

PACS Point Source AOT Pipeline Tutorial

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on behalf of the PACS ICC (Instrument Control Centre)

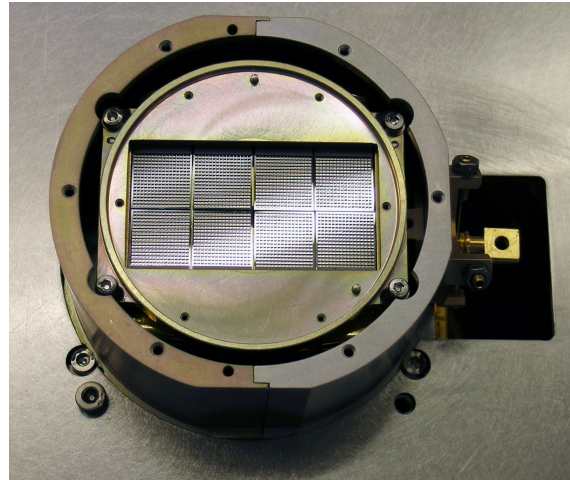


ESAC, Villafranca, 15th December 2009

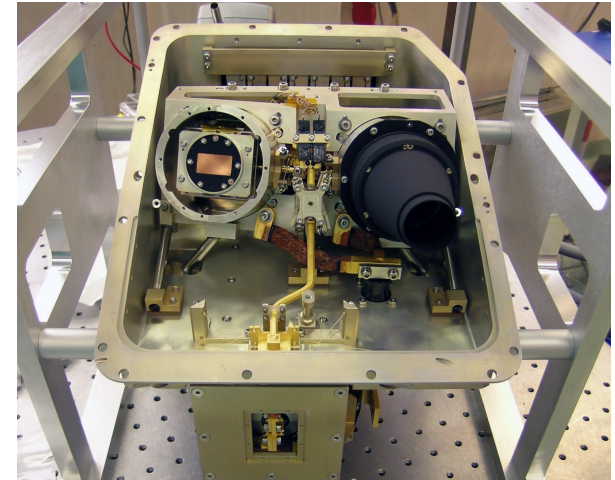
Introduction – PACS Point Source AOT



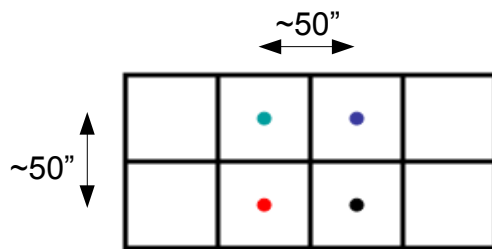
Focal plane chopper



Blue detector matrix



Focal plane unit



- Nod 1 chop A
- Nod 1 chop B
- Nod 2 chop A
- Nod 2 chop B

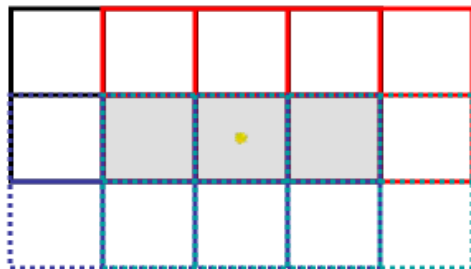
Chopping:

- frequency: 1.25 Hz
- four averaged readouts per chopper plateau
- 75 chop cycles per nod
- dithering optional:
 - three dither positions per nod
 - chopper offsets +/- 7/3 pixels

Nodding:

- telescope offset
- consecutive nod cycles in ABBA pattern

(nod1 chop A – nod1 chop B) – (nod2 chop A – nod2 chop B)



Point-source AOT footprint on the sky

blue detector: (4 x 2) x (16 x 16) pixels 3.2" each

red detector: (2 x 1) x (16 x 16) pixels 6.4" each

Script used during this session:

[PACS_PHOT_PS_pipeline_DP_Wkshp_v2.0.py](#)

Local pool used during this session:

[OSBID1342186141_PS_AOT](#)

Observation Context

detector data	auxiliary data	calibration data
Level 0: decompressed “raw” data	telescope pointing	mechanisms
Level 0.5: AOT independent	housekeeping (status information)	detector settings
Level 1: fully calibrated	ephemerides	flux calibration
Level 2: final result (e.g. maps)		spatial calibration, etc.

Last Minute Changes (although not relevant for the demo)



PACS_PHOT_PS_pipeline_DP_Wkshp.py

to

PACS_PHOT_PS_pipeline_DP_Wkshp_v2.0.py

```
# get the number of sliced nod cycles in observation :
```

```
noofsciframes=slicedFrames.numberOfScienceFrames
```

```
# select pixel size of final map and correct wavelength information
```

```
if (camera == 'blue'):
```

```
    pixsize=1.0
```

```
    if (slicedFrames.refs[1].product.meta["blue"].getValue() == "blue1"):
```

```
        lam = 70.0
```

```
    else:
```

```
        lam = 100.0
```

```
elif (camera == 'red'):
```

```
    pixsize=2.0
```

```
    lam = 160.0
```

```
#slicedFrames.meta["repFactor"] = LongParameter(noofsciframes*2)
```

Crucial pipeline processing steps

- flag bad bad pixels
 - flag saturated pixels
 - convert digital detector units to volts
 - convert digital chopper sensor units to deflection angles
 - attribute coordinates to individual pixels
 - average readouts per chopper plateau
 - subtract chopped off source from on source frames
 - average data per dither position + deglitching
 - subtract nodded off source from on source frames
 - combine/average data for each dither position
 - apply flatfield
 - apply flux conversion to Jy/pixel
-
- produce final maps (rotated to equatorial coordinate system)
 - three dither positions averaged
 - shift and add combined

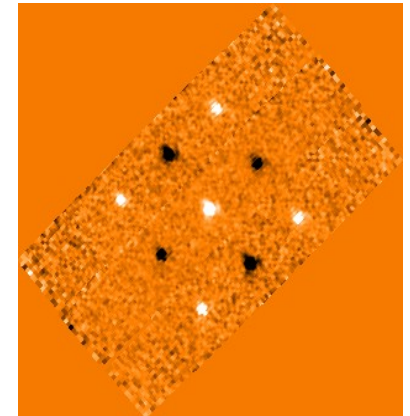
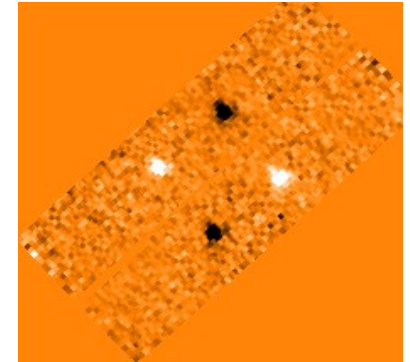
Level 0 to Level 1

Level 1 to Level 2

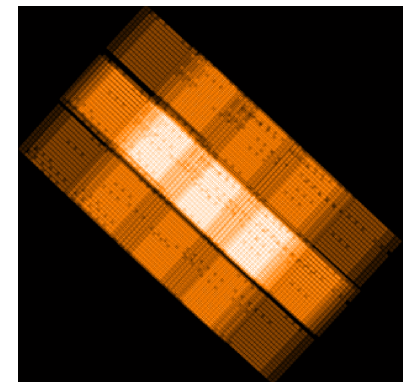
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Level 0 to Level 1



Level 1 to Level 2



Test data set: HD 148387 (η Dra)



- target selected from IGBPP (ISO Ground Based Preparatory Programme)
- **blue** (70 micron) and **red** (160 micron)
- dithering
- two repetitions (ABBA nod cycle)
- flux prediction: 480 mJy (**blue**), 89 mJy (**red**)
- data are sliced in packets according to nod cycle repetitions