Sesión especial de PANIC 4K:
cómo sacar el mayor partido a tu tiempo asignado de observación

PANIC Pipeline & Quick-Look Overview

José Miguel Ibáñez-Mengual (IAA-CSIC)

24-Sep-2025

CAHA15-CE-39

Outline

- Part 1: PANIC QL
  - PANIC data flow system
  - Quick-Look overview

- Part 2: PANIC Pipeline (PAPI)
  - Data Handling
  - Pipeline overview and main steps
  - Step-by-step Quick-Guide
  - Doc & Installation & Contribution

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Goal

The goal is to demonstrate the package's basic features without getting into too much detail.

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PANIC
Quick-Look

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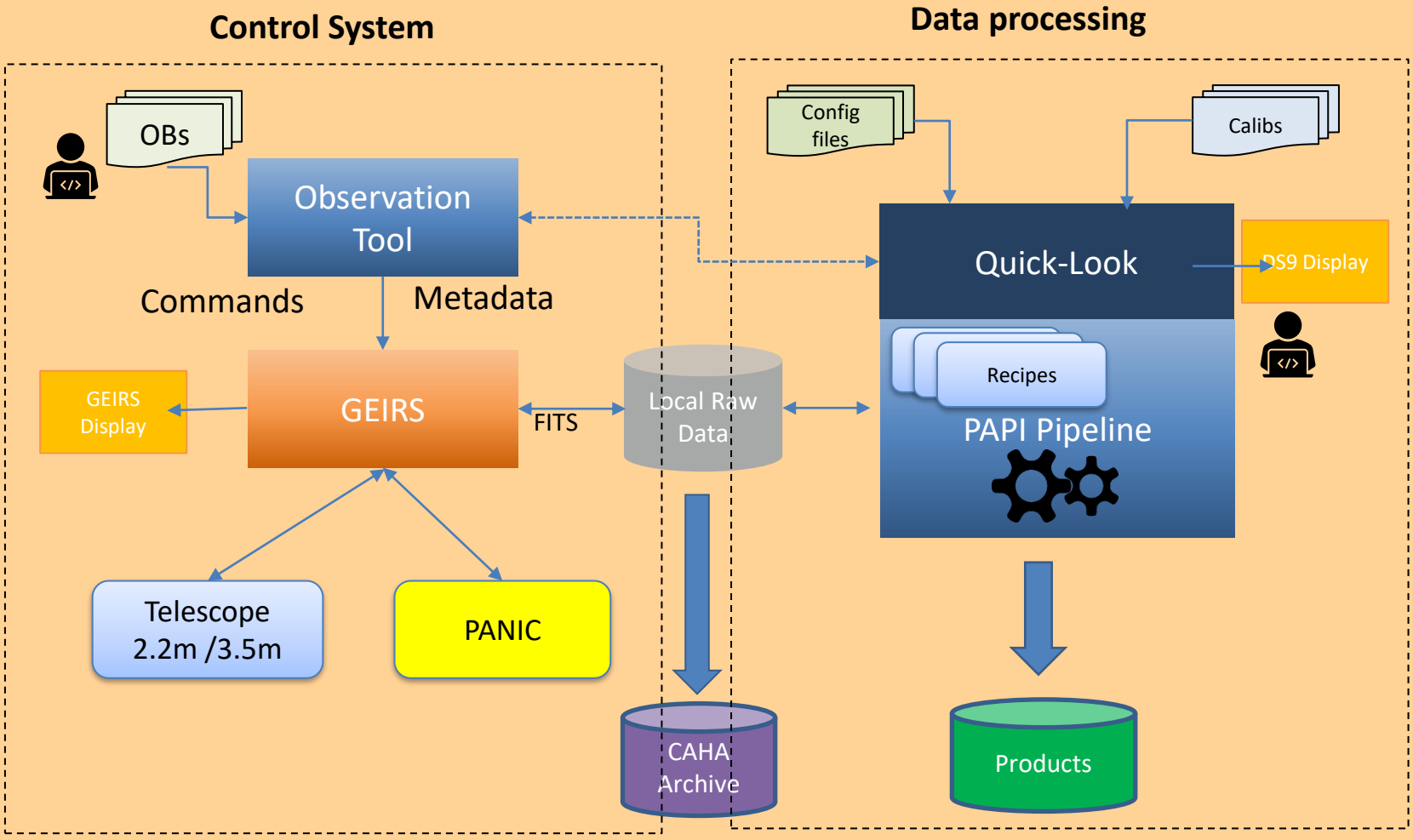
PANIC Data Flow System Architecture overview



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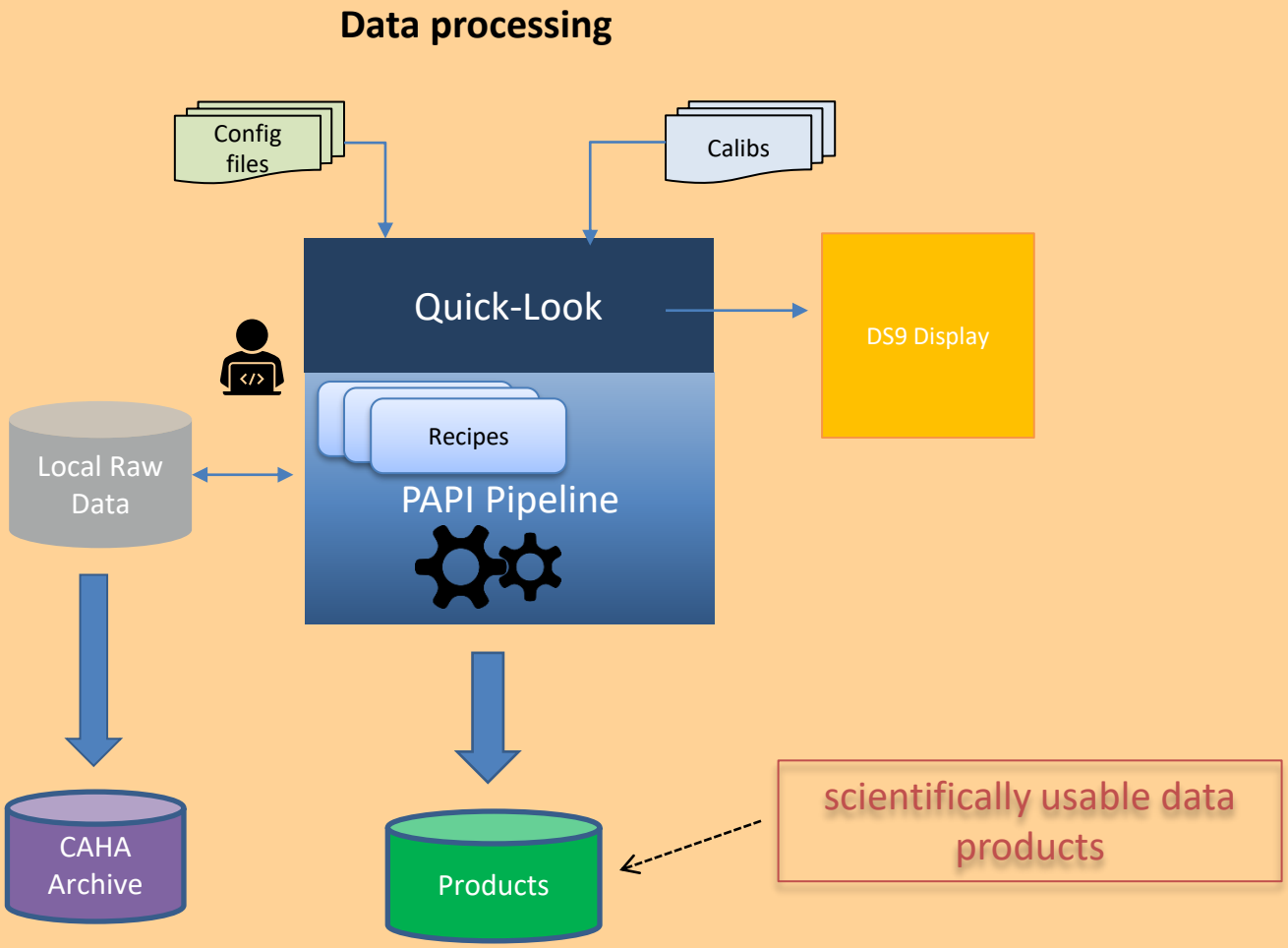
PQL: GUI Component of PAPI



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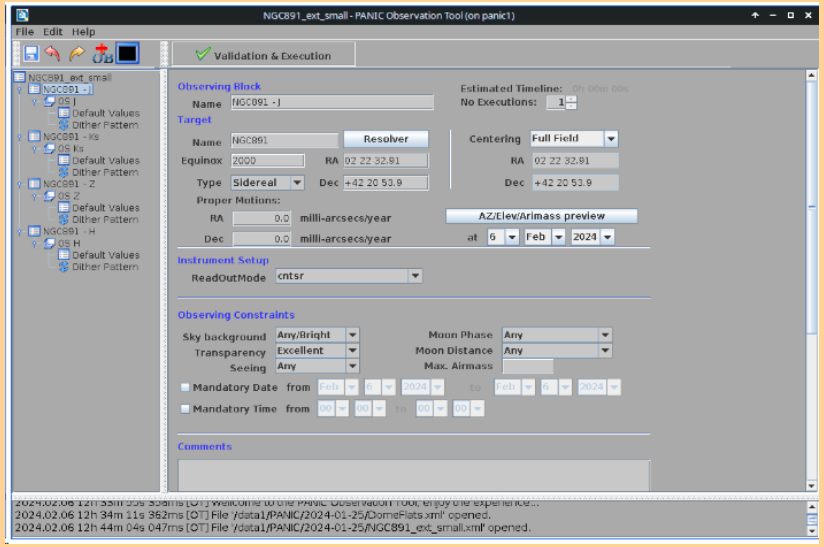
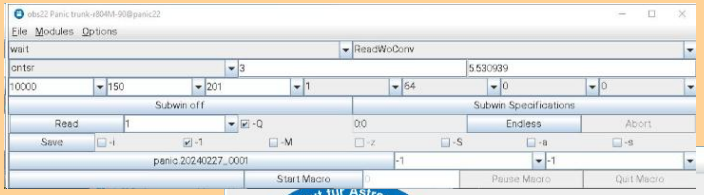
PANIC Data Flow System Architecture overview



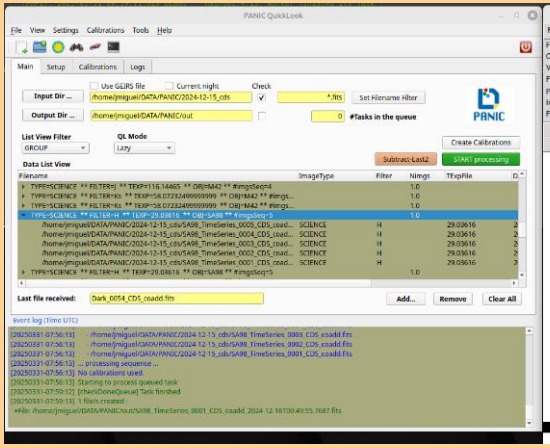
OT

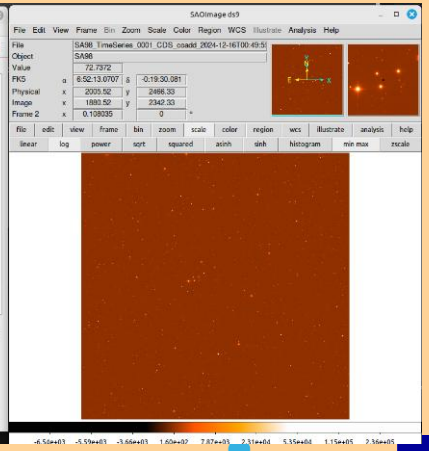
OBs



GEIRS

QL





Raw Data

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PANIC Quick-Look (PQL)

- Why a Quick-Look?
  - Graphical Tool for quick and interactive data processing using PAPI *quick-mode*
  - Verify whether observations are proceeding as expected
  - On-line / off-line
  - Some functions:
    - PANIC Focus determination
    - Data grouping
    - Astrometric calibration
    - Data visualization
    - Quick reduction
    - …

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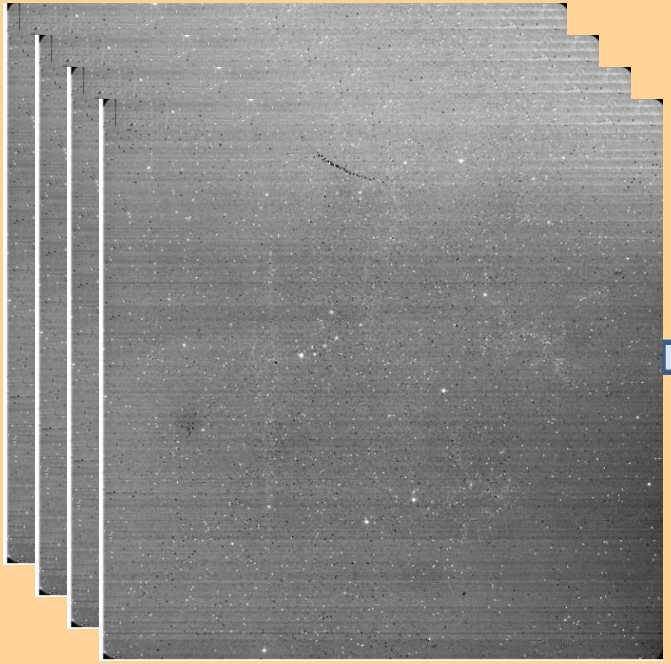
PANIC PAPI/QL Goal

Raw

Processed



Quick Processing

H4RG 15um: 4k x 4k
FOV: 26.3 x 26.3 arcmin
Pix. Scale: 0.37 arcsec/pix

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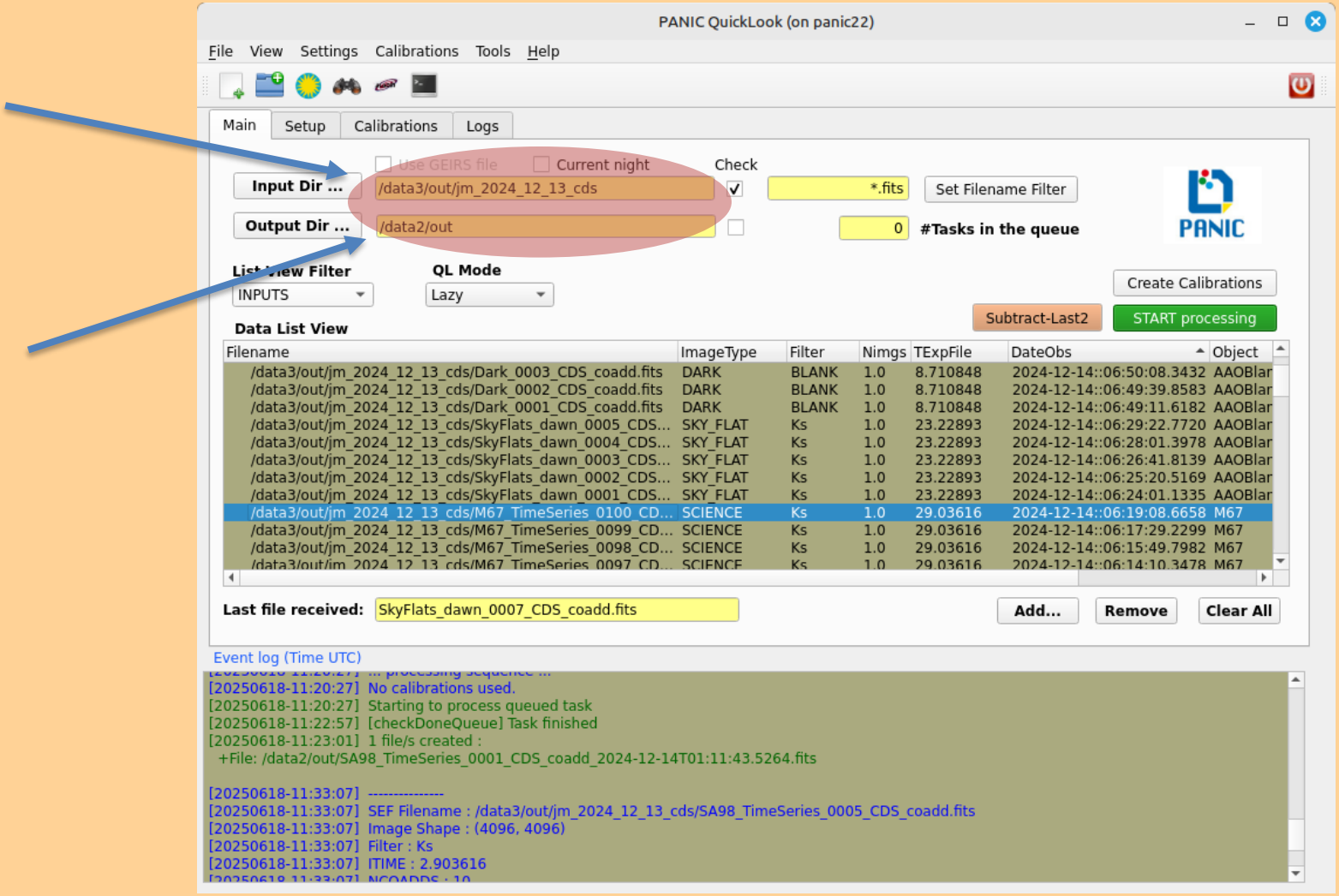
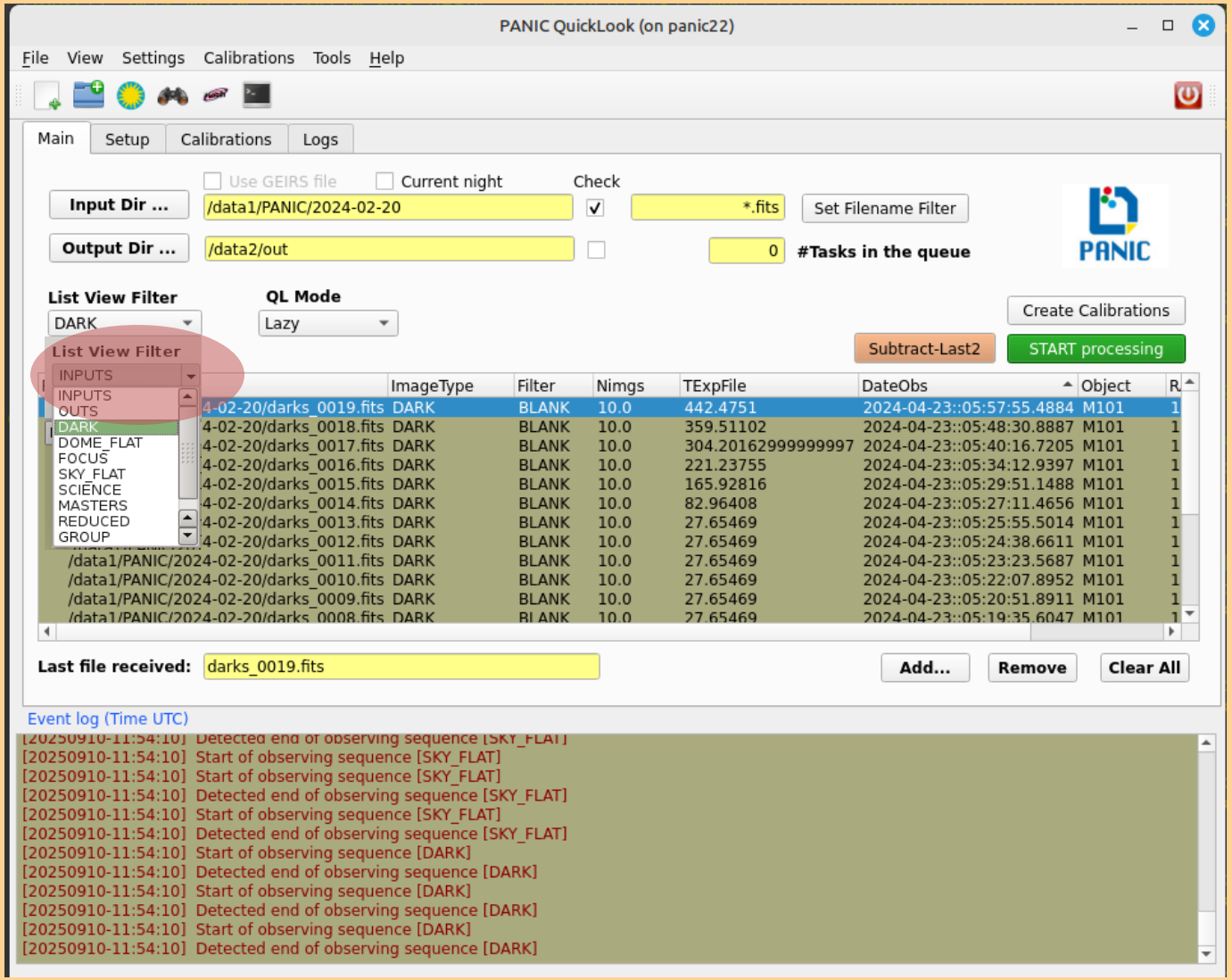
PQL - Main GUI


PANIC QuickLook (on panic22)
File View Settings Calibrations Tools Help
Main Setup Calibrations Logs
Use GEIRS file
Current night
Check
Input Dir ...
/data3/out/jm_2024_12_13_cds
*.fits
Set Filename Filter
Output Dir ...
/data2/out
0
#Tasks in the queue
PANIC
List View Filter
INPUTS
QL Mode
Lazy
Create Calibrations
Subtract-Last2
START processing
Data List View
Filename ImageType Filter Nimgs TExpFile DateObs Object
/data3/out/jm_2024_12_13_cds/Dark_0003_CDS_coadd.fits DARK BLANK 1.0 8.710848 2024-12-14::06:50:08.3432 AAOBlar
/data3/out/jm_2024_12_13_cds/Dark_0002_CDS_coadd.fits DARK BLANK 1.0 8.710848 2024-12-14::06:49:39.8583 AAOBlar
/data3/out/jm_2024_12_13_cds/Dark_0001_CDS_coadd.fits DARK BLANK 1.0 8.710848 2024-12-14::06:49:11.6182 AAOBlar
/data3/out/jm_2024_12_13_cds/SkyFlats_dawn_0005_CDS... SKY_FLAT Ks 1.0 23.22893 2024-12-14::06:29:22.7720 AAOBlar
/data3/out/jm_2024_12_13_cds/SkyFlats_dawn_0004_CDS... SKY_FLAT Ks 1.0 23.22893 2024-12-14::06:28:01.3978 AAOBlar
/data3/out/jm_2024_12_13_cds/SkyFlats_dawn_0003_CDS... SKY_FLAT Ks 1.0 23.22893 2024-12-14::06:26:41.8139 AAOBlar
/data3/out/jm_2024_12_13_cds/SkyFlats_dawn_0002_CDS... SKY_FLAT Ks 1.0 23.22893 2024-12-14::06:25:20.5169 AAOBlar
/data3/out/jm_2024_12_13_cds/SkyFlats_dawn_0001_CDS... SKY_FLAT Ks 1.0 23.22893 2024-12-14::06:24:01.1335 AAOBlar
/data3/out/jm_2024_12_13_cds/M67_TimeSeries_0100_CD... SCIENCE Ks 1.0 29.03616 2024-12-14::06:19:08.6658 M67
/data3/out/jm_2024_12_13_cds/M67_TimeSeries_0099_CD... SCIENCE Ks 1.0 29.03616 2024-12-14::06:17:29.2299 M67
/data3/out/jm_2024_12_13_cds/M67_TimeSeries_0098_CD... SCIENCE Ks 1.0 29.03616 2024-12-14::06:15:49.7982 M67
Last file received: SkyFlats_dawn_0007_CDS_coadd.fits
Add... Remove Clear All
Event log (Time UTC)
[20250618-11:20:27] No calibrations used.
[20250618-11:20:27] Starting to process queued task
[20250618-11:22:57] [checkDoneQueue] Task finished
[20250618-11:23:01] 1 file/s created :
+File: /data2/out/SA98_TimeSeries_0001_CDS_coadd_2024-12-14T01:11:43.5264.fits
[20250618-11:33:07] ----------
[20250618-11:33:07] SEF Filename : /data3/out/jm_2024_12_13_cds/SA98_TimeSeries_0005_CDS_coadd.fits
[20250618-11:33:07] Image Shape : (4096, 4096)
[20250618-11:33:07] Filter : Ks
[20250618-11:33:07] ITIME : 2.903616

PQL - Main GUI



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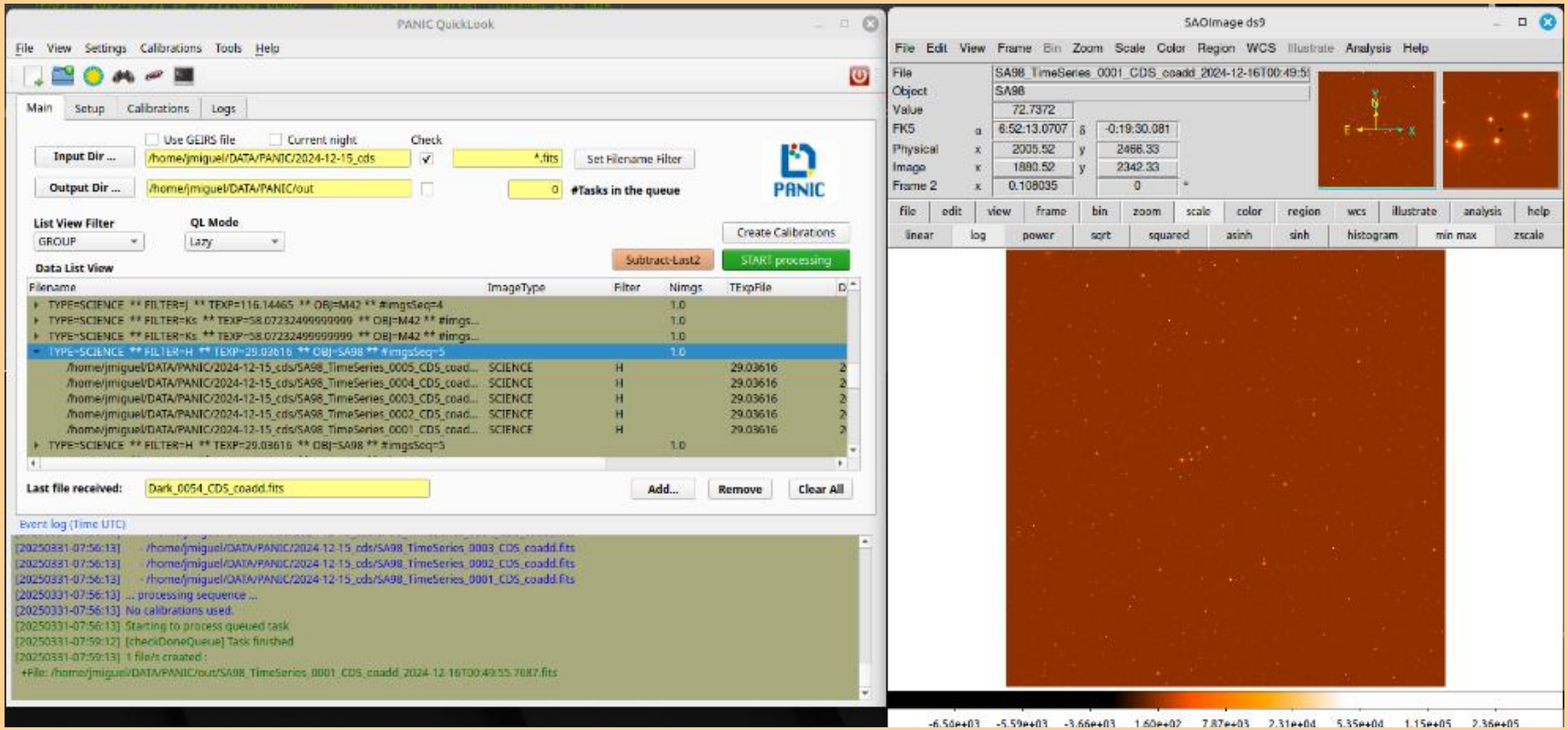
PQL - DS9 Display



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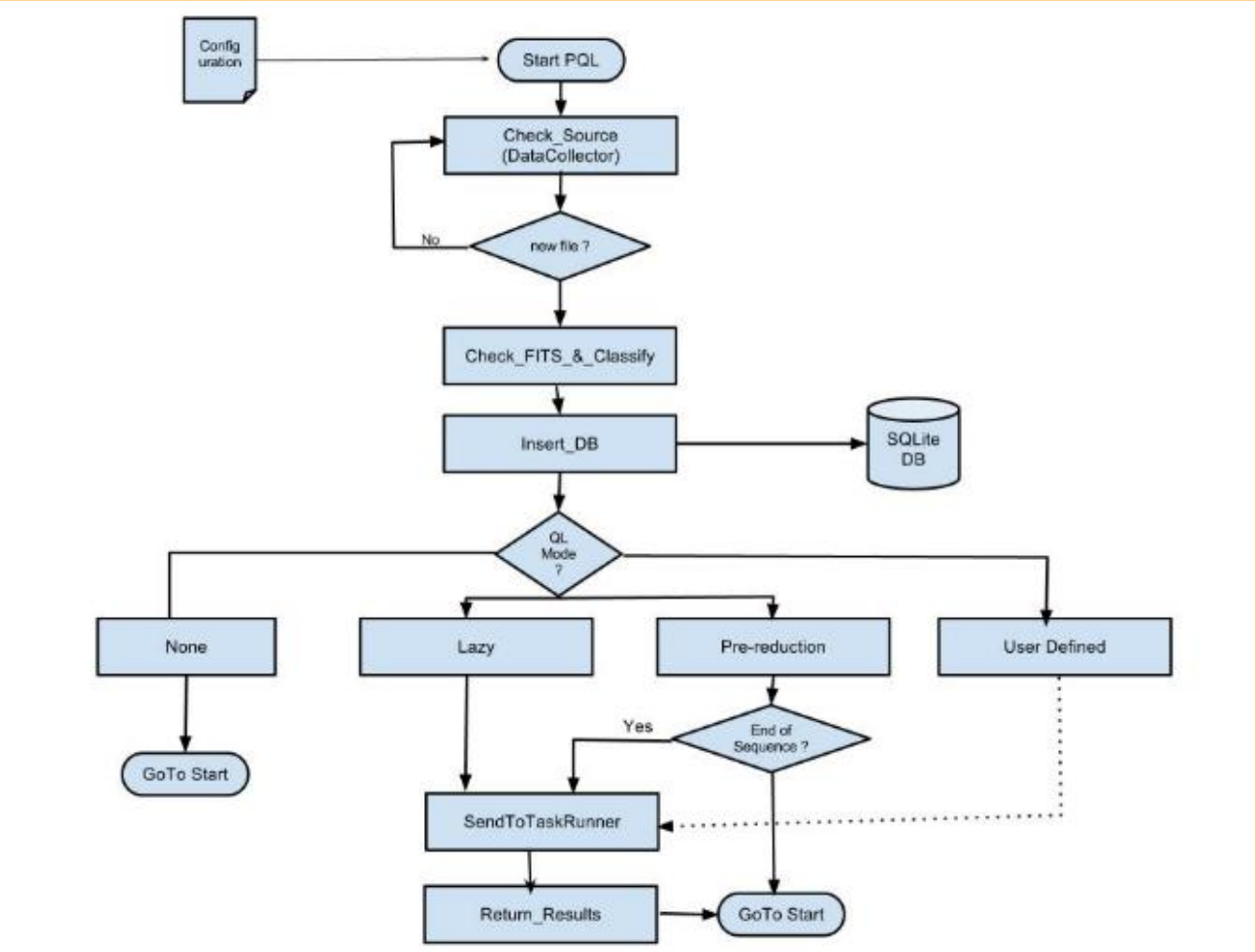
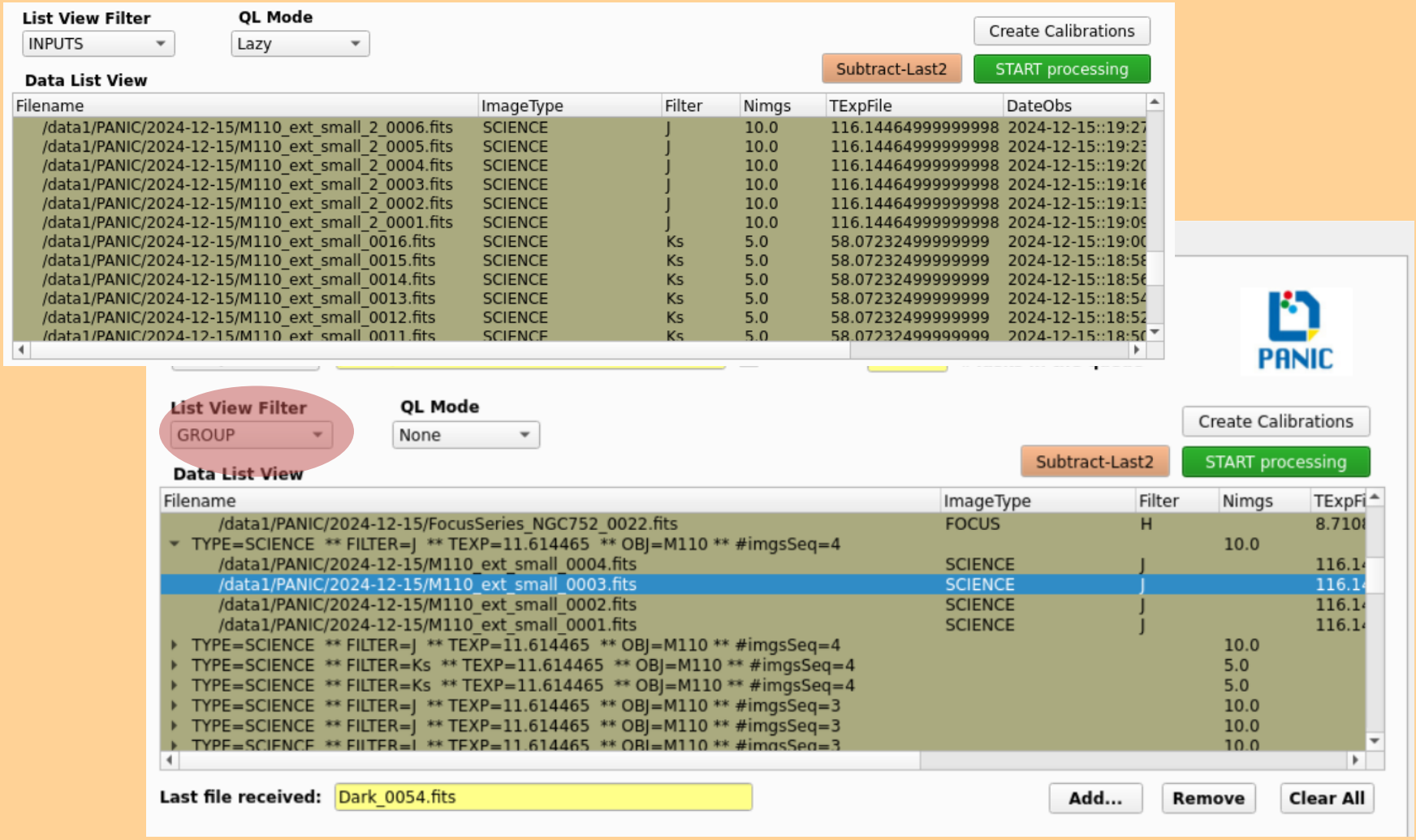
Quick-Look Flow Chart



Data Grouping



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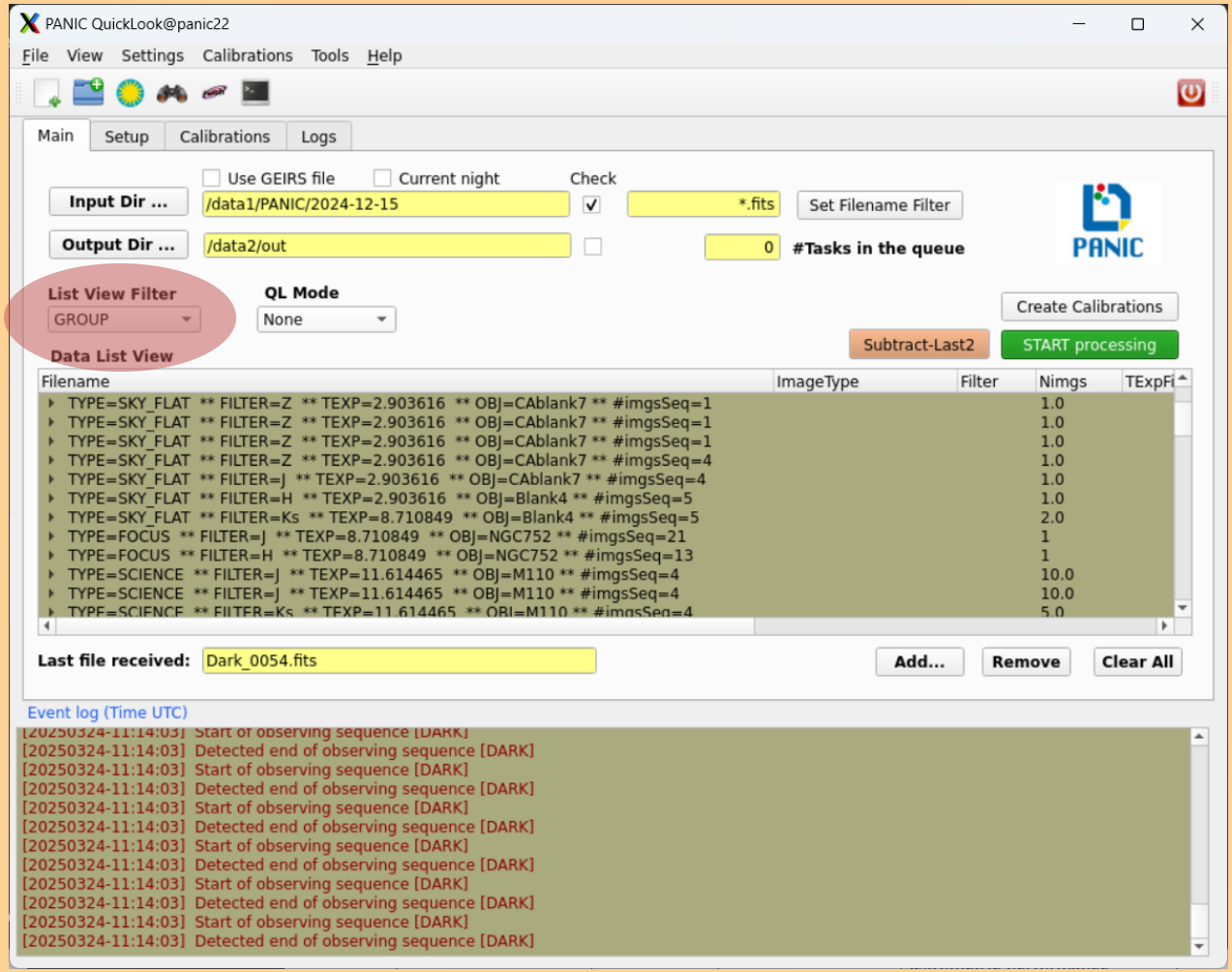
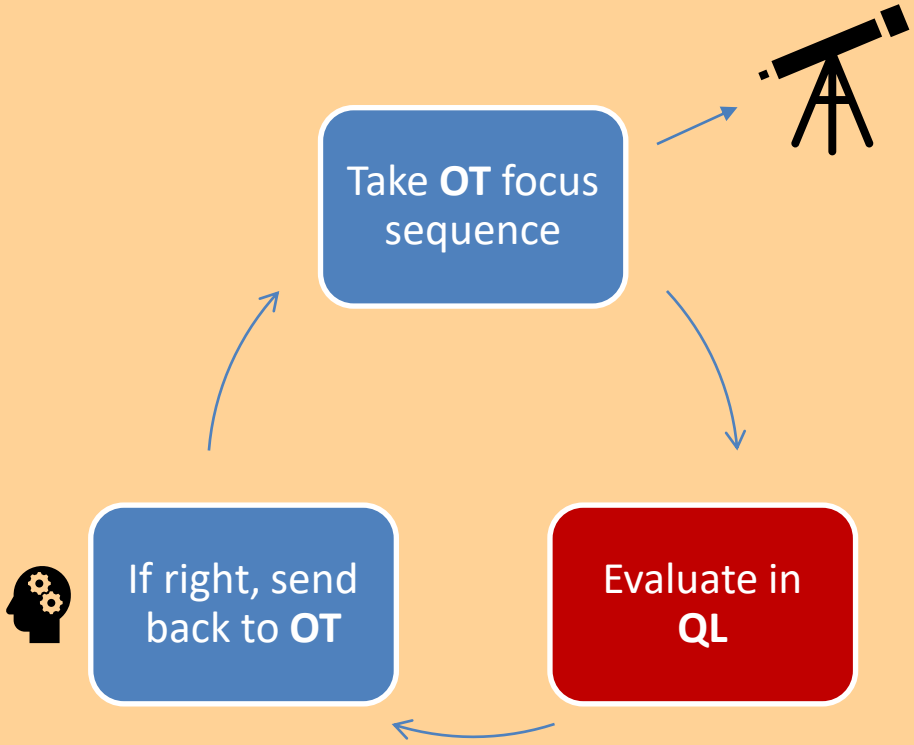
Data Grouping



CAHA15-CE-3902 por valor de 1.1M€

Instrument focusing: PQL Focus Evaluation

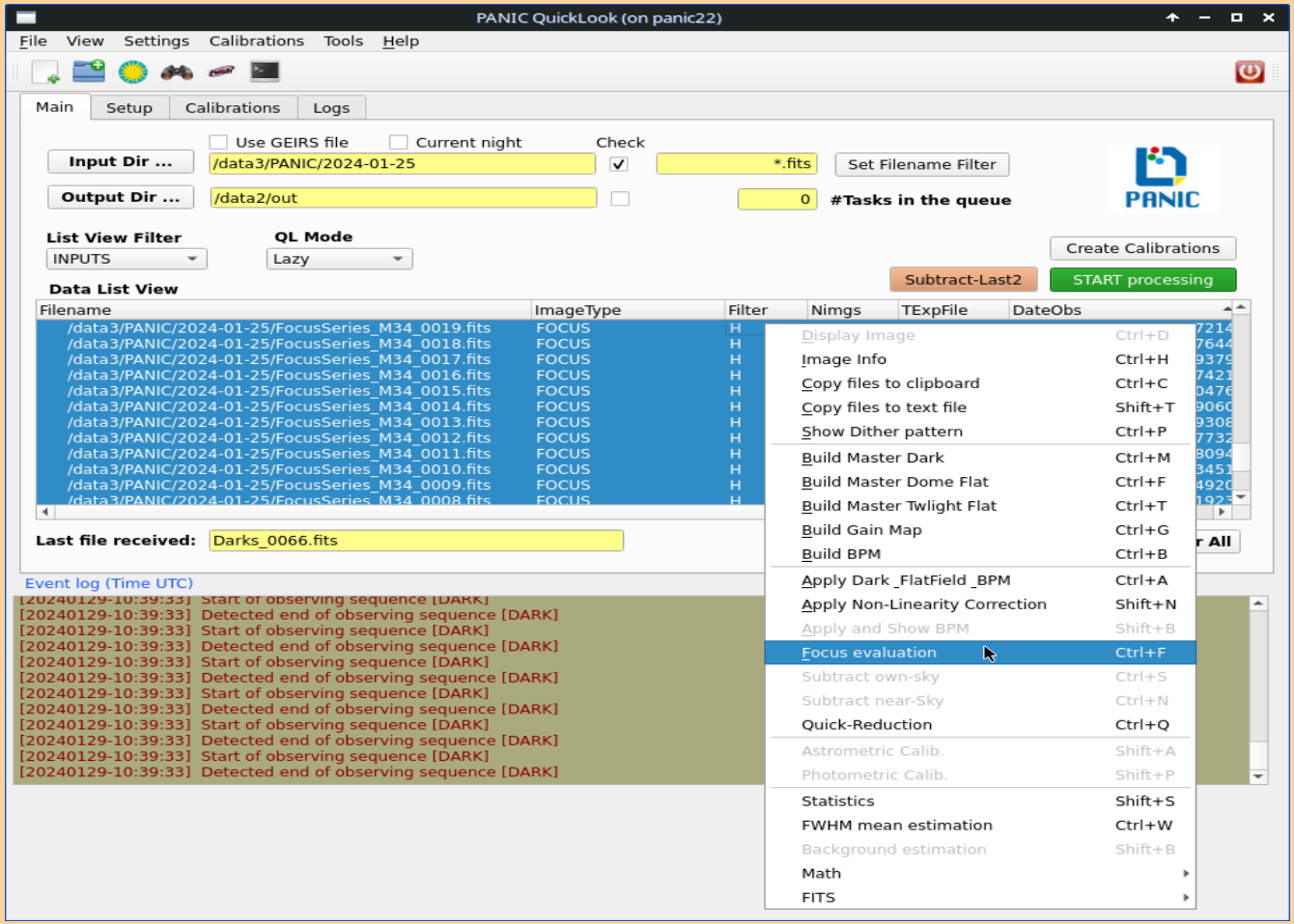
- Telescope focusing



CAHA15-CE-3902 por valor de 1.1M€

Instrument focusing: PQL Focus Evaluation

➢ Telescope focusing



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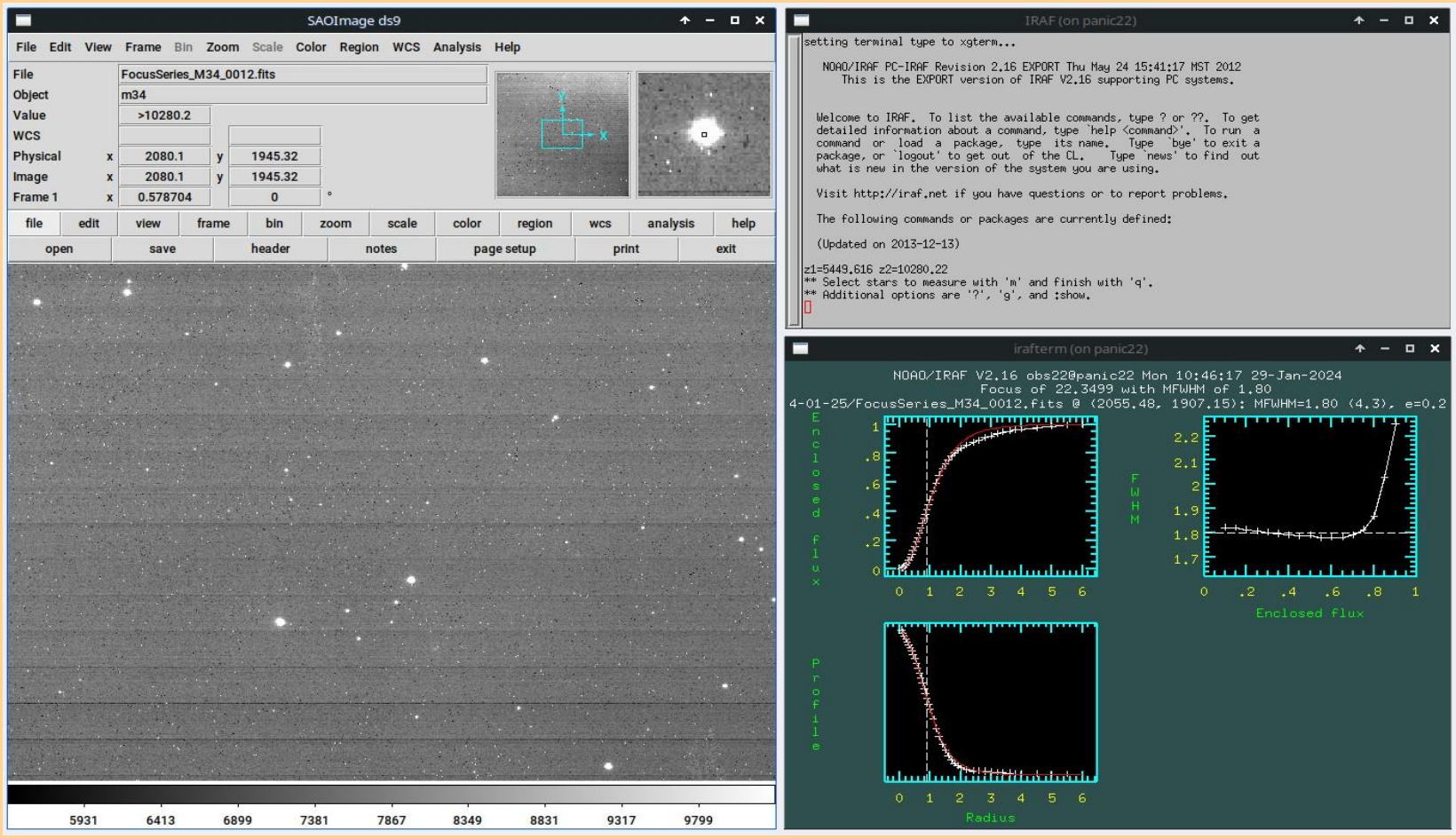
Focus_evaluation: focus star selection



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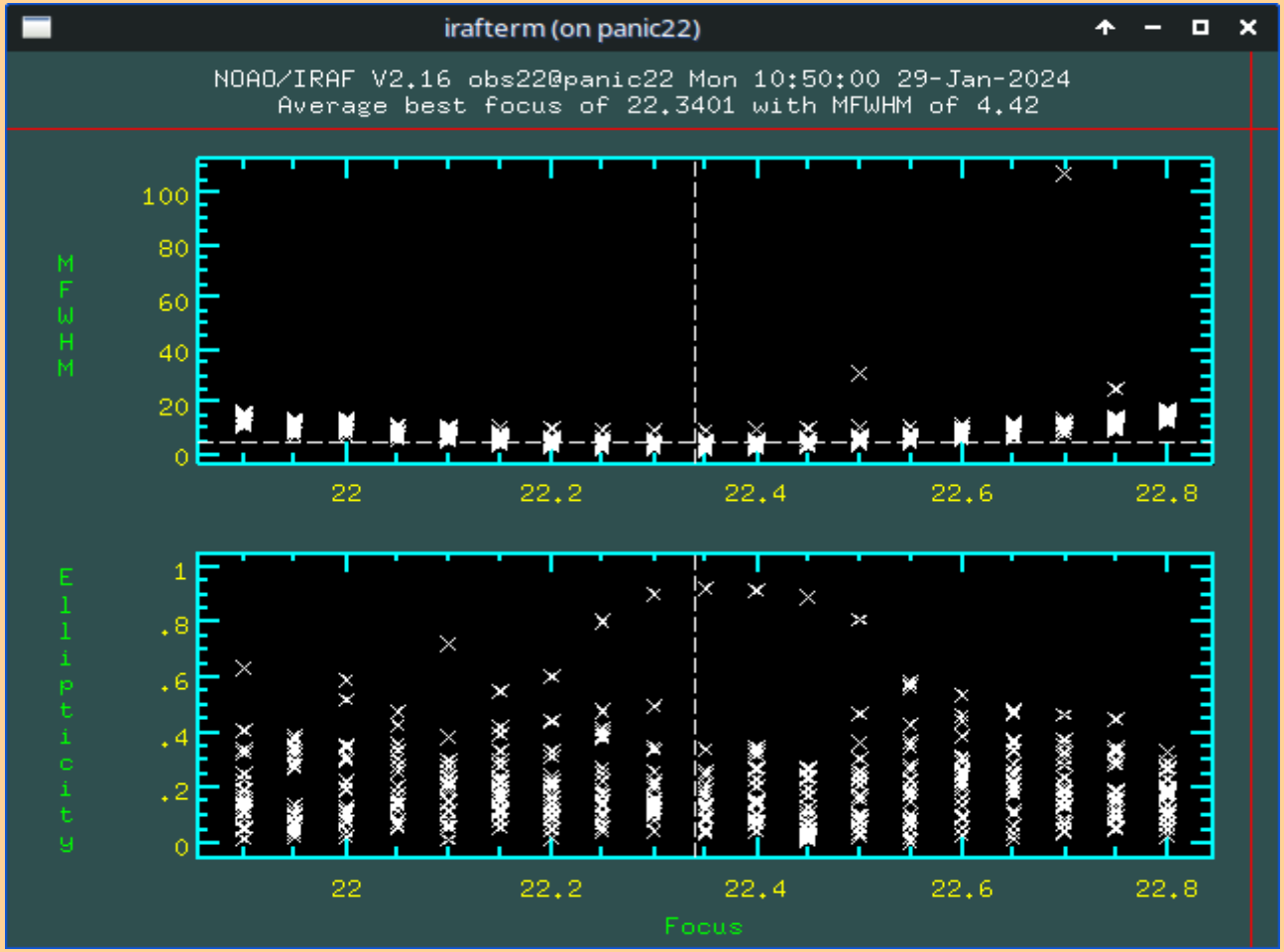
Focus Evaluation: cleaning focus set of measurements



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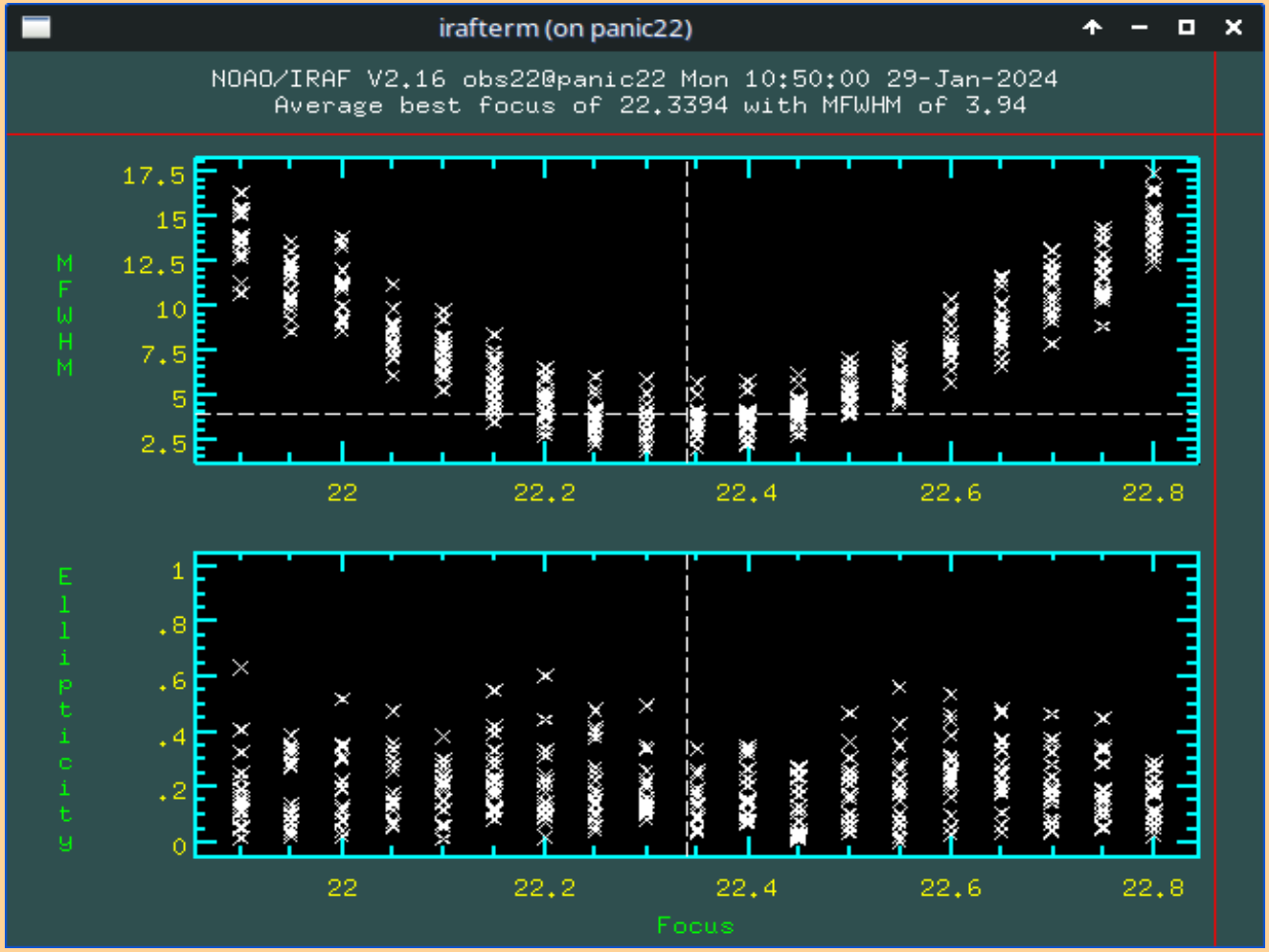
Focus Evaluation: final focus set of measurements



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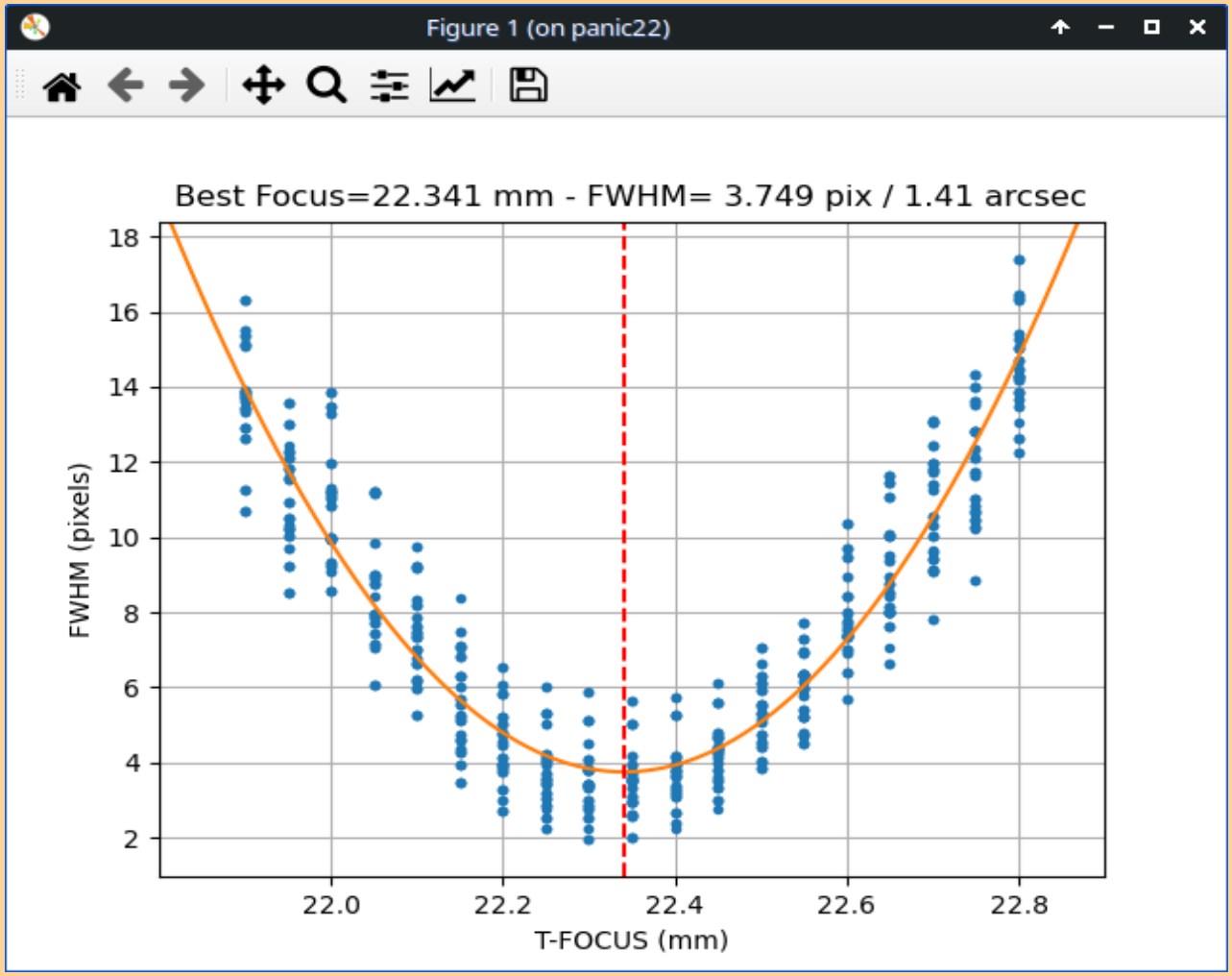
Focus Evaluation: focus fitted parable



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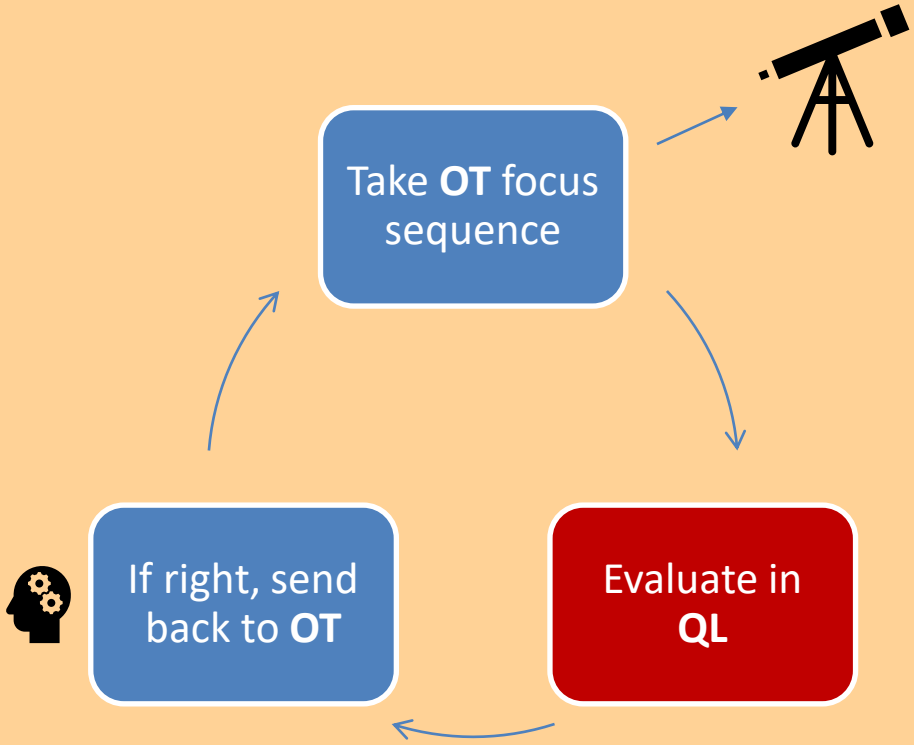
Instrument focusing: PQL Focus Evaluation

- Telescope focusing



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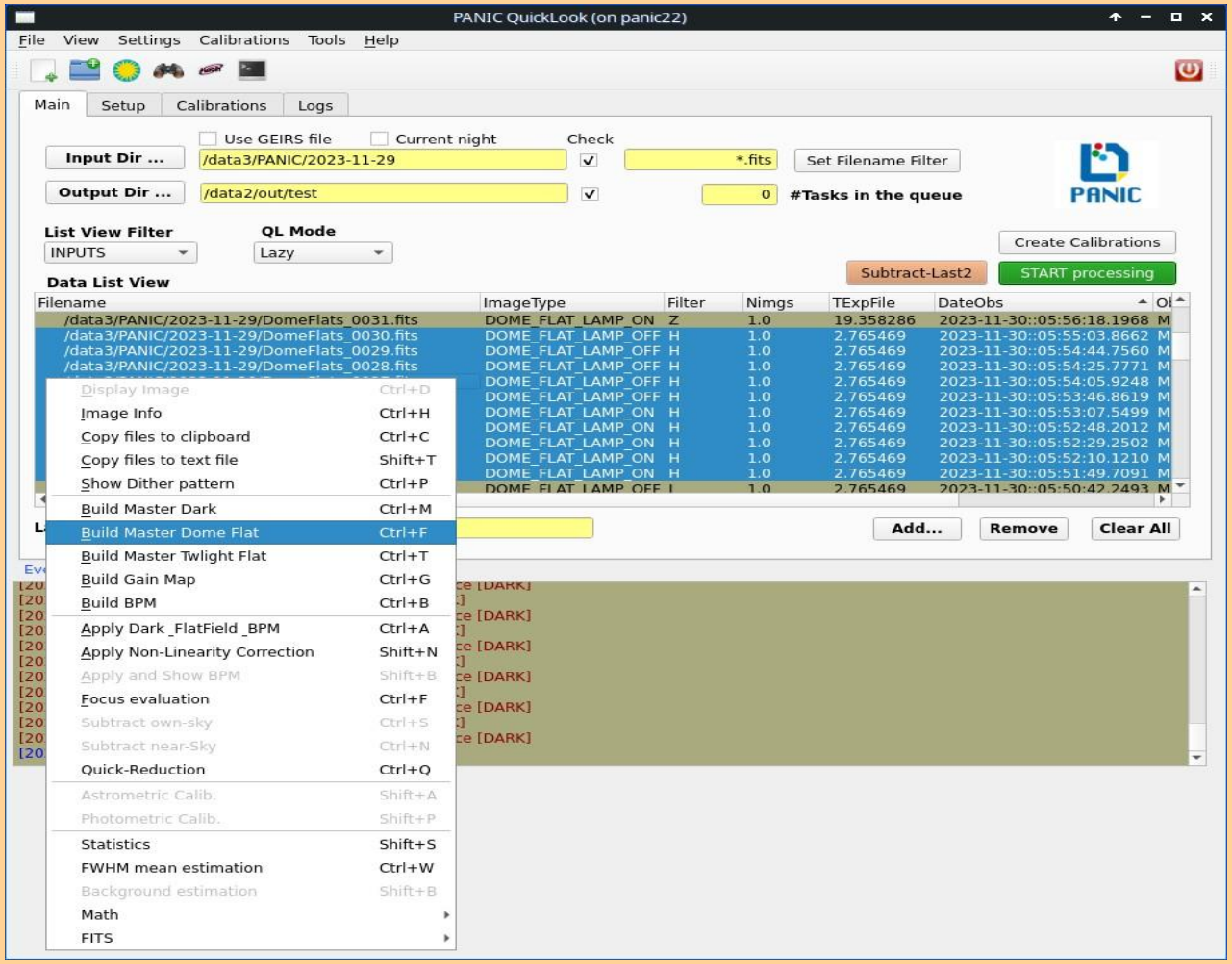
PQL: Build Master calibrations



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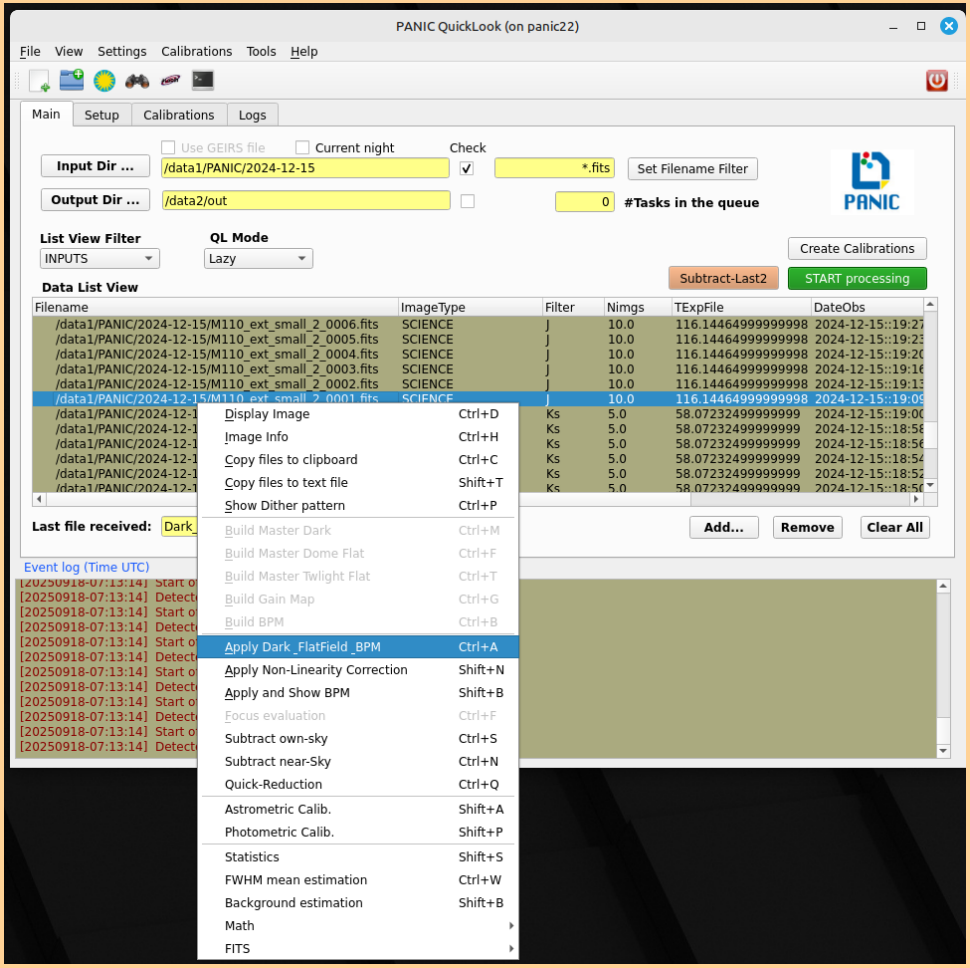
PQL: Apply Master calibrations



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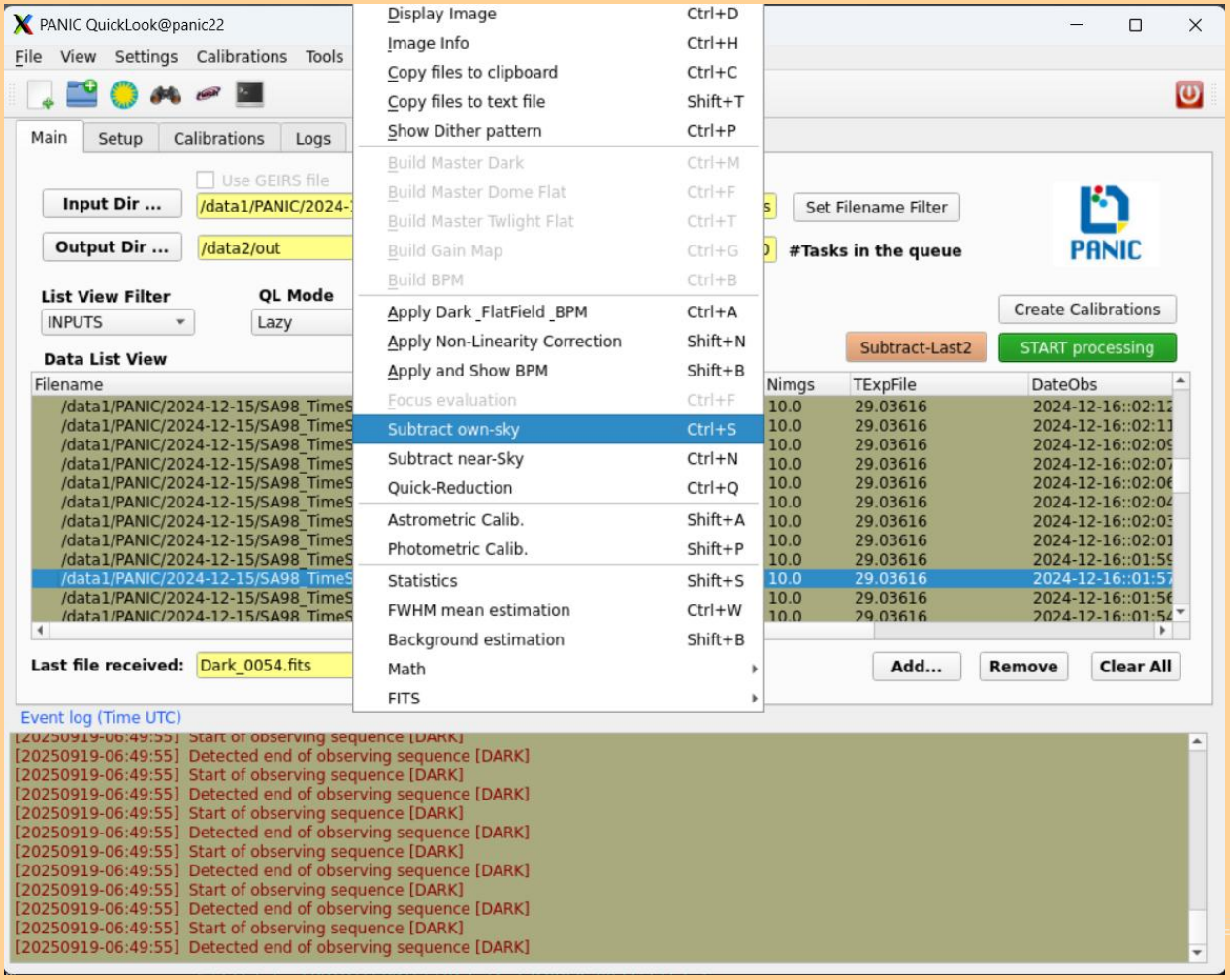
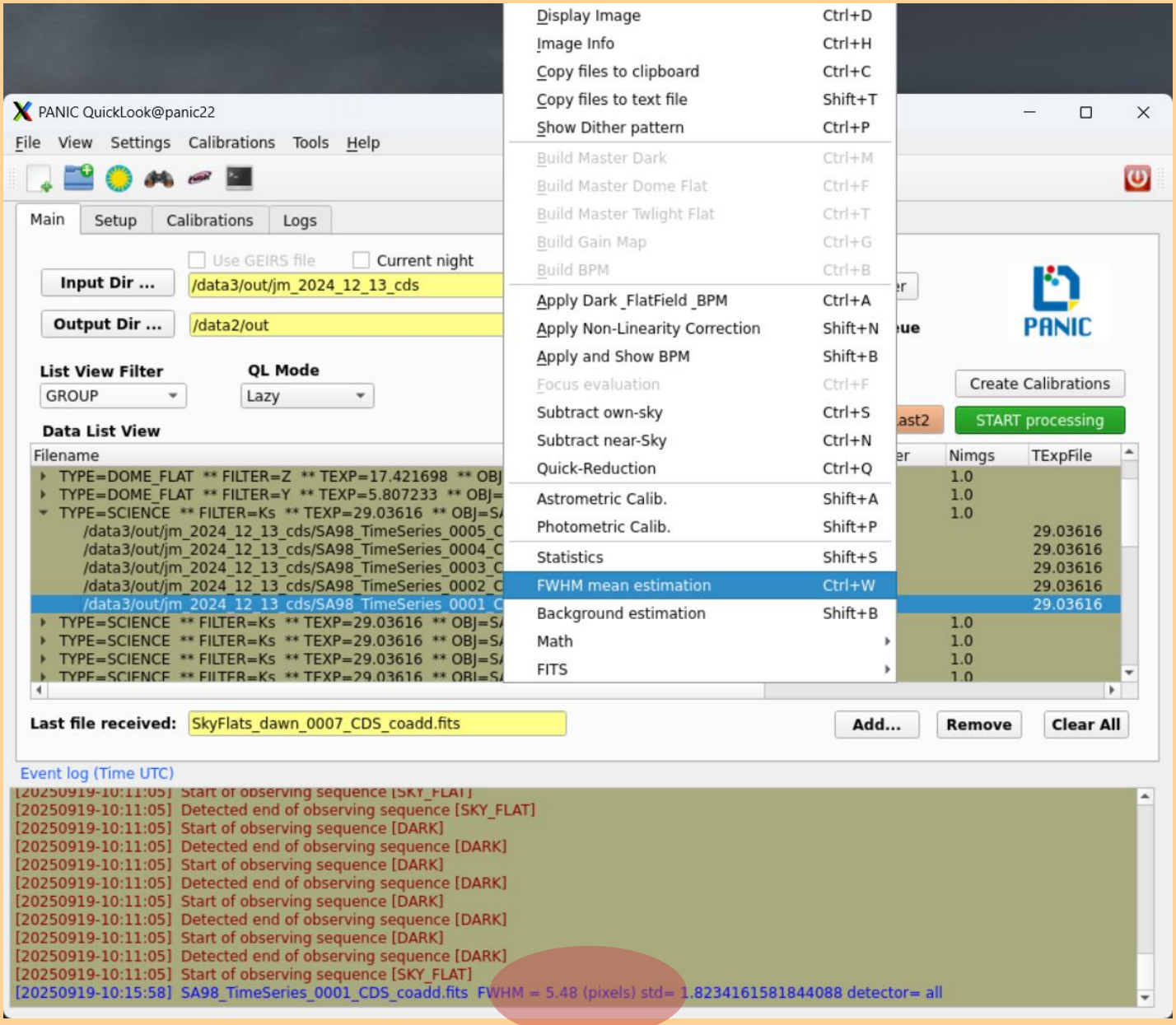
Sky-Subtraction

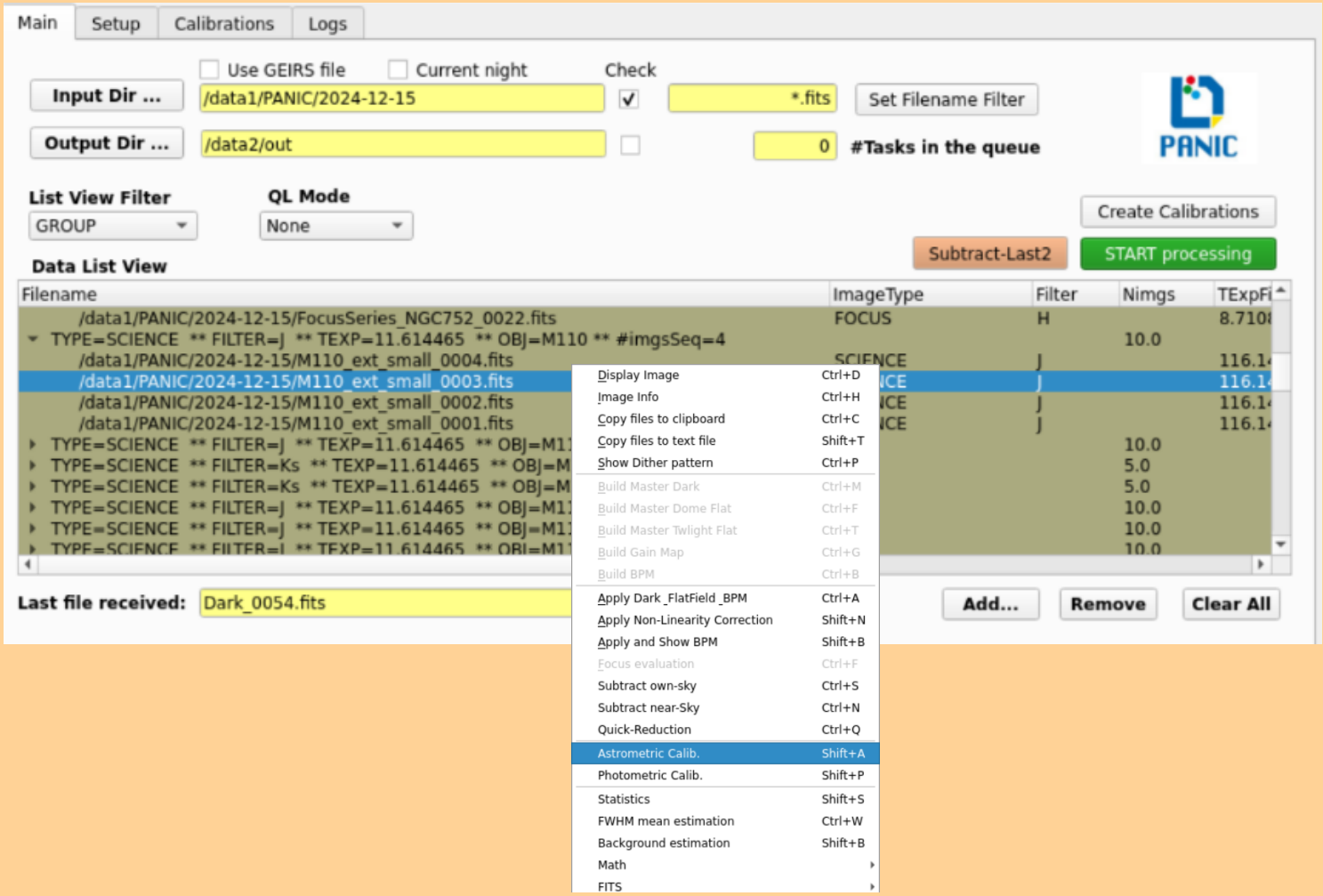
- With the QL, it is possible to subtract the own-sky or near-sky by right-clicking and selecting the respective option. If the target is an extended object and you have SCIENCE and SKY files for it, you can subtract the sky by selecting both images, right-clicking, and then selecting ‘Math’ and ‘Subtract Images’.



QL: FWHM estimation



PQL: Astrometric Calibration



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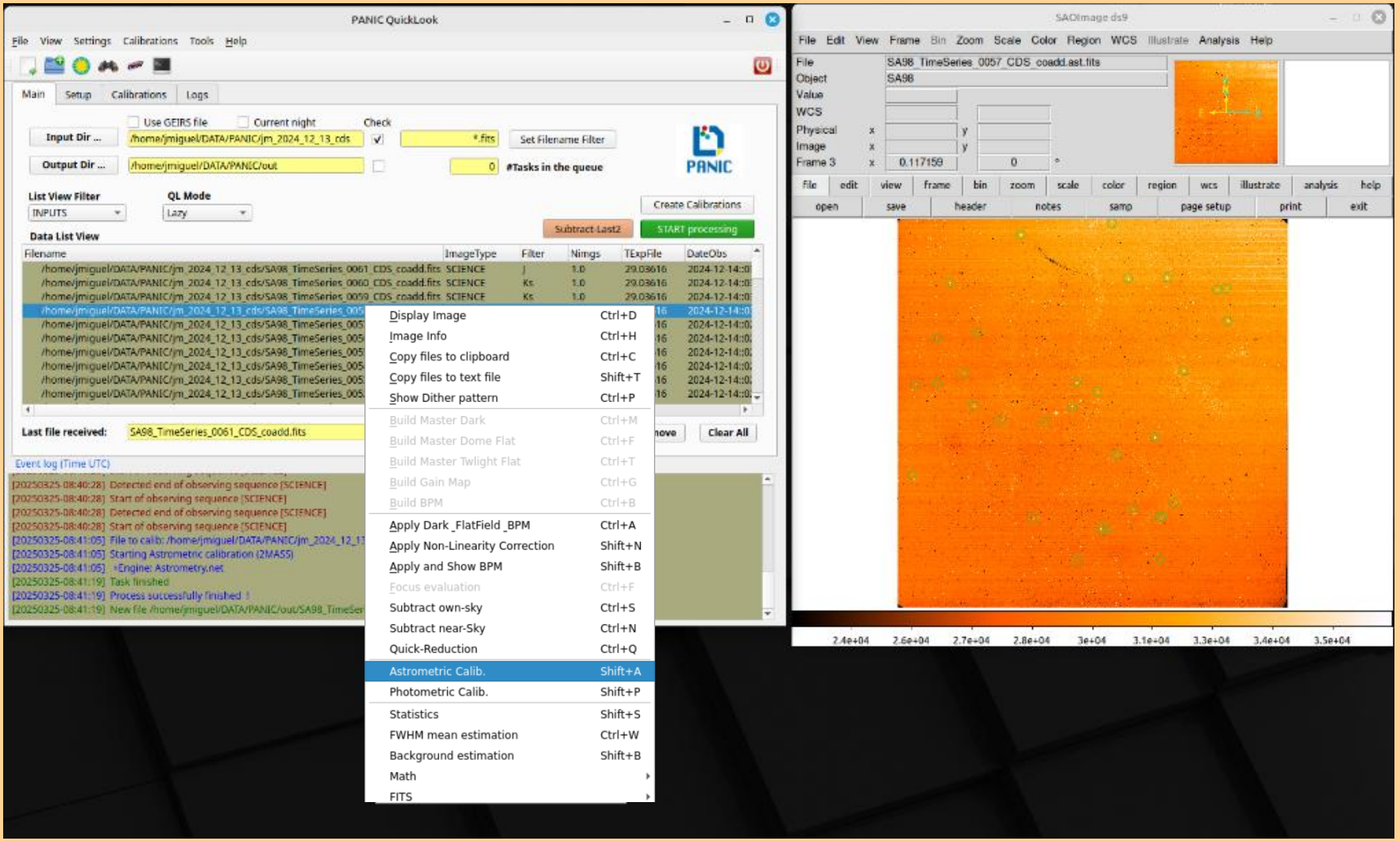
PQL: Astrometric Calibration

- Using Astrometry.net + GAIA-DR3



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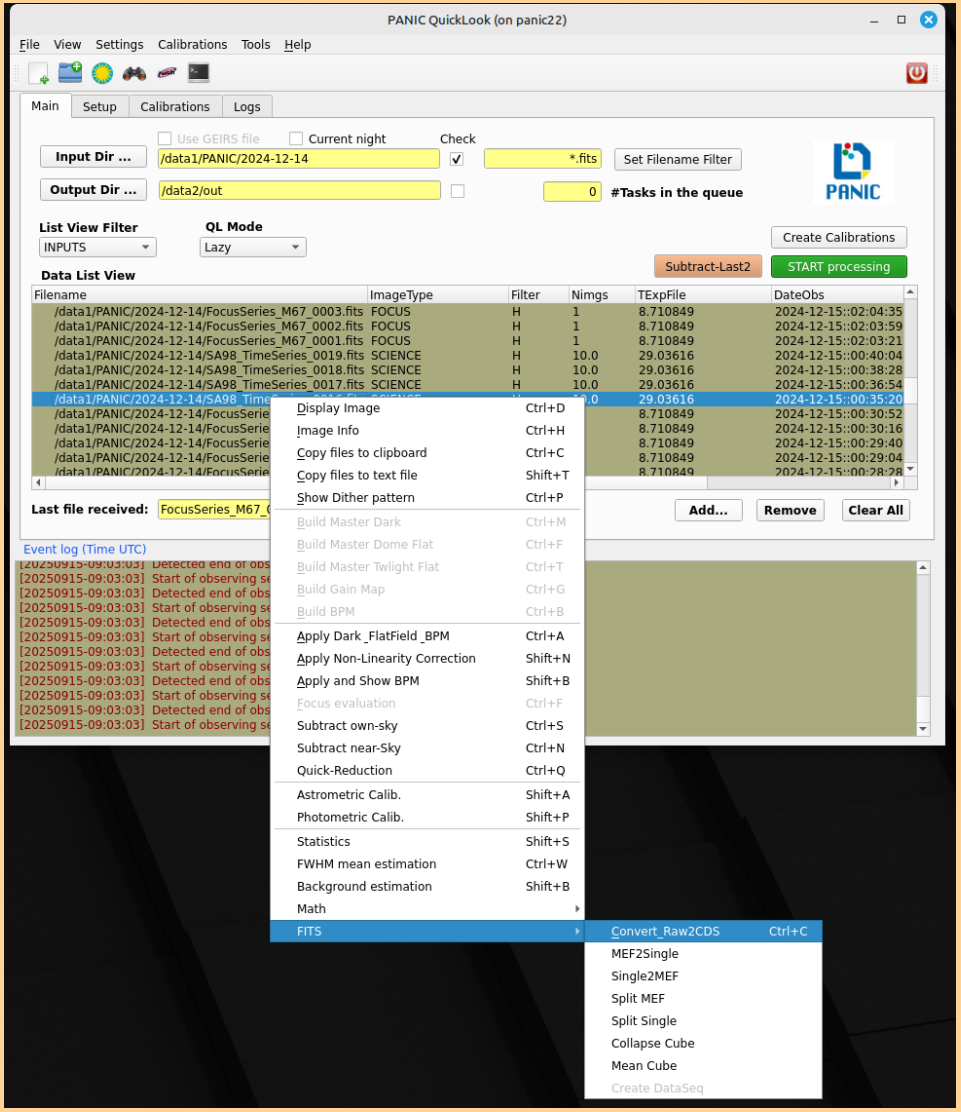
PQL: FITS Handling



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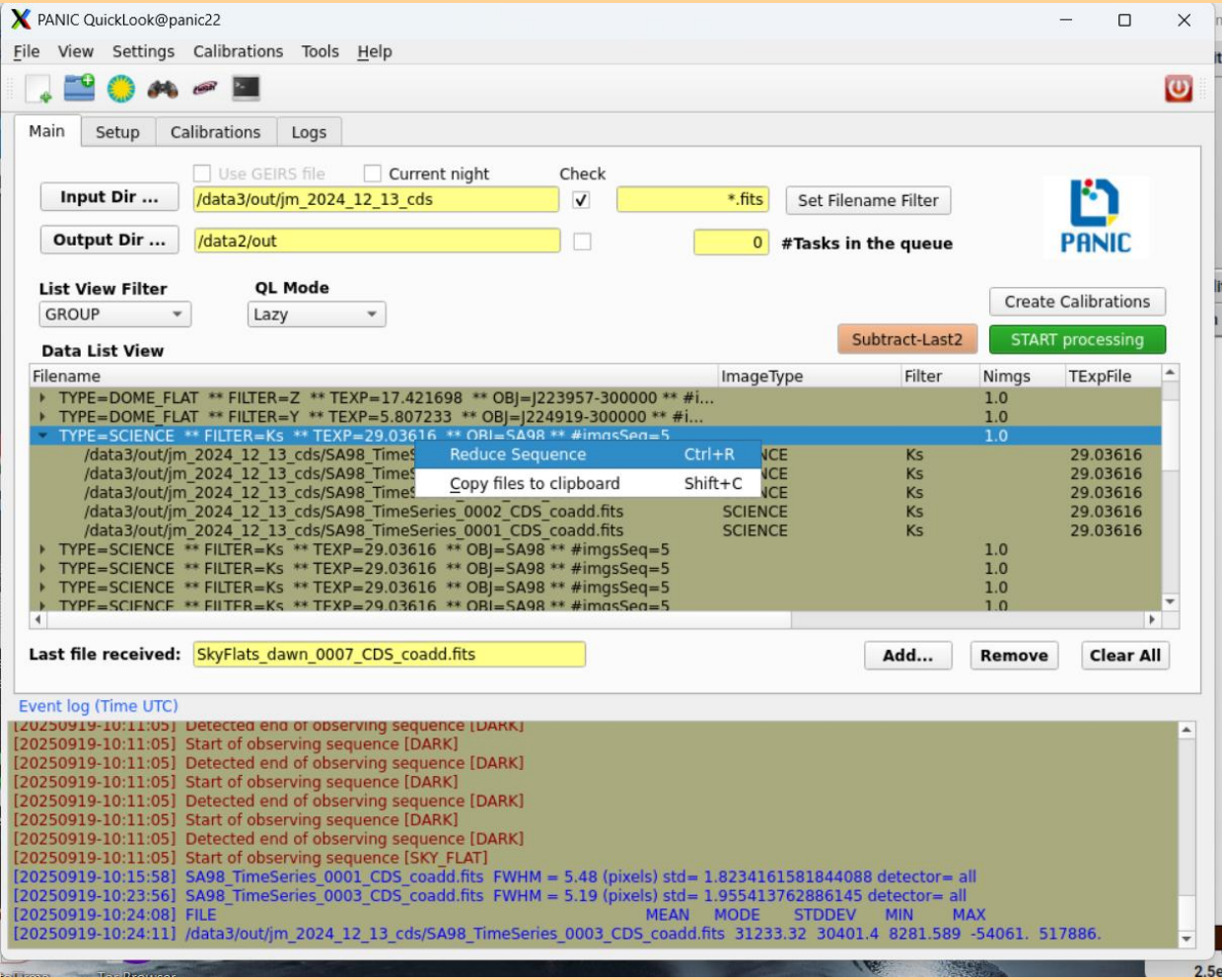
QL: Quick-Reduction



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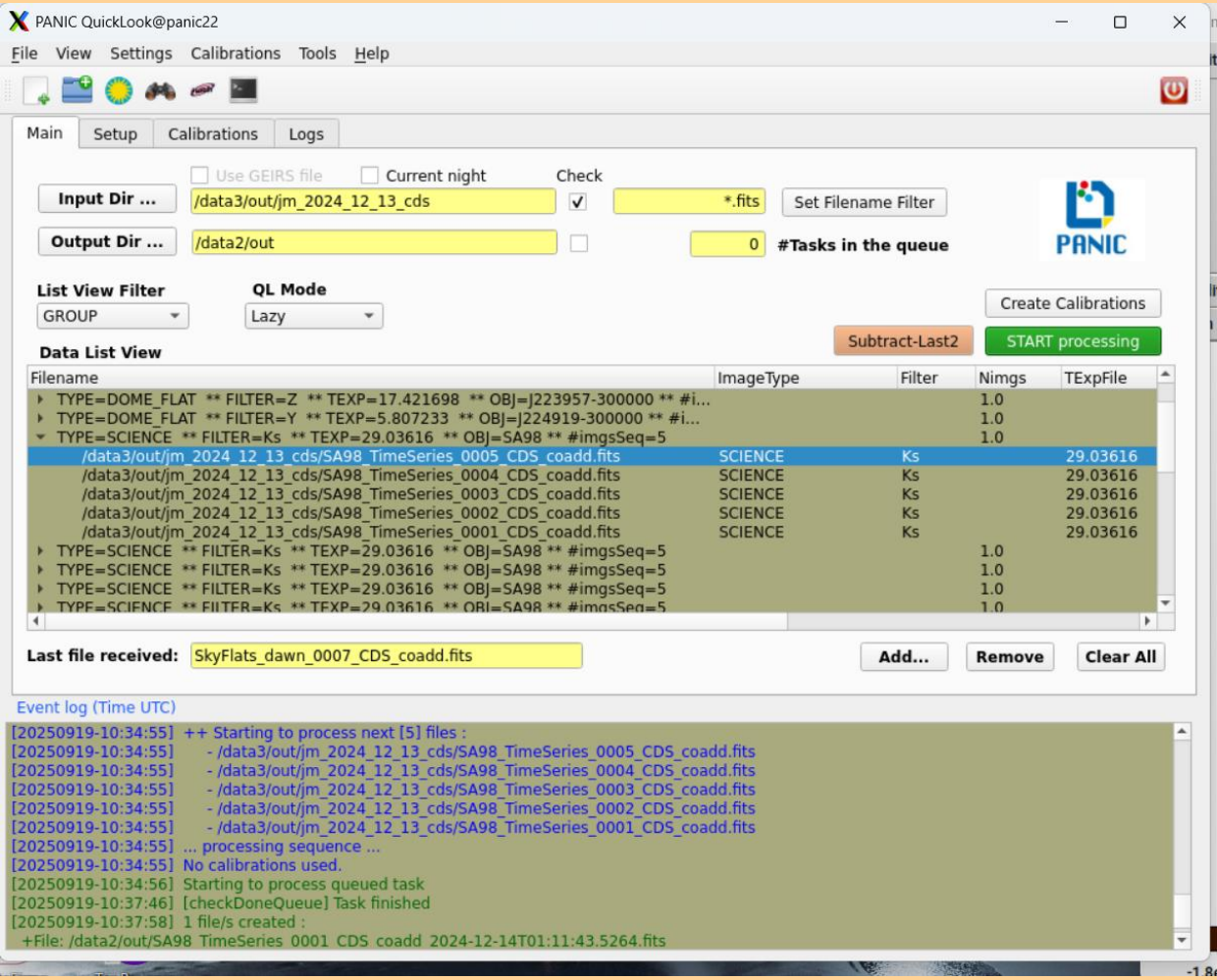
QL: Quick-Reduction(2)



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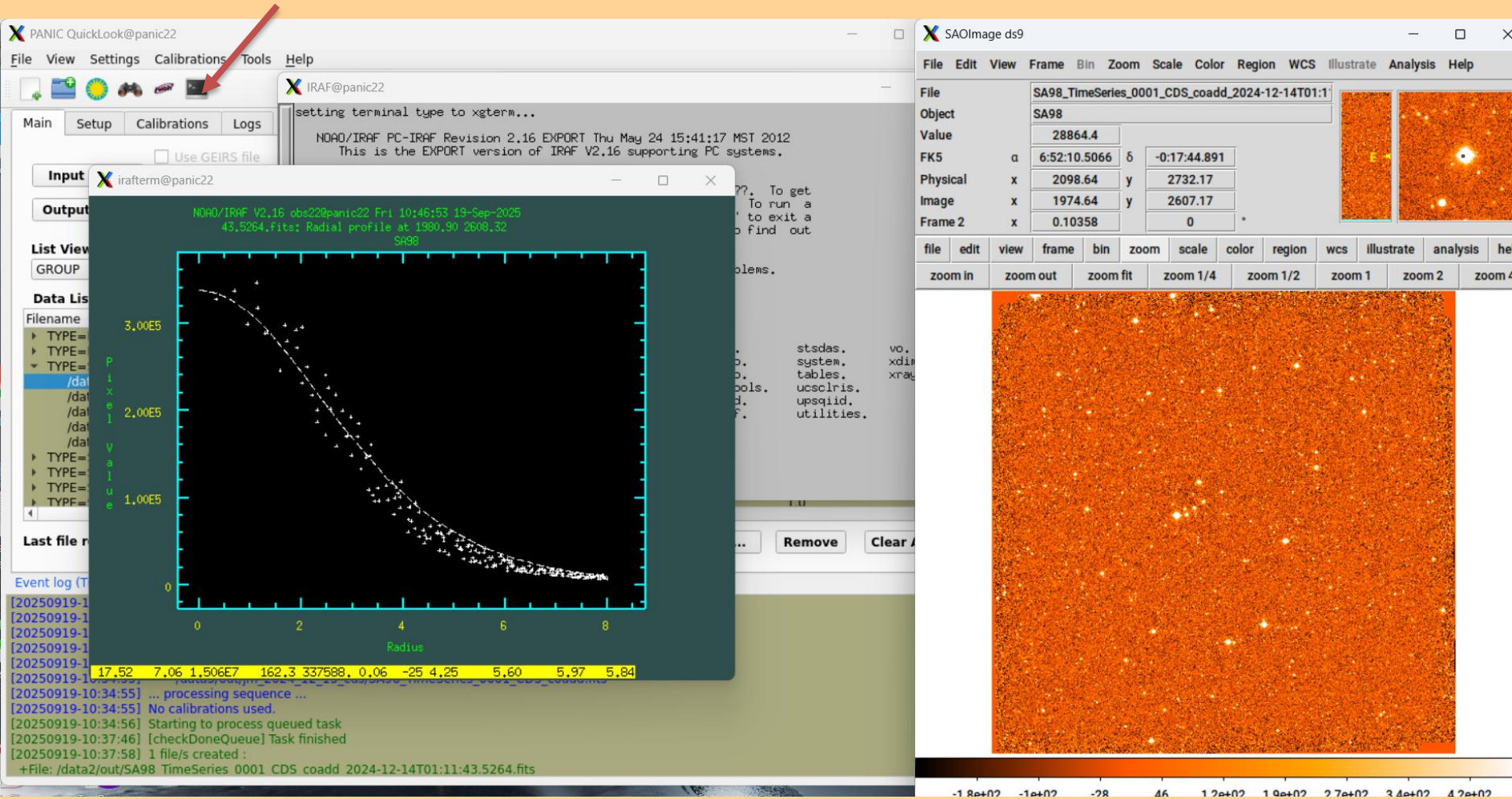
QL: IRAF console



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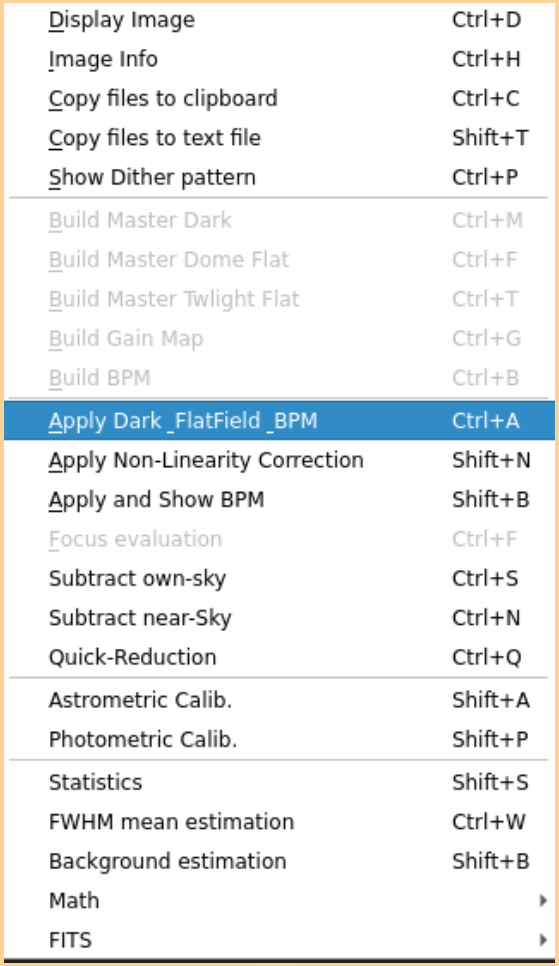
PQL: Other functions



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PANIC
Pipeline (PAPI)

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PANIC Pipeline

- Why a Data Reduction Pipeline?
  - Instrument Requirement !
  - Data volume (40-50 GB/night)
  - Complex detector characteristics (non-linearity, cross-talk)
  - Sky subtraction & Dither patterns
  - Automate reduction, improve data quality, enable quick-look (**on-line**) and science-ready outputs (**off-line**)
  - **Commissioning** support !

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PANIC Pipeline Goal

User needs → Scientific Validation

↓ (In Progress !)

Requirements → Technical Verification

↓

Produce **scientifically** usable data products

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Data Handling

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PANIC data production rate, storage and retrieval

- The **PANIC** features a **4k × 4k detector**, generating astronomical data in **FITS format**. Data acquisition operates in two main saving modes:

- **Integrated Mode** (Integrated All in the OT): Produces a single **32-bit coadded image** per exposure (**BITPIX = 32**) → **64 MB per file**

- **Cube Mode** (FITS Cube in the OT): Captures a sequence of **N non-integrated images**, stored as a **FITS cube**, with each slice representing a **32-bit image → N x 64 MB per file**

- Raw mode (Single Frame Cube): **all the frames of CNTSR (large data files!)** → *convRaw2CDS.py*

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PANIC data production rate, storage and retrieval

- Data is initially stored on the **PANIC computer's local storage**, where it remains for at least **one month** for local processing and archiving. Additionally, at the end of each observing night, all data is transferred to the **global CAHA archive system** for long-term storage. Observers can later retrieve their data using the **secure file transfer protocol (SFTP)** over the observatory's **high-speed network infrastructure** for transfer to their local systems.

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PAPI constraints

- FITS metadata → OT Keywords
- Readout Mode → CNTSR
- Save Mode →
    - Integrated (**preferred**), mandatory for Focusing Evaluation
    - Cube Mode
    - Raw Mode

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OT Keywords

For general purpose, such as viewing and simple analysis, only minimal headers keywords are required. However, and in order to group and reduce observing sequences, the following header keywords are also required:

```
OBS_TOOL= 'OT_V1.1 '           / PANIC Observing Tool Software version
PROG_ID = '        '           / PANIC Observing Program ID
OB_ID   = '6       '           / PANIC Observing Block ID
OB_NAME = 'OB CU Cnc Ks 2'     / PANIC Observing Block Name
OB_PAT  = '5-point '           / PANIC Observing Block Pattern Type
PAT_NAME= 'OS Ks 2 '           / PANIC Observing Secuence Pattern Name
PAT_EXPN=                    1 / PANIC Pattern exposition number
PAT_NEXP=                    5 / PANIC Pattern total number of expositions
IMAGETYP= 'SCIENCE '           / PANIC Image type
```

These keywords are automatically added to the FITS header by the PANIC Observation Tool, as each file is created. If these are not saved, PQL will not work correctly.

Other important Keywords

EXPTIME = NEXP * ITIME

```
SAVEMODE= 'continuous.sampling.read '  / save cycle-type
NEXP    =                   10   / cycle repeat count
CPAR1   =                    2   / cycle type parameter
ITIME   =             2.903616   / [s] scheduled integration time
CTIME   =             5.807233   / [s] read-mode cycle time
EMSAMP  =                    1   / [ct] electronic multi-sampling
NCOADDS =                   10   / [ct] coadds (total)
EXPTIME =            29.03616   / [s] total integ. time
FRAMENUM=                    1   / contains 1 .. 20
```

EXPTIME = (NEXP * ITIME) * N_DitherPos

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Other important Keywords (2)

Saved as a cube:

```
SAVEMODE= 'single.frame.read'  / save cycle-type
NEXP    =                   10 / cycle repeat count
CPAR1   =                    2 / cycle type parameter
ITIME   =             2.903616 / [s] scheduled integration time
CTIME   =             5.807233 / [s] read-mode cycle time
EMSAMP  =                    1 / [ct] electronic multi-sampling
NCOADDS =                    1 / [ct] coadds (total)
EXPTIME =             2.903616 / [s] total integ. time
FRAMENUM=                    1 / contains 1 .. 20
```

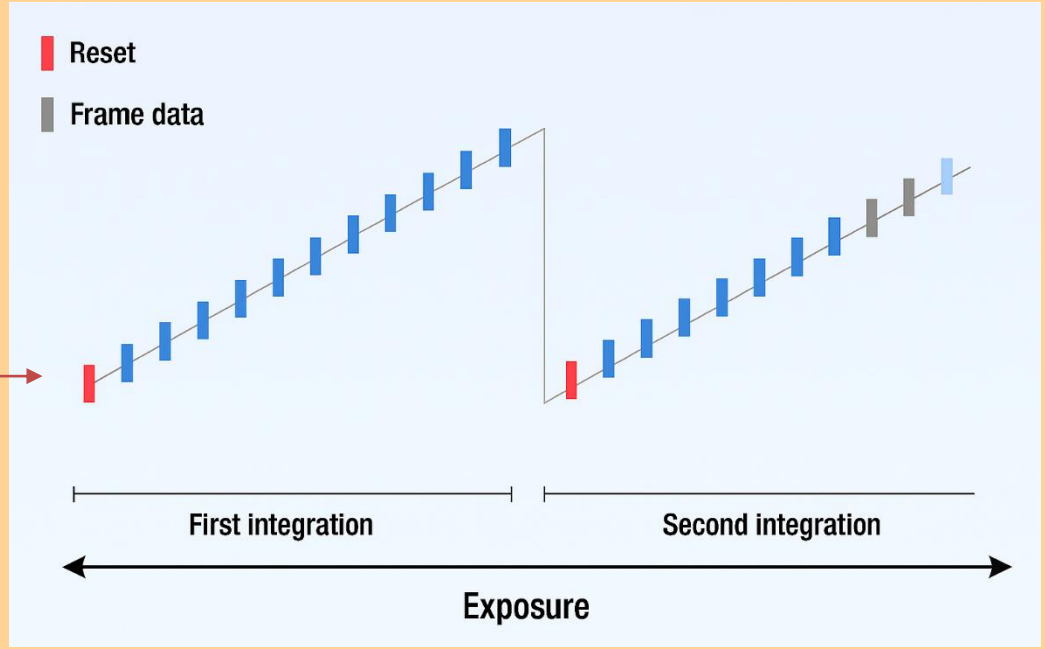
Other important Keywords (3)

```
SAVEMODE= 'continuous.sampling.read' / save cycle-type
NEXP    =                    3 / cycle repeat count
CPAR1   =                    2 / cycle type parameter
ITIME   =             2.903616 / [s] scheduled integration time
CTIME   =             5.807233 / [s] read-mode cycle time
EMSAMP  =                    1 / [ct] electronic multi-sampling
NCOADDS =                    3 / [ct] coadds (total)
EXPTIME =             8.710849 / [s] total integ. time
FRAMENUM=                    1 / sum of 3 image(s)
```

PANIC raw data & readout mode

- PANIC **CNTSR** (continuous sampling read) raw data is generated as CDS image subtracting the first frame from the last frame, ignoring all the other frames on the ramp.

x10 resets



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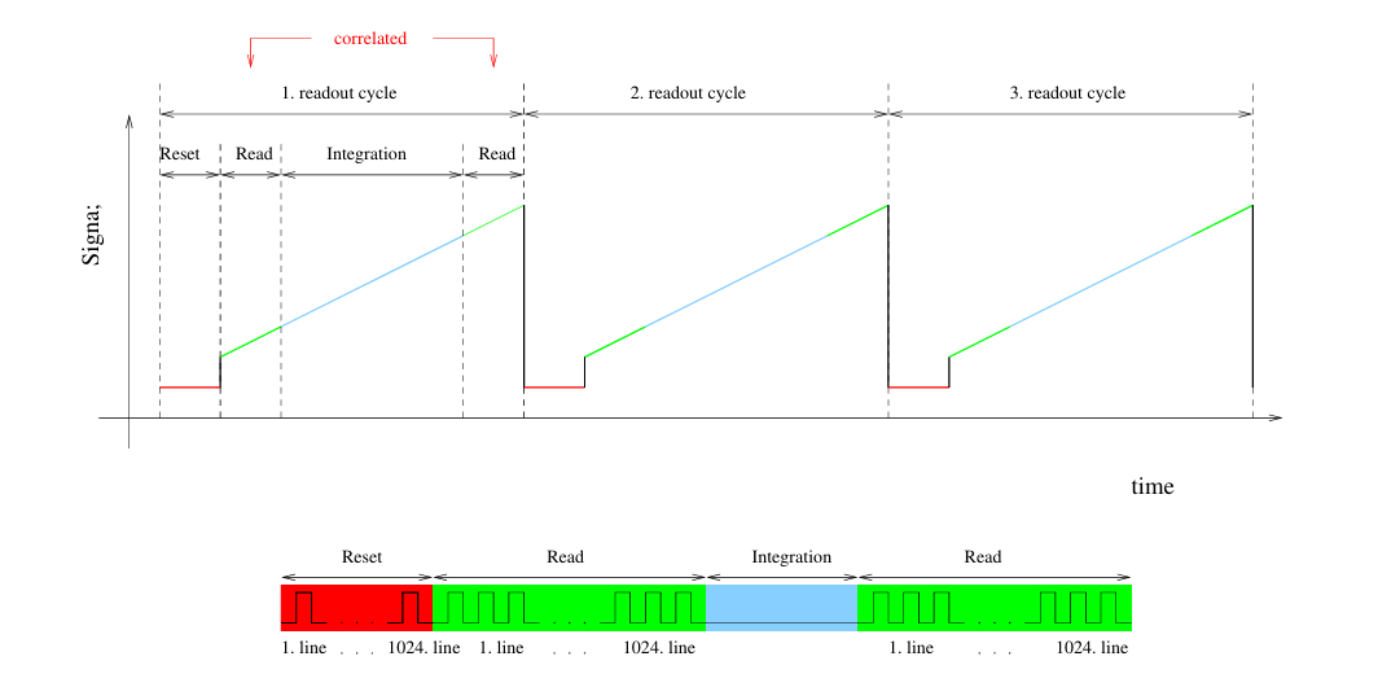
PANIC raw data & readout mode (2)

- CDS (Correlated double sampling)



Image= Last Frame – Reset Frame

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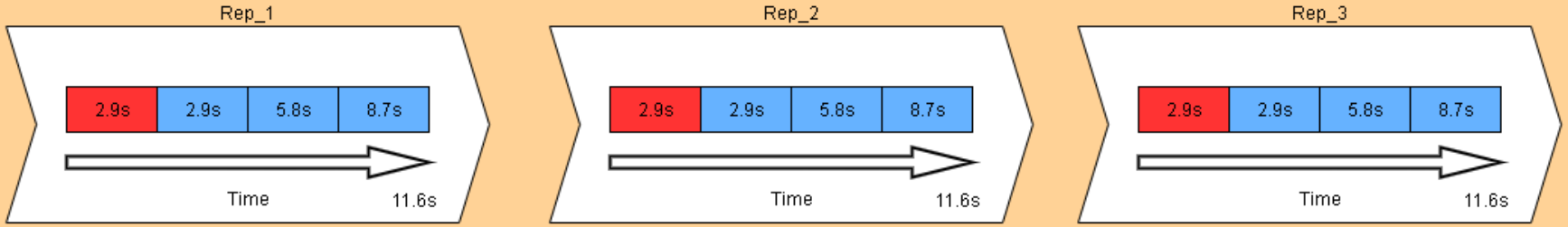
Saving Modes



Itime=8.7s
NReps=3
EXPTIME=26.1

Saving Modes

Integrated: (Frame#3_1 - ResetFrame_1) + (Frame#3_2 - ResetFrame_2) + Frame#3_3 - ResetFrame_3)

Cube: (Frame#3_1 - ResetFrame_1) , (Frame#3_2 - ResetFrame_2) , Frame#3_3 - ResetFrame_3)

Raw: [ResetFrame_1, Frame#1_1, Frame#1_2, Frame#1_3], [ResetFrame_2, Frame#2_1, Frame#2_2, Frame#2_3], [ResetFrame_3, Frame#3_1, Frame#3_2, Frame#3_3]

Data Volume

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Common NIR detector Artifacts

- Non-Linearity
- Bad Pixels
- Persistence
- Pixel/channel cross-talk
- *Reset anomaly*

- Bright and strongly variable sky

data processing

Dithering strategy

EXPTIME = (NEXP * ITIME) * N_DitherPos

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Processing: Main Steps

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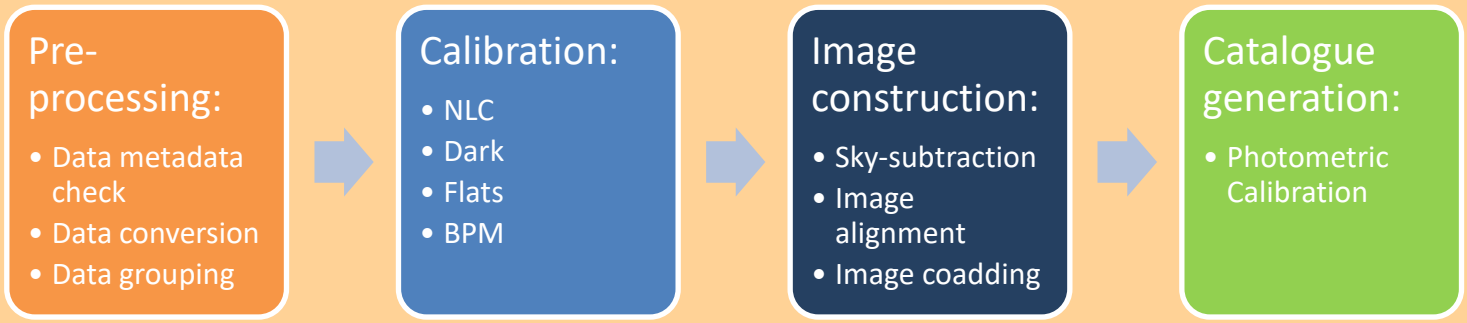
PAPI: main stages



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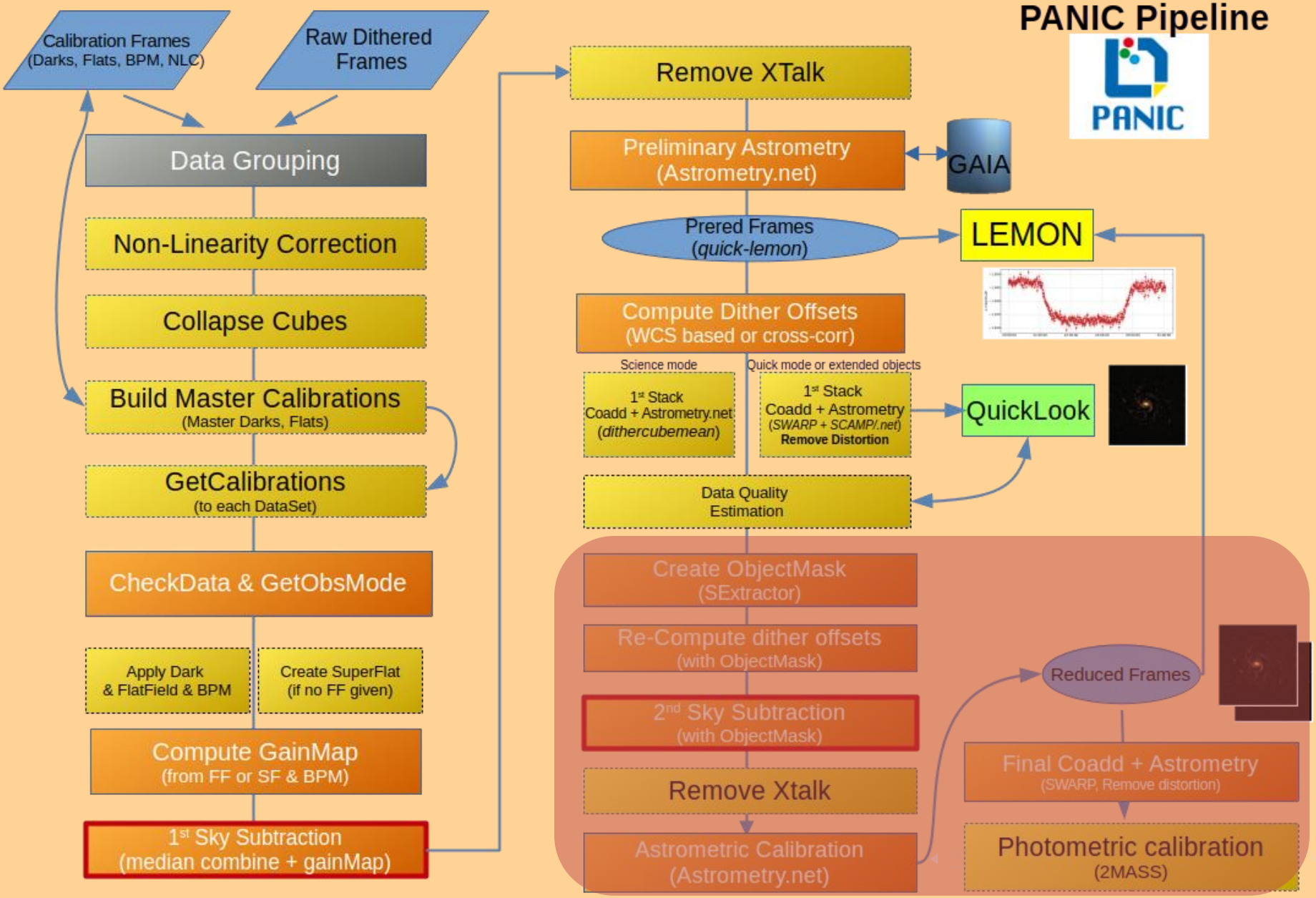
PAPI: main steps



Non-Linearity Correction

- Constraints:
  - To be applied to **all** raw frames saved as integrated.
  - Only for CNTSR readout mode
- What:
  - CDS offset subtraction
  - NLC correction (polynomial fit)→ $S_{lin} = P(S_{raw}) = \sum_{i=1}^{7} c_i S^i$
- How:
  - Enabling **First step** in the pipeline.

```
[nonlinearity]
# Non-linearity correction configuration
apply = True
suffix = "NL"
# FITS file containing the NL model for correction
model_cntsr = /data/Calibs2/BD_NLC/NLCORR_2025-04-09.fits
# FITS file containing the reference offset (bias) to be used for correction
cds_offset_cntsr = /data/Calibs2/BD_NLC/CDS-OFFSET_2025-03-27.fits
```

  - Manually

```
> python reduce/correctNonLinearity.py \
  -m /data1/Calibs2/BD_NLC/NLCORR_2025-04-09.fits \
  -r /data1/Calibs2/BD_NLC/CDS-OFFSET_2025-03-27.fits \
  -i /data3/out/2024-12-15_cds/Dark_0001_CDS_coadd.fits
```

QL

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Non-Linearity Correction (2)

Special Handling

- The non-linearity correction is **applied only to the pixels** that have a value between the **minimum** and **maximum** values defined in the reference file. If a pixel value is below the minimum or above the maximum, it will not be corrected. This is done to avoid applying the correction to pixels that are not within the valid range of the non-linearity model.

- Pixels having a **NaN** value will not have the linearity correction applied.

- **Integrated images** (i.e., images with **NCOADD** > 1) are also corrected for non-linearity. The non-linearity correction is applied to the integrated image divided by NCOADD, and then the result is multiplied by NCOADD. This is done to ensure that the non-linearity correction is applied to the average pixel value of the integrated image, rather than to the sum of the pixel values.

- The **CDS reference offset** (bias) to be subtracted previously to apply the model will also be scaled by NCOADD.

- **Sub-windows/Sub-arrays** are supported, applying the non-linearity correction only to the pixels contained in the sub-window. The sub-window is defined by the keyword DETSEC. If this keyword are not present, the whole image is considered as the sub-window.

NLC results

- **Typical residuals <0.5%, although some datasets show systematic errors up to 1.5%.**
- **The correction is robust across the entire useful range, though less accurate at very low signal levels due to offset uncertainties.**

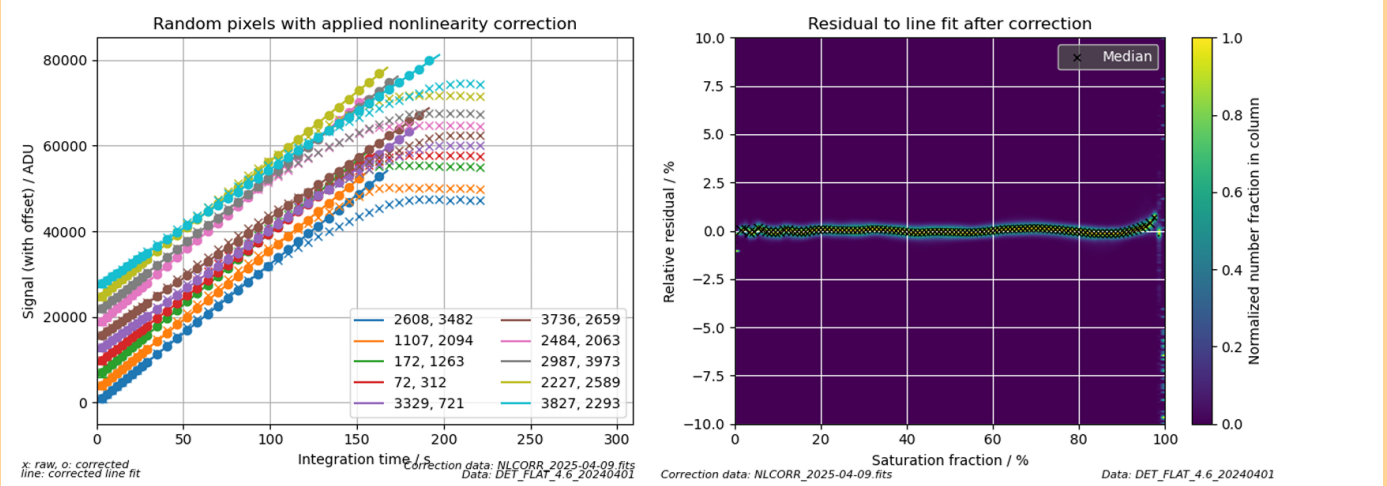
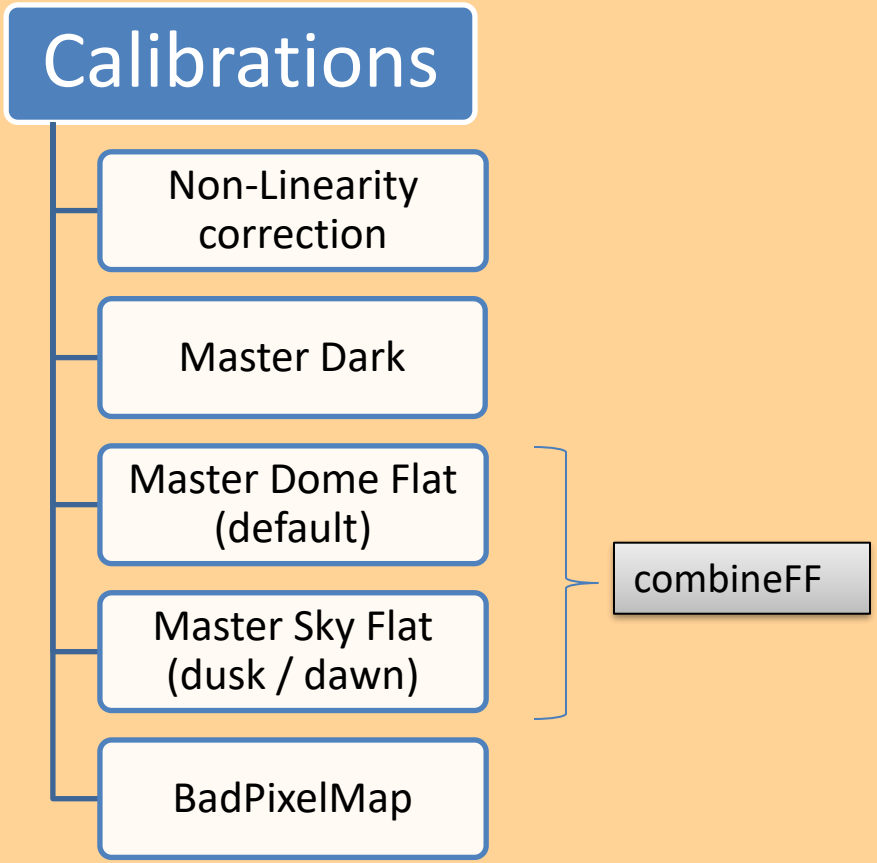


Figure 15: Calibration data (160 s saturation) from cycle 12. Left: 10 pixels ramps. Cross: measured, dots: corrected, line: linear fit. Right: Relative residual per saturation fraction, normalized per column, and median values, symbol sizes scaled with number of pixels.

PANIC4K-DET-TN-02_2_Nonlinearity.pdf

Calibrations



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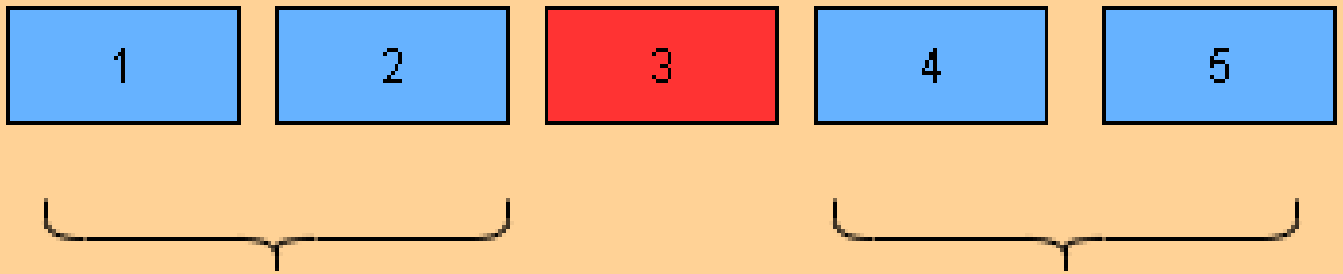
Sky Subtration

- Based on Sliding-Window



- **Config parameter !**
  - →the temporal spacing should not exceed 10 min on either side

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Sliding-window for sky subtraction

- Sequence of N images: for image i, use *W* previous and *W* subsequent frames (*W*=3, i=7).

target image i (excluded)

frames used to build sky for i

other frames (outside the window)

Sky(i) = combine({ I_{i−w}, …, I_{i−1}, I_{i+1}, …, I_{i+w} })
combine = median / mean with sigma-clipping (excludes image i).

- At the edges (i near 1 or N), use an asymmetric window!

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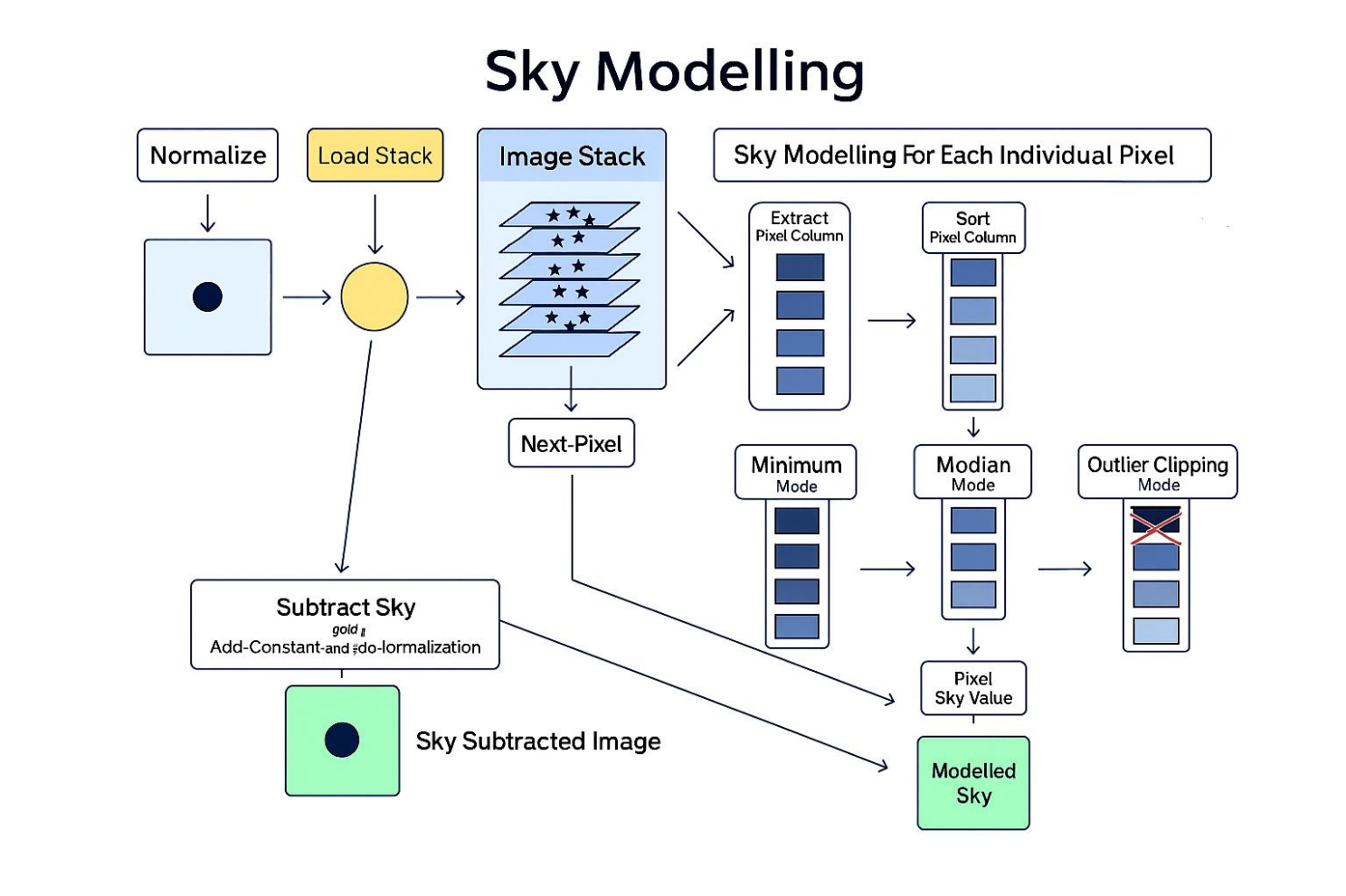
Sky modeling



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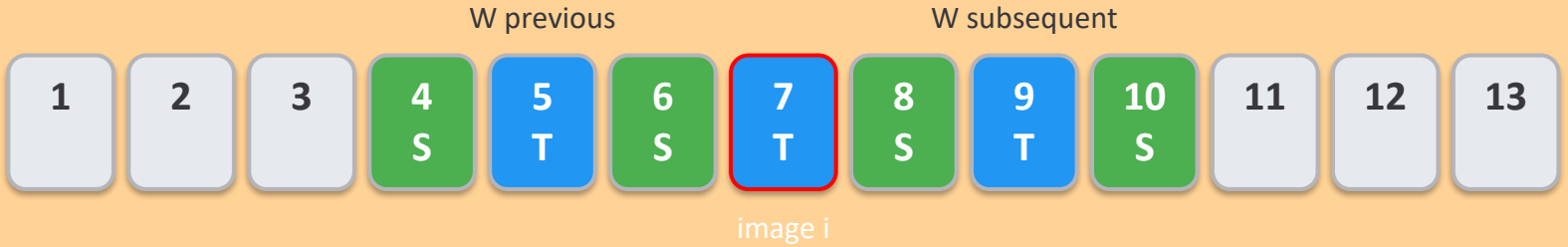
Sliding-window for sky subtraction (Extended objects)

Sequence of N images: for image i, use W previous and W subsequent frames (w=3, i=7).



target image i (excluded)

frames used to build sky for i

other frames (outside the window)

Sky(i) = combine({ I_{i−w}, …, I_{i−1}, I_{i+1}, …, I_{i+w} })
combine = median / mean with sigma-clipping (excludes image i).

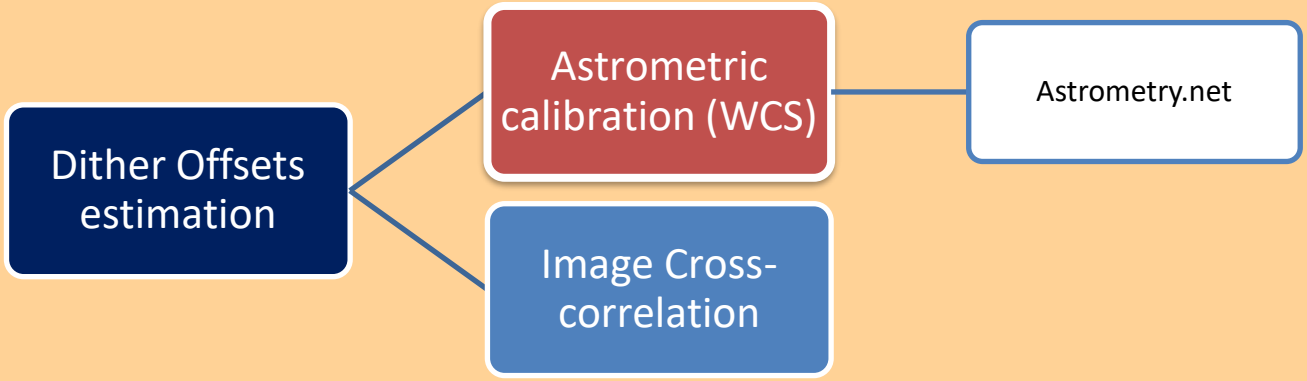
At the edges (i near 1 or N), use an asymmetric window!

- dither (T-T-T-T-T- ....)
- dither_on_off (T-S-T-S-T-S-T-S-T-S-T-....)
- dither_off_on (S-T-S-T-S-T-S-T-S-T-S-....)
- other (non defined sequence,unknown)

(e.g, T-S-T-T-S-T-T-S-T-....)

Dither offsets estimation

1) Given a set of sky subtracted dithered images:
    1) Based on astrometric calibration (wcs)
    2) Using cross-correlation: no astrometric calibration required; cross-reference offset algorithm. For big offsets and sparse/poor fields, it not recommended.



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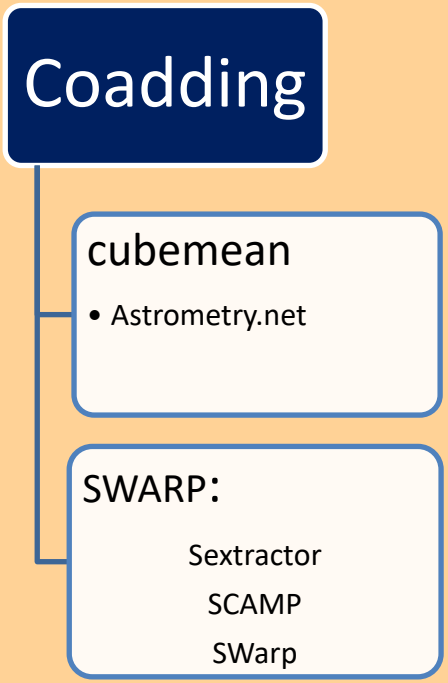
Coadding

1) Given a set of sky subtracted dithered images and dither offsets, two options:
    1) Compute cube mean
    2) Swarp based: Sextractor + SCAMP + SWarp



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Second Sky-Subtraction

1) Given a set of sky subtracted dithered images and dither offsets: 1) Compute object mask (Sextractor) of first coadd → **mask out fainter objects**
   2) Compute sky background model based using object mask

2nd SkySubtraction

Object Mask
- SExtractor
- Compute offsets (px) of objMask with calibrated frames

Compute Sky:
- Median combine with objMask

Coadding

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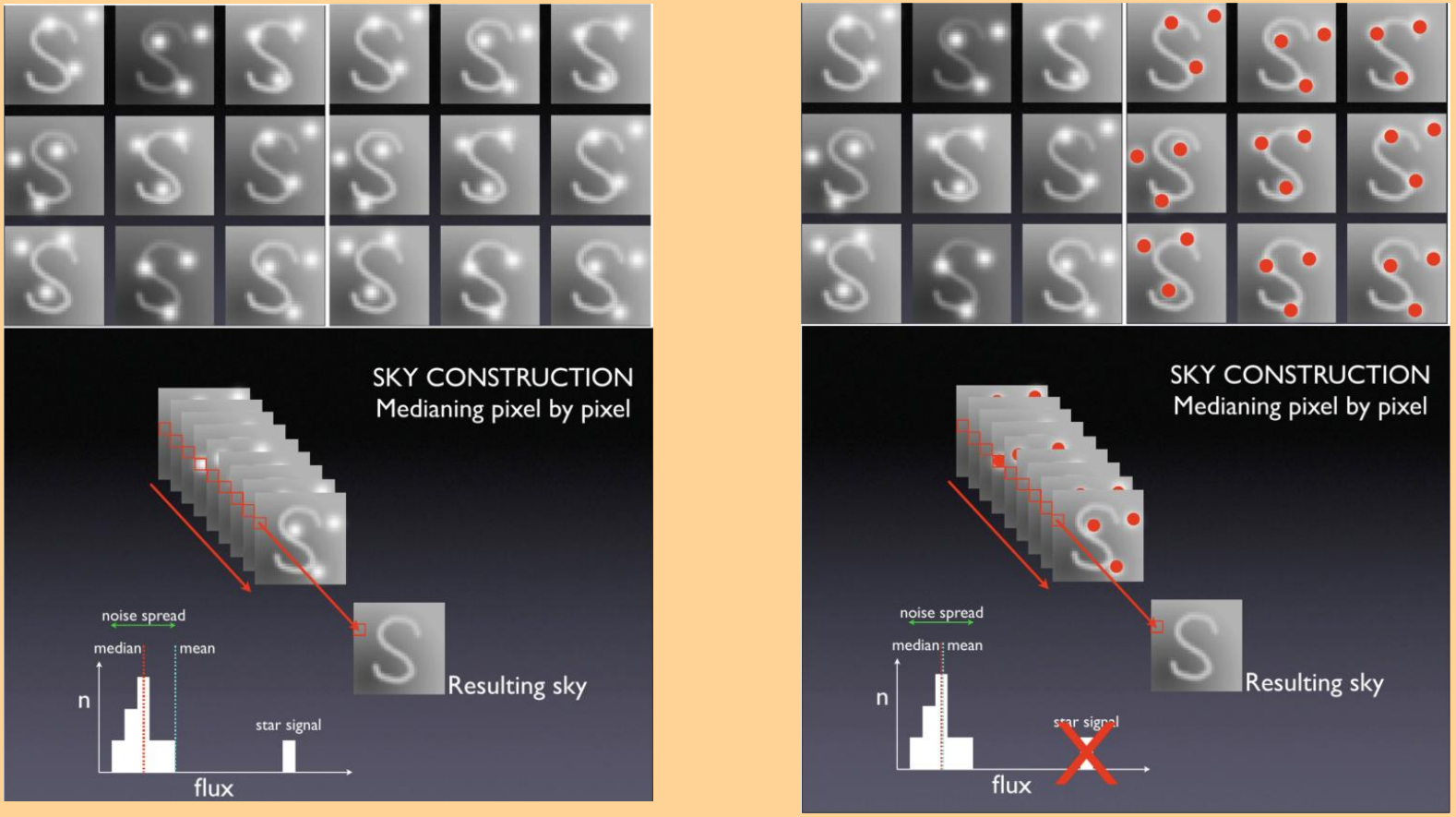
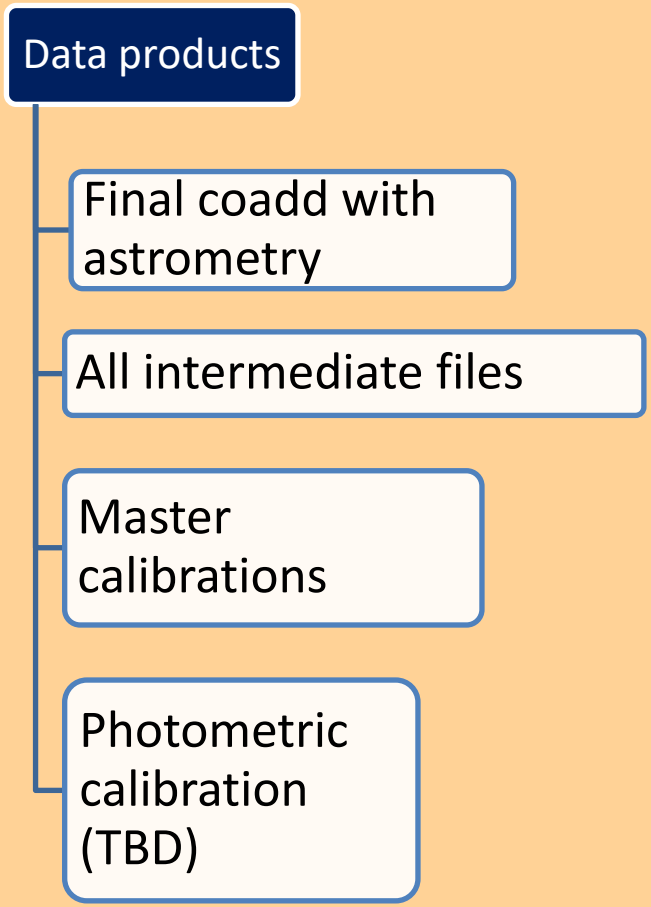
Object masking



Courtesy of Löic Albert

PAPI Data products



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Running PAPI: Quick Guide

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PAPI step-by-step Guide (1)

- Directories:

  - source directory –> /data3/out/2025_01_19_cds/
  - output directory –> /data2/out/2025_01_19_out/
  - calibration directory –> /data2/out/2025_01_19_cal/

- Show the sequences in your dataset:

```
> python run_papi.py -s /data3/out/2025_01_19_cds/ -p
```

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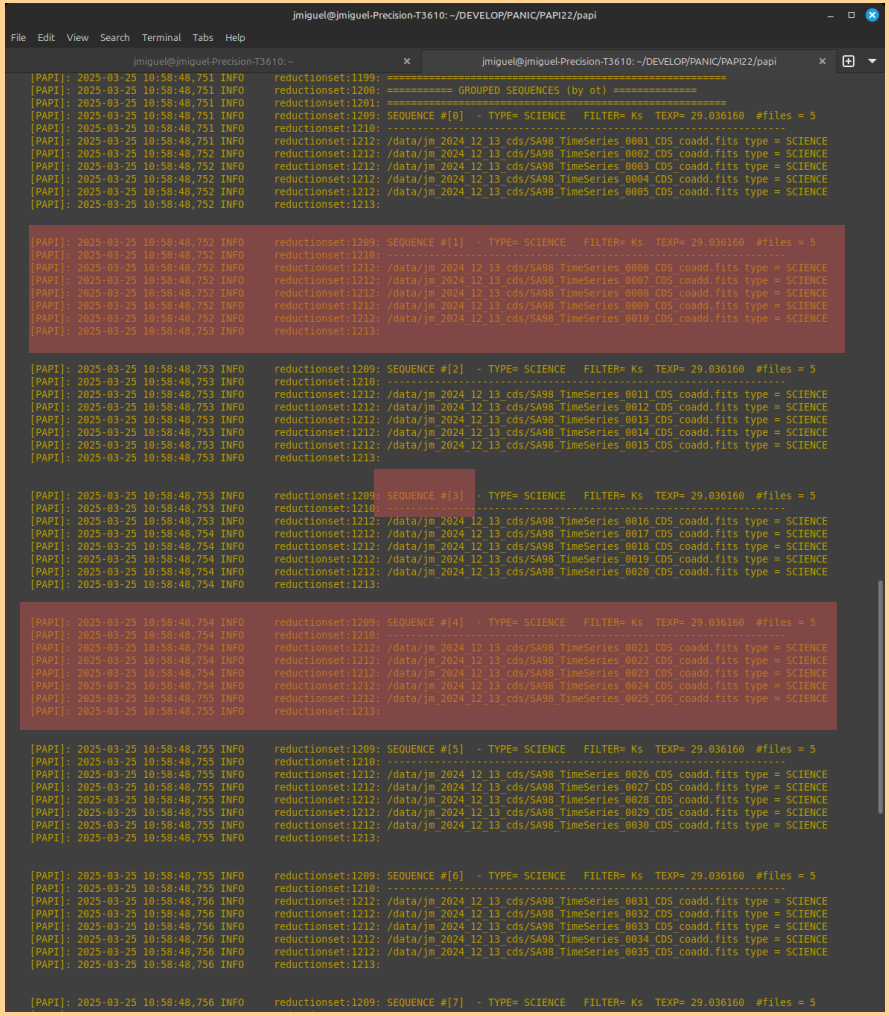
PAPI Command Line

> ./run_papi.py -s /data/jm_2024_12_13_cds/ -p



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PAPI step-by-step Guide (2)

- Directories:

  - source directory –> /data3/out/2025_01_19_cds/
  - output directory –> /data2/out/2025_01_19_out/
  - calibration directory –> /data2/out/2025_01_19_cal/

- Create the master calibrations:

1.DARKs:

>python run_papi.py -s /data3/out/2025_01_19_cds/ -d /data2/out/2025_01_19_cal/ -T DARK

2.DOME_FLATs

>python run_papi.py -s /data3/out/2025_01_19_cds/ -d /data2/out/2025_01_19_cal/ -T DOME_FLAT

3.SKY_FLATs

>python run_papi.py -s /data3/out/2025_01_19_cds/ -d /data2/out/2025_01_19_cal/ -C /data2/out/2025_01_19_cal/ -T SKY_FLAT

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PAPI step-by-step Guide (3)

- Directories:

  - source directory –> /data3
  - output directory –> /data2
  - calibration directory –> /da

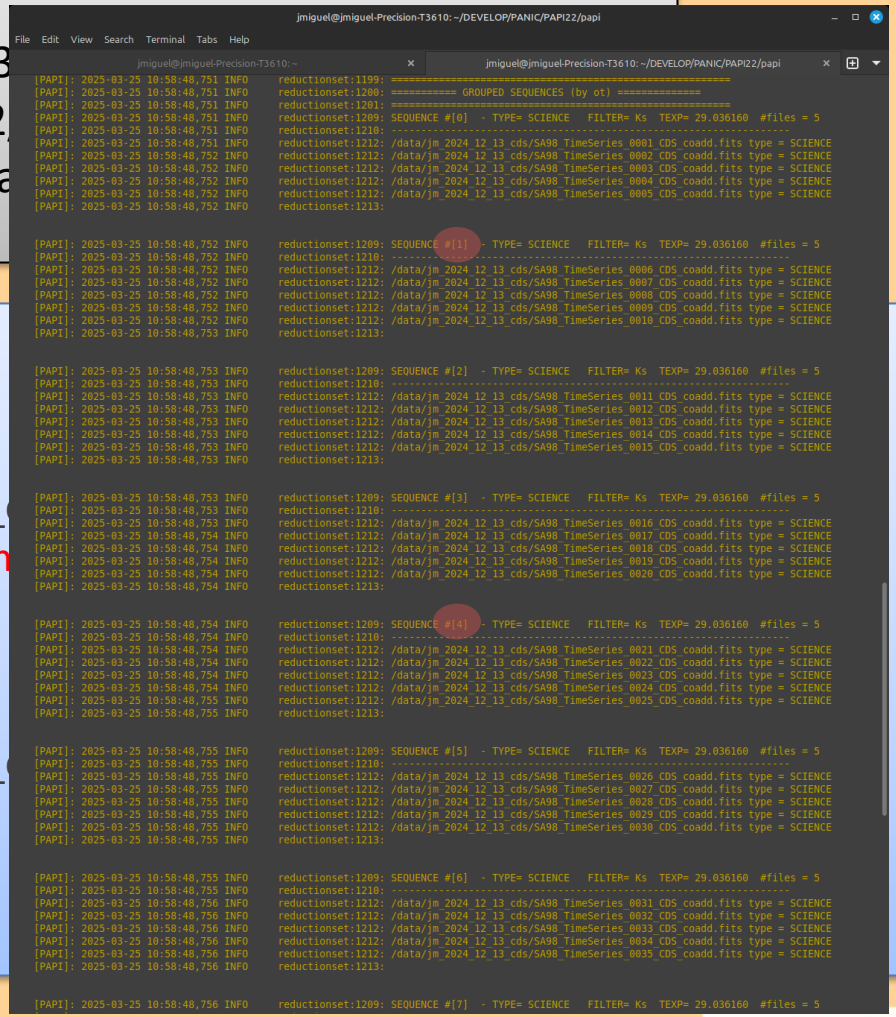
- Process the SCI sequences:

1.By sequences id

> python run_papi.py -s /data3/out/2025_01_19_
/data2/out/2025_01_19_cal/ -S seq_init seq_en

2.All sequences

> python run_papi.py -s /data3/out/2025_01_19_
/data2/out/2025_01_19_cal/ -T SCIENCE



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PAPI Command Line

```
> run_papi.py -s /data/2024-12-15_cds/ -C /data/2024-12-15_cds/calibs/ -d /data/2024-12-15_cds/out/ -S 54 54
```

Terminal - obs22@panic22:...dataset/output/Q01

File Edit View Terminal Tabs Help

obs22@panic22:...NSTALL/PAPI22/papi | obs22@panic22:...dataset/output/Q01

```
obs22@panic22:/data3/PANIC_demo_dataset/output/Q01> ls
NGC891_ext_small_0002.fits                NGC891_ext_small_0014.fits                NGC891_ext_small_0026.fits
NGC891_ext_small_0002_D_F.fits            NGC891_ext_small_0014_D_F.fits            NGC891_ext_small_0026_D_F.fits
NGC891_ext_small_0002_D_F.skysub.ast.fits NGC891_ext_small_0014_D_F.skysub.ast.fits NGC891_ext_small_0026_D_F.skysub.ast.fits
NGC891_ext_small_0002_D_F.skysub.fits     NGC891_ext_small_0014_D_F.skysub.fits     NGC891_ext_small_0026_D_F.skysub.ast.fits.head
NGC891_ext_small_0003.fits                NGC891_ext_small_0015.fits                NGC891_ext_small_0026_D_F.skysub.ast.fits.ldac
NGC891_ext_small_0003_D_F.fits            NGC891_ext_small_0015_D_F.fits            NGC891_ext_small_0026_D_F.skysub.fits
NGC891_ext_small_0004.fits                NGC891_ext_small_0016.fits                NGC891_ext_small_0027.fits
NGC891_ext_small_0004_D_F.fits            NGC891_ext_small_0016_D_F.fits            NGC891_ext_small_0027_D_F.fits
NGC891_ext_small_0004_D_F.skysub.ast.fits NGC891_ext_small_0016_D_F.skysub.ast.fits NGC891_ext_small_0028.fits
NGC891_ext_small_0004_D_F.skysub.fits     NGC891_ext_small_0016_D_F.skysub.fits     NGC891_ext_small_0028_D_F.fits
NGC891_ext_small_0005.fits                NGC891_ext_small_0017.fits                NGC891_ext_small_0028_D_F.skysub.ast.fits
NGC891_ext_small_0005_D_F.fits            NGC891_ext_small_0017_D_F.fits            NGC891_ext_small_0028_D_F.skysub.ast.fits.head
NGC891_ext_small_0006.fits                NGC891_ext_small_0018.fits                NGC891_ext_small_0028_D_F.skysub.ast.fits.ldac
NGC891_ext_small_0006_D_F.fits            NGC891_ext_small_0018_D_F.fits            NGC891_ext_small_0028_D_F.skysub.fits
NGC891_ext_small_0006_D_F.skysub.ast.fits NGC891_ext_small_0018_D_F.skysub.ast.fits NGC891_ext_small_0029.fits
NGC891_ext_small_0006_D_F.skysub.fits     NGC891_ext_small_0018_D_F.skysub.fits     NGC891_ext_small_0029_D_F.fits
NGC891_ext_small_0007.fits                NGC891_ext_small_0019.fits                NGC891_ext_small_0030.fits
NGC891_ext_small_0007_D_F.fits            NGC891_ext_small_0019_D_F.fits            NGC891_ext_small_0030_D_F.fits
NGC891_ext_small_0008.fits                NGC891_ext_small_0020.fits                NGC891_ext_small_0030_D_F.skysub.ast.fits
NGC891_ext_small_0008_D_F.fits            NGC891_ext_small_0020_D_F.fits            NGC891_ext_small_0030_D_F.skysub.ast.fits.head
NGC891_ext_small_0008_D_F.skysub.ast.fits NGC891_ext_small_0020_D_F.skysub.ast.fits NGC891_ext_small_0030_D_F.skysub.ast.fits.ldac
NGC891_ext_small_0008_D_F.skysub.fits     NGC891_ext_small_0020_D_F.skysub.fits     NGC891_ext_small_0030_D_F.skysub.fits
NGC891_ext_small_0009.fits                NGC891_ext_small_0021.fits                NGC891_ext_small_0031.fits
NGC891_ext_small_0009_D_F.fits            NGC891_ext_small_0021_D_F.fits            NGC891_ext_small_0031_D_F.fits
NGC891_ext_small_0010.fits                NGC891_ext_small_0022.fits                gain_H.fits
NGC891_ext_small_0010_D_F.fits            NGC891_ext_small_0022_D_F.fits            gain_J.fits
NGC891_ext_small_0010_D_F.skysub.ast.fits NGC891_ext_small_0022_D_F.skysub.ast.fits gain_Ks.fits
NGC891_ext_small_0010_D_F.skysub.fits     NGC891_ext_small_0022_D_F.skysub.fits     gain_Z.fits
NGC891_ext_small_0011.fits                NGC891_ext_small_0023.fits                offsets1.pap
NGC891_ext_small_0011_D_F.fits            NGC891_ext_small_0023_D_F.fits            py-sextractor.conv
NGC891_ext_small_0012.fits                NGC891_ext_small_0024.fits                py-sextractor.nnw
NGC891_ext_small_0012_D_F.fits            NGC891_ext_small_0024_D_F.fits            py-sextractor.param
NGC891_ext_small_0012_D_F.skysub.ast.fits NGC891_ext_small_0024_D_F.skysub.ast.fits py-sextractor.sex
NGC891_ext_small_0012_D_F.skysub.fits     NGC891_ext_small_0024_D_F.skysub.fits     skylist1.list
NGC891_ext_small_0013.fits                NGC891_ext_small_0025.fits
NGC891_ext_small_0013_D_F.fits            NGC891_ext_small_0025_D_F.fits
obs22@panic22:/data3/PANIC_demo_dataset/output/Q01>
```

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PAPI Config file

- PAPI has a set of configuration files required to run properly. They are the next ones:

➢ **papi.cfg**: main configuration file

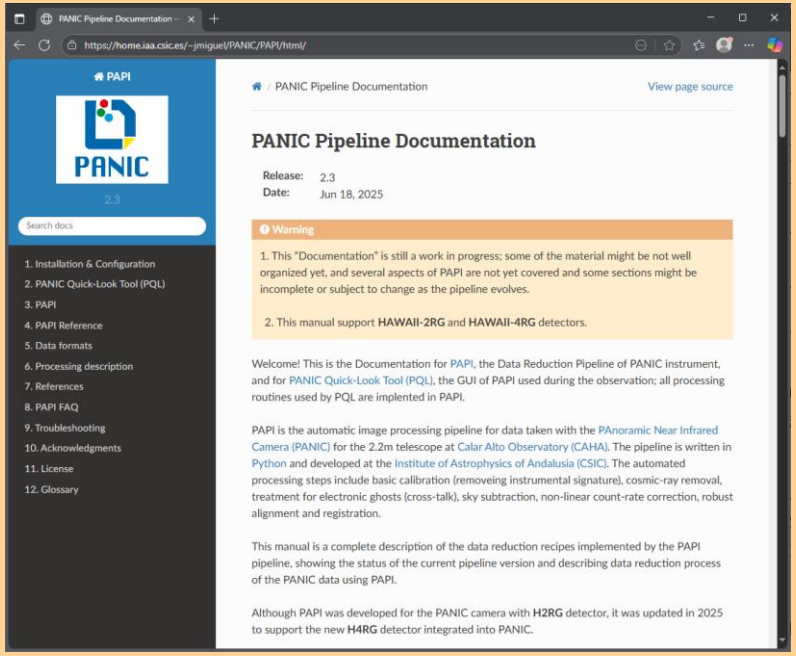
In addition to the command line options, PAPI has a configuration file in which the user can set both the command line options and a wider set of additional ones. This config file can be specified with the -c option,
but by default it is looked for it in the config_files directory defined by PAPI_CONFIG environment variable.

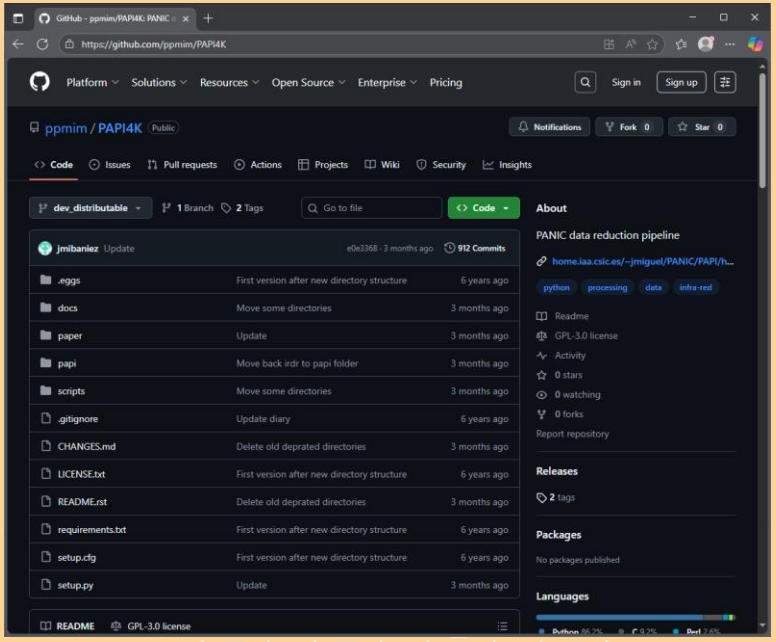
➢ scamp.cfg: SCAMP configuration file
➢ swarp.conf: SWARP configuration file
➢ sextractor.sex : SExtractor configuration file
➢ sextractor.conf:
➢ sextractor.cong:
➢ sextractor.nnw:
➢ sextractor.param:

Many data products can be improved for specific science cases by using non-default settings!

Documentation

- Main documentation sites:
  - PANIC User's Manual
  - PAPI & QL manual
  - Github:
    - https://github.com/ppmim/PAPI4K





PAPI Installation

- https://github.com/ppmim/PAPI4K

Package	Version stable/next
openSUSE	15.5
Anaconda	2022.05 / 2024.10
IRAF - PyRAF	2.16 - 2.1.15
Python	3.7.13 / 3.7.16
PyQt	5.15.7
Astropy	4.3.1
SExtractor	2.25 / 2.28.2
SCAMP	2.10 / 2.13
SWarp	2.41.5

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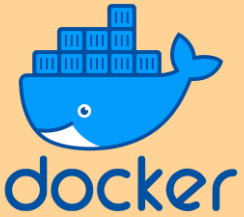
PAPI Installation

- From Git clone https://github.com/ppmim/PAPI4K

- Very soon: Docker container with all software installed



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PAPI: Caveats

- The PANIC pipeline will **never automate everything** for everybody, but it should be capable of doing most things for most people.
- Currently, PAPI can process data acquired using the Observing Tool (OT) by defining the necessary Observing Blocks (OB), or alternatively through manual reduction using GEIRS scripts. However, PAPI is not intended to handle all types of observations performed with PANIC.
- Furthermore, PAPI has **not yet been fully validated** with scientific data, as no datasets reduced with it have been used in published scientific papers. Validation efforts are ongoing to ensure its reliability and suitability for scientific analysis.

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PAPI Citation

- ASCL.net
- JOSS – Journal Of Open Source Software
- Zenodo:
  - José Miguel Ibáñez. (2025). ppmim/PAPI4K: Release candidate for PAPI4K (papi4k.v1). Zenodo. https://doi.org/10.5281/zenodo.15676577

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Questions, problems, or want to contribute?

- Staying up to date on the latest news:
  - Subscribe to Github notifications at https://github.com/ppmim/PAPI4K

- Questions about your data or the PANIC pipeline?
  - Contact CAHA Astronomy group
  - Contact jmiguel@iaa.es

- Got a suggestion?
  - The PANIC pipeline is open-source, pull requests welcome at https://github.com/ppmim/PAPI4K
  - File an Issue or Dicussion on GitHub

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PAPI: Next

- Next
  - Complete Scientific Validation !
  - Docker container
  - Migration to Python 3.11 and remove IRAF dependences
  - Containerisation (Docker)
  - Reproducibility & OpenScience
  - CI/CD
  - Publish a paper

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Questions ?

Thanks for your attendance !

Questions ?

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