



Accessing and using focal plane data at CC-IN2P3

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LSST-France meeting

Annecy

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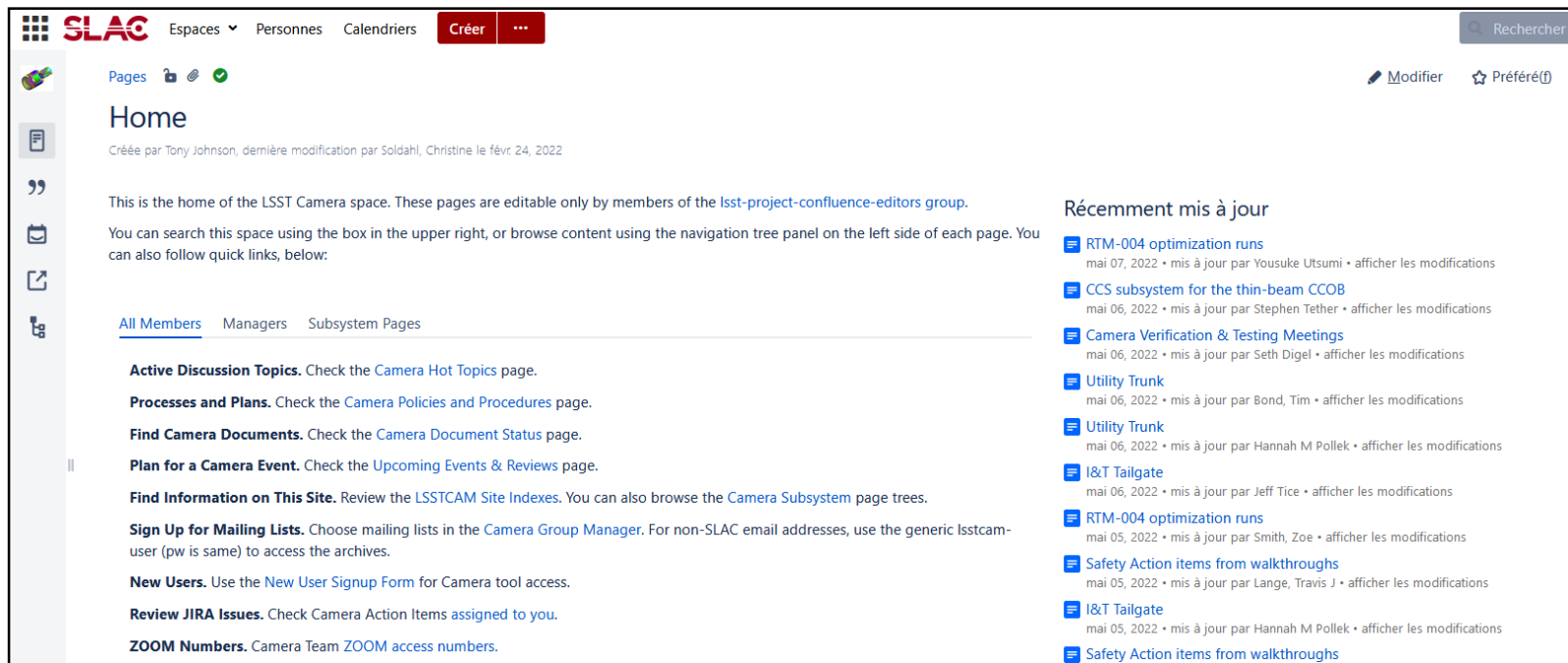
Ressources

- Very useful google doc from P. Antilogus :
“Informations needed to work on LSST sensors/focal plane data” [link](#)
Part of it summarized in the next slides

- Key step : get access to the LSSTCAM confluence space
Then you become a member of the camera team!



 **Seth Digel** il y a 3 mois
 Good afternoon Thibault. Please ask Regina Matter (regina@slac.stanford.edu) to add you to the Camera team, with cc to Vincent Riot (riot1@llnl.gov), Aaron Roodman (roodman@slac.stanford.edu) and Pierre.



The screenshot shows the SLAC Confluence Home page for the LSST Camera space. The page title is "Home" and it was created by Tony Johnson. The content includes a welcome message and instructions on how to search and navigate the space. A navigation tree on the left shows "All Members", "Managers", and "Subsystem Pages". The main content area lists various topics and links, such as "Active Discussion Topics", "Processes and Plans", "Find Camera Documents", "Plan for a Camera Event", "Find Information on This Site", "Sign Up for Mailing Lists", "New Users", "Review JIRA Issues", and "ZOOM Numbers". A "Récemment mis à jour" (Recently updated) section on the right lists several documents, including "RTM-004 optimization runs", "CCS subsystem for the thin-beam CCOB", "Camera Verification & Testing Meetings", "Utility Trunk", "I&T Tailgate", and "Safety Action items from walkthroughs".

BOT data (1/2)

- Bench Optical Test data (taken at SLAC)

Run 5 : most recent data

- Data organized in 2 ways / 2 types of directory trees:

- per day tree : follows the acquisition sequence
- eotest tree: structure reflects the runs and types of image (actually only links to the per day tree)

- At CC-IN2P3

per day tree : /sps/lstt/groups/FocalPlane/SLAC/storage/

eotest tree : /sps/lstt/groups/FocalPlane/SLAC/run5/

- All run 5 folders are there (full structure) but some are empty.
- There is no automatic procedure for the copy of the runs from SLAC: you should ask P. Antilogus if you need a missing run.

Run #	Date	Shifter	Step	Acq. File	Sequencer (e2v/ITL/Corner)	CCS Distro	Config	Hardware/Software notes	Comments
13151	2021/12/9	Yousuke	step07	B_protocol_with_gain.cfg	E2V:FP_E2V_2s_ir2_v26_3000.seq ITL:FP_ITL_2s_ir2_v26_3000.seq	focal-plane 6.1.1	ODV=26.9 for ITL dPclk=9.3 for E2V	HV were on (adjustment script is on) All Rafts are running Room light were OFF Flat projector lamp ON	rc=14 IDLE_FLUSH CLEARDELA v1.5.7 CCDTEMP=

BOT data (2/2)

```
/sps/lstt/groups/FocalPlane/SLAC/run5/13151
bias_bias_007 -> /sps/lstt/groups/FocalPlane/SLAC/storage/20211209/MC_C_20211209_001677
bot_persistence_bias_207 -> /sps/lstt/groups/FocalPlane/SLAC/storage/20211210/MC_C_20211210_000164
dark_bias_026 -> /sps/lstt/groups/FocalPlane/SLAC/storage/20211209/MC_C_20211209_001696
flat_ND_OD0.5_SDSSi_1357.0_flat0_111 -> /sps/lstt/groups/FocalPlane/SLAC/storage/20211210/MC_C_20211210_000069
flat_bias_116 -> /sps/lstt/groups/FocalPlane/SLAC/storage/20211210/MC_C_20211210_000074
flat_empty_SDSSi_104807.0_flat1_142 -> /sps/lstt/groups/FocalPlane/SLAC/storage/20211210/MC_C_20211210_000100
lambda_flat_SDSSY_10000_078 -> /sps/lstt/groups/FocalPlane/SLAC/storage/20211210/MC_C_20211210_000037
sflat_flat_SDSSi_H_068 -> /sps/lstt/groups/FocalPlane/SLAC/storage/20211210/MC_C_20211210_000029
```

Translation example :

flat_empty_SDSSi_104807.0_flat1_142

- flat: flat sub-run
- empty : no neutral density filter at the lamp level
- SDSSi : the light went through a SDSS i filter
- 104807.0 : the exposure time has been tuned to target a 104807 e^- per pixel in average
- flat1 : flat image, the second in a row taken in the same condition (there is a 'flat0' just before, as part of a flat pair)
- image 142 taken in this run



flat projector
(from Y. Utsumi)

eotest

- eotest (Electro-Optical Test) package developed by SLAC people
<https://github.com/lsst-camera-dh/eotest>

- Results

- https://srs.slac.stanford.edu/BOT_EO_Reports

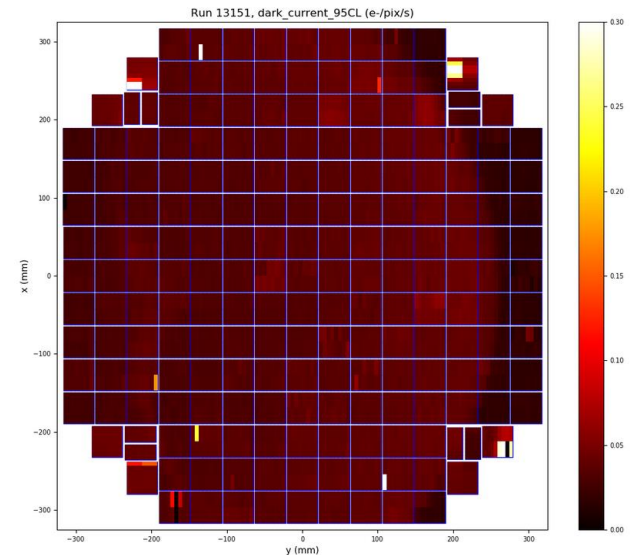
- Possible to run (parts of) eotest at CC-IN2P3

- ➔ Done for PCA studies of the bias correction

- `/sps/lst/users/tguillem/Rubin/Focal_Plane/lst_distrib/w_2022_01/eotest`

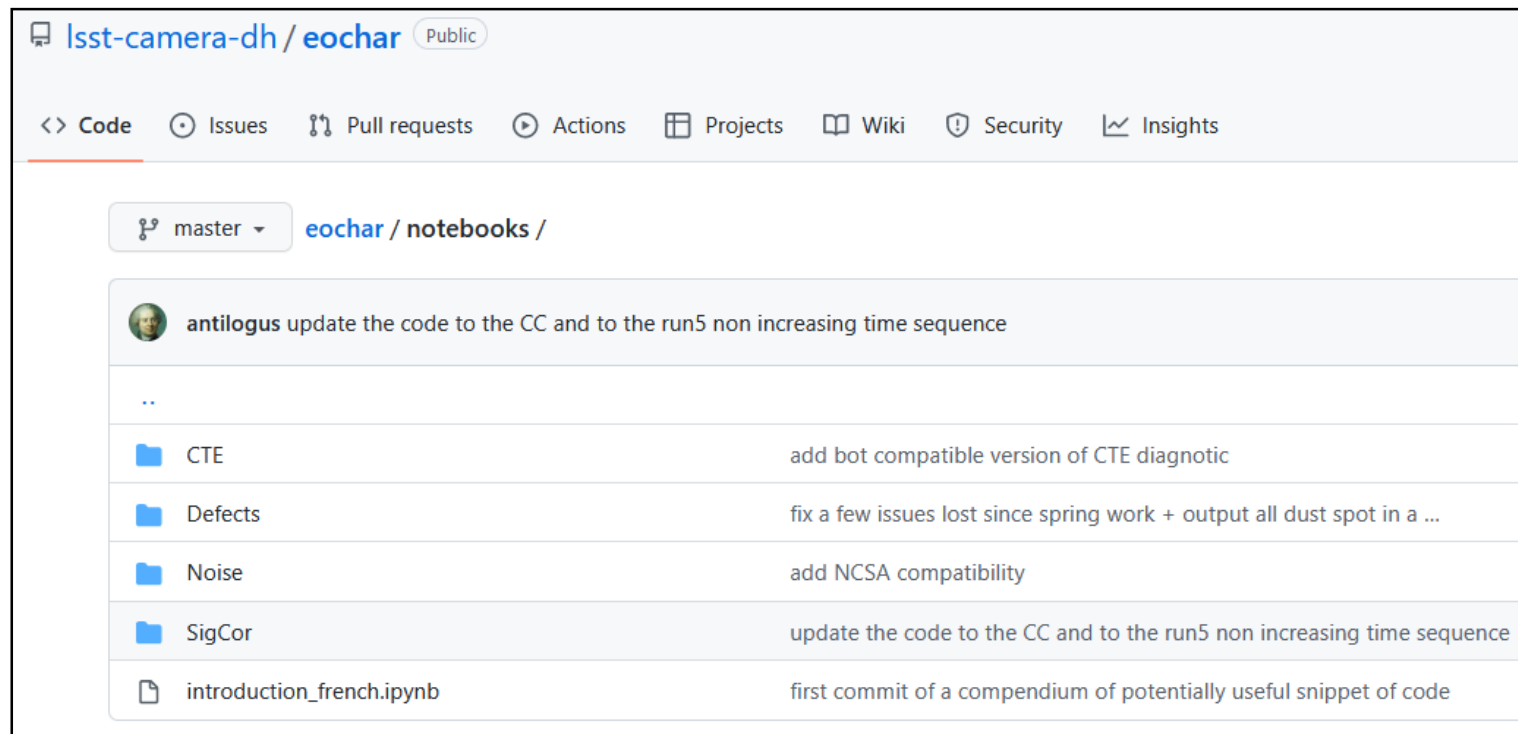
- No use of the butler, but eotest using gen3 butler in preparation

- <https://github.com/lst-camera-dh/eotask-gen3>



eochar

- Package developed by P. Antilogus for various studies on BOT .fits files <https://github.com/lstt-camera-dh/eochar>
 - Some common python code (file manipulation, corrections, plotting functions, etc.)
 - A set of notebooks (some compatible with butler gen2)



The screenshot shows the GitHub repository page for 'eochar' by 'lstt-camera-dh'. The repository is public. The navigation bar includes links for Code, Issues, Pull requests, Actions, Projects, Wiki, Security, and Insights. The current view is the 'notebooks' directory on the 'master' branch. A commit by 'antilogus' is shown, with a description: 'update the code to the CC and to the run5 non increasing time sequence'. Below the commit, a list of files and folders is displayed, each with a commit message:

File/Folder	Commit Message
CTE	add bot compatible version of CTE diagnostic
Defects	fix a few issues lost since spring work + output all dust spot in a ...
Noise	add NCSA compatibility
SigCor	update the code to the CC and to the run5 non increasing time sequence
introduction_french.ipynb	first commit of a compendium of potentially useful snippet of code

Processing of the full focal plane

- Impossible to process sequentially the full focal plane (189 CCD) with a notebook interactively: memory consumption and several days needed...
→ Parallelization required

Possible options :

- 1) DASK
- 2) Batch jobs (Slurm)

Parallelization level: CCD, raft in some cases

- Fork of eochar : <https://github.com/tguillemLSST/eochar>

Conversion to python scripts:

CTE_diagnostic_BOT.py

Bot_CovCTE.py

→ Use of the butler gen2 for the full focal plane processing

- 1) Butler data ingestion of almost all runs (in batch)
- 2) Submission of 189 jobs in batch



Code divergence...

```
[tguillem@cca010]~/data_run5/butler/all_runs/13141% pwd -P
/sps/lstt/groups/FocalPlane/SLAC/run5/butler/all_runs/13141
[tguillem@cca010]~/data_run5/butler/all_runs/13141% ls
13141_list.txt _mapper raw registry.sqlite3
```

Results for the full focal plane

<https://me.lsst.eu/tguillem/batch/run5/reference/PTC/>

Run 5 PTC data (November-December 2021)

T. Guillemin & P. Antilogus (html template from P. Astier & B. Racine)

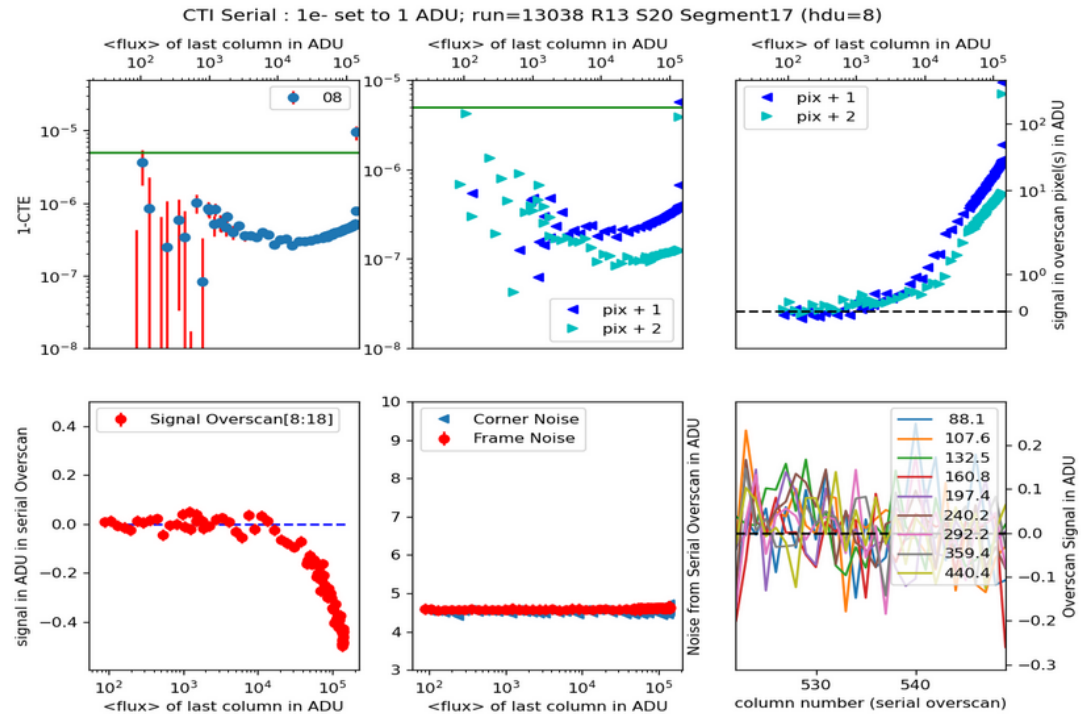
run	raft	chip	chan	plot
13038	R01	S00	10-1	CCD Summary_parallelCTE
13039	R02	S01	11-2	CCD Summary_serialCTE
13144	R03	S02	12-3	CCD Cov01 vs Flux
	R10	S10	13-4	CCD Cov10 vs Flux
	R11	S11	14-5	CHAN cte_parallel
	R12	S12	15-6	CHAN cte_serial
	R13	S20	16-7	CHAN Cov vs Flux
	R14	S21	17-8	
	R20	S22	07-9	
	R21		06-10	
	R22		05-11	
	R23		04-12	
	R24		03-13	
	R30		02-14	
	R31		01-15	
	R32		00-16	
	R33			
	R34			
	R41			
	R42			
	R43			

[Next object same plot](#)

[Next plot same object](#)

[Next run](#)

R13



Two examples

1) Notebook (no butler)

https://github.com/tguillemLSST/focal_plane_analysis/blob/main/tutorial/images_direct.ipynb

Requirements:

JupyterLab notebook platform at CC-IN2P3 configured to use the LSST science pipelines (button **lsst_distrib**)

2) Python script (butler gen2)

https://github.com/tguillemLSST/focal_plane_analysis/blob/main/tutorial/images_butler.py

Requirements:

ssh access to CC-IN2P3
setup lsst release