Accessing and using focal plane data at CC-IN2P3

Thibault Guillemin (LAPP)

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

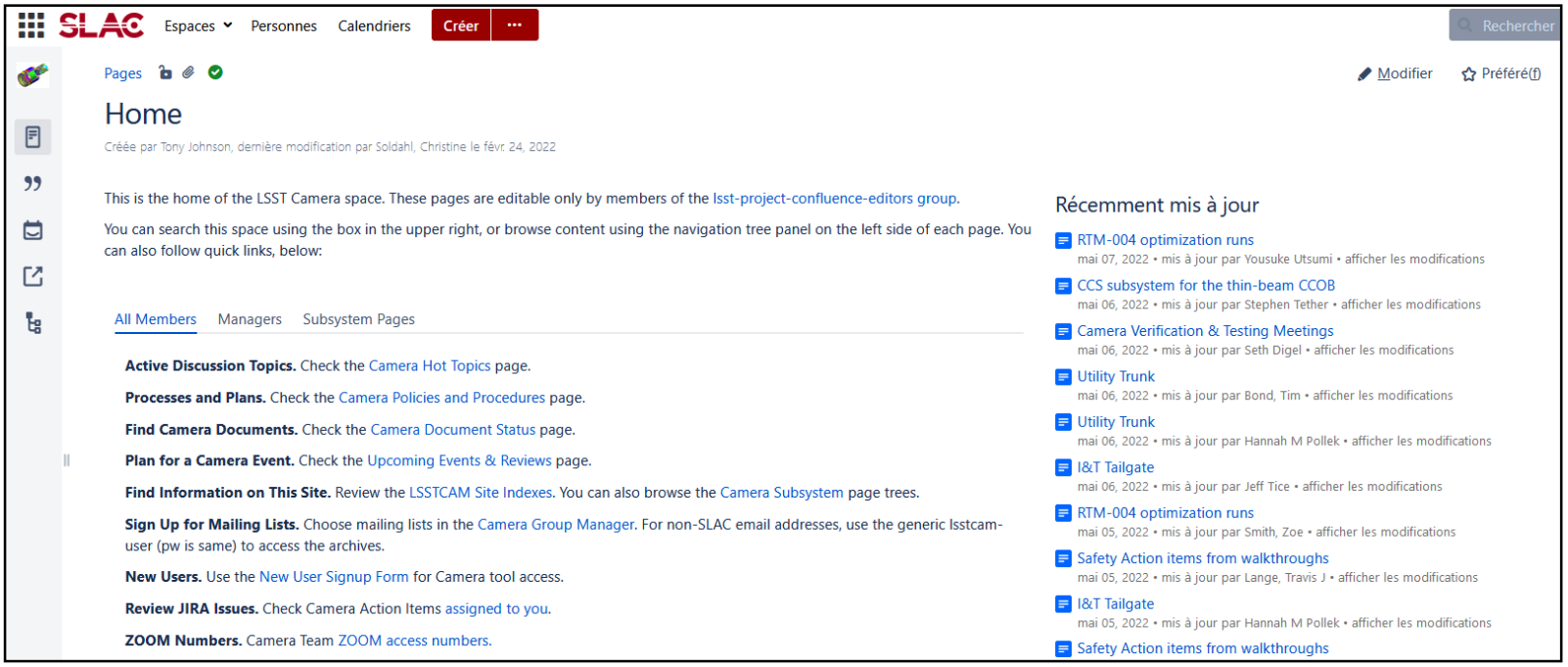
Part of it summarized in the next slides

- 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.



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

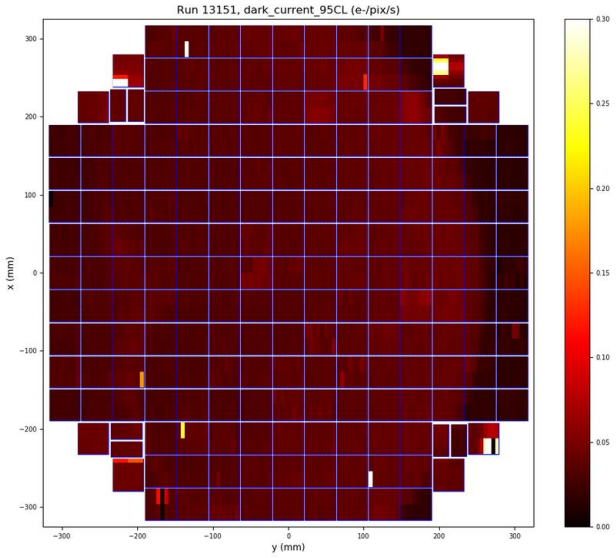
eotest

- eotest (Electro-Optical Test) package developped 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/lsst/users/tguillem/Rubin/Focal_Plane/lsst_distrib/w_2022_01/eotest

- No use of the butler, but eotest using gen3 butler in preparation
https://github.com/lsst-camera-dh/eotask-gen3

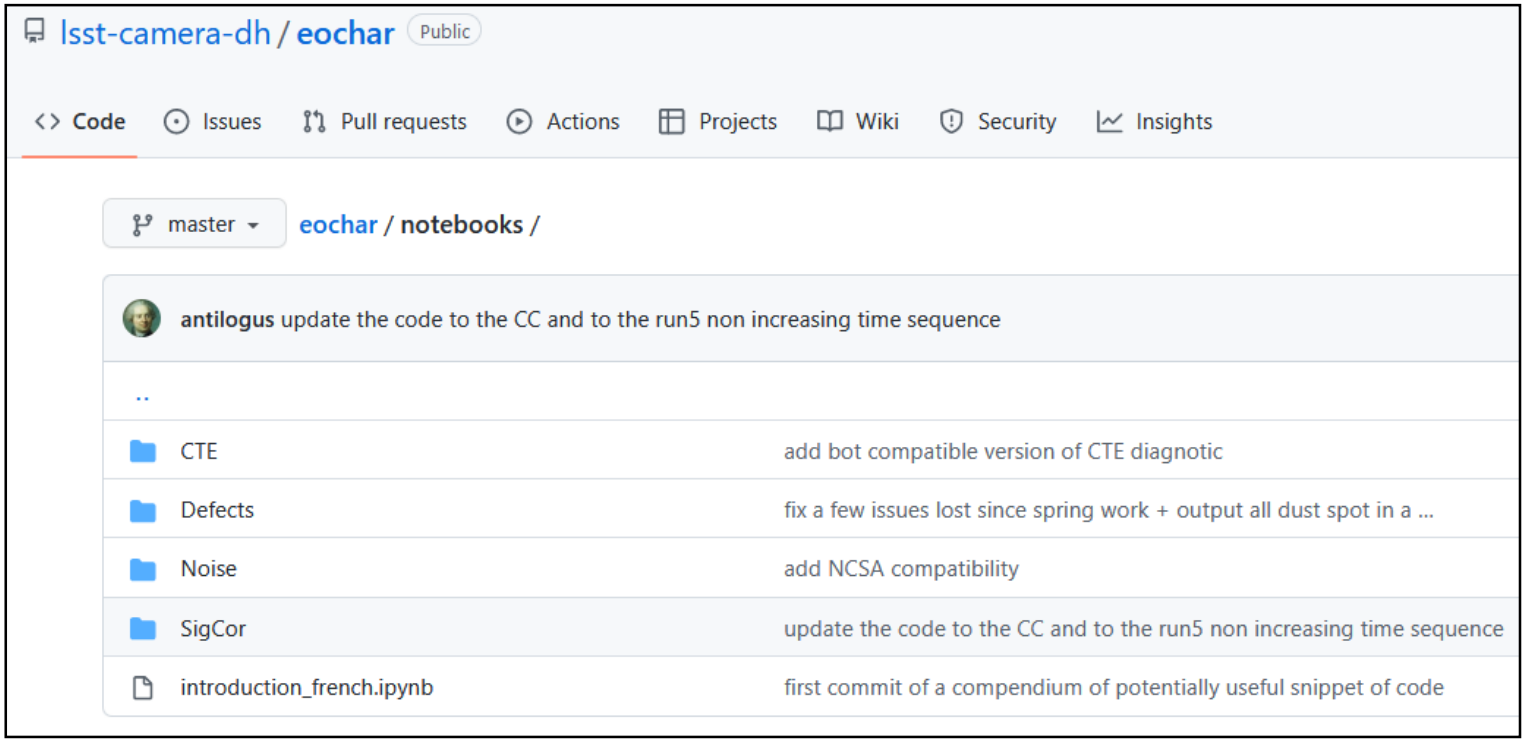


eochar

- Package developped by P. Antilogus for various studies on BOT .fits files

https://github.com/lsst-camera-dh/eochar

- Some common python code (file manipulation, corrections, plotting functions, etc.)
- A set of notebooks (some compatible with butler gen2)



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/lsst/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/

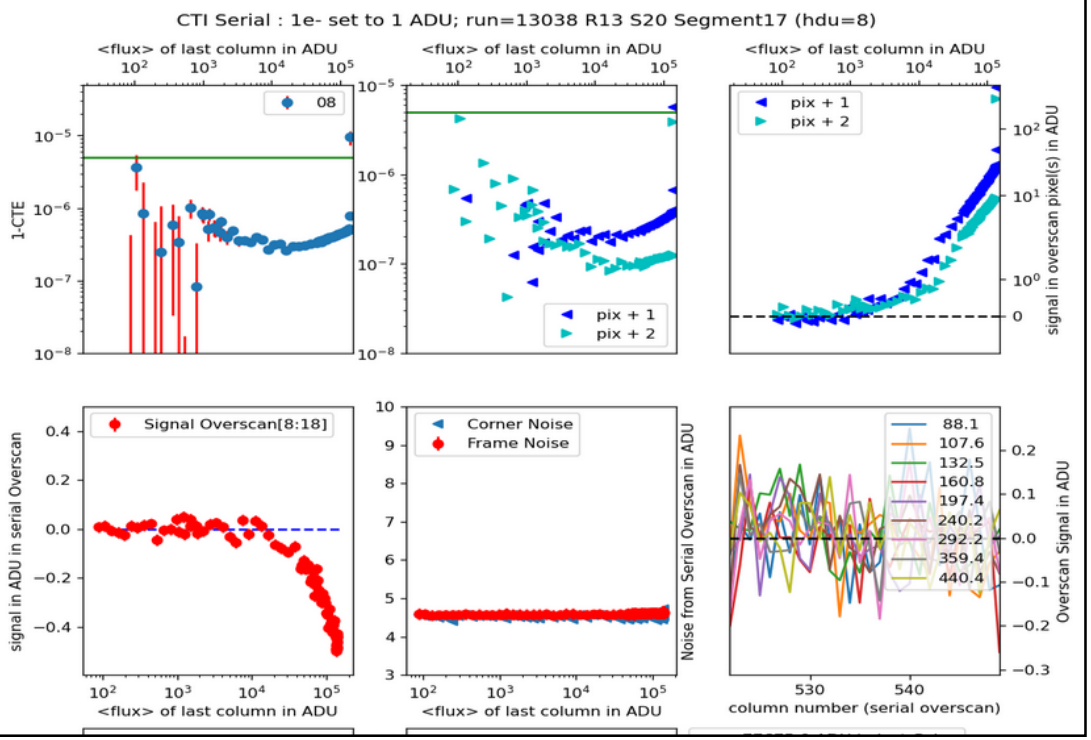
Run 5 PTC data (November-December 2021)

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



Hands-on

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