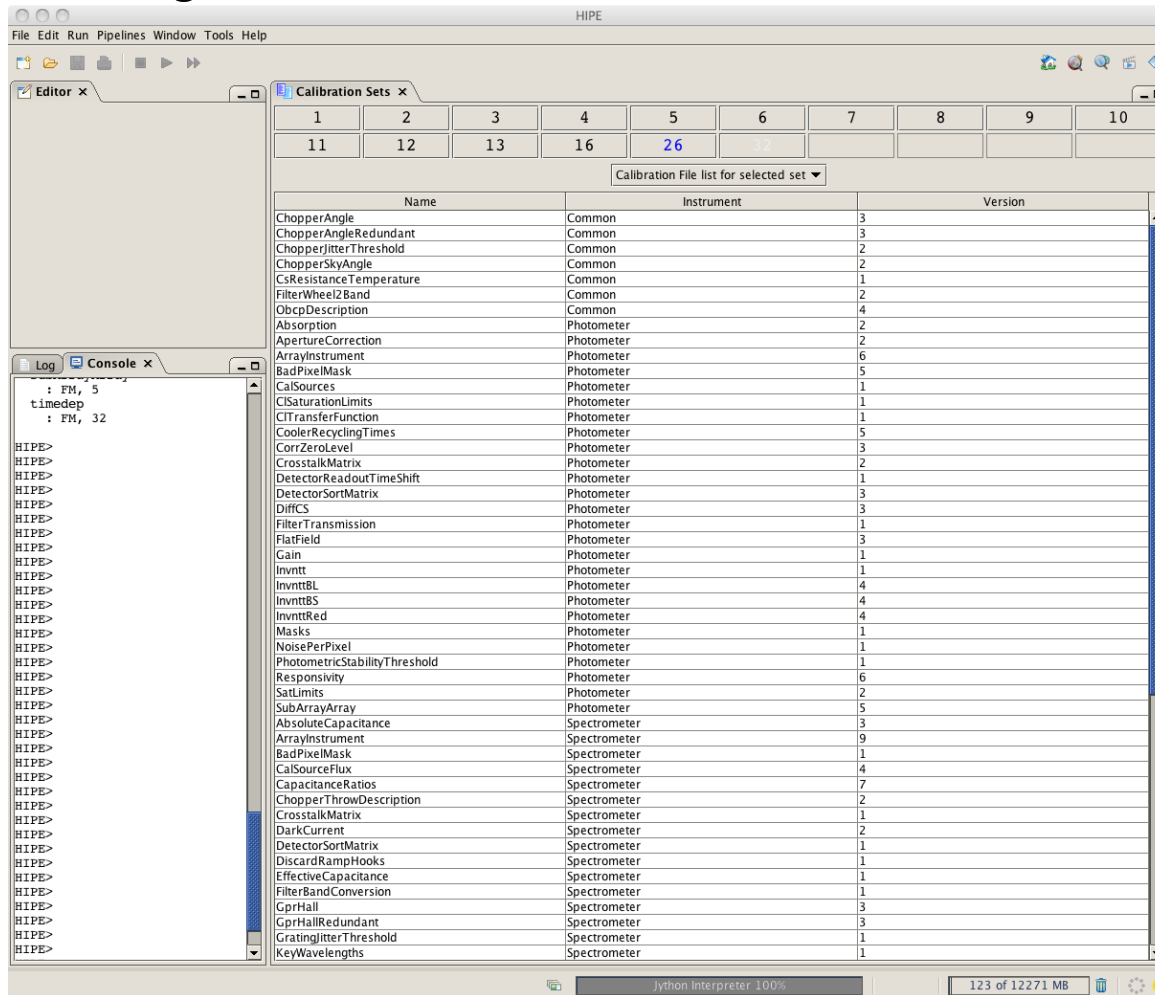
- The figures below show the calibration sets view with set 26 selected



Release notes shown in Calibration Sets view

# Inspecting Calibration Products – continued

- The figures below show the calibration sets view with set 26 selected



File list shown in Calibration Sets view