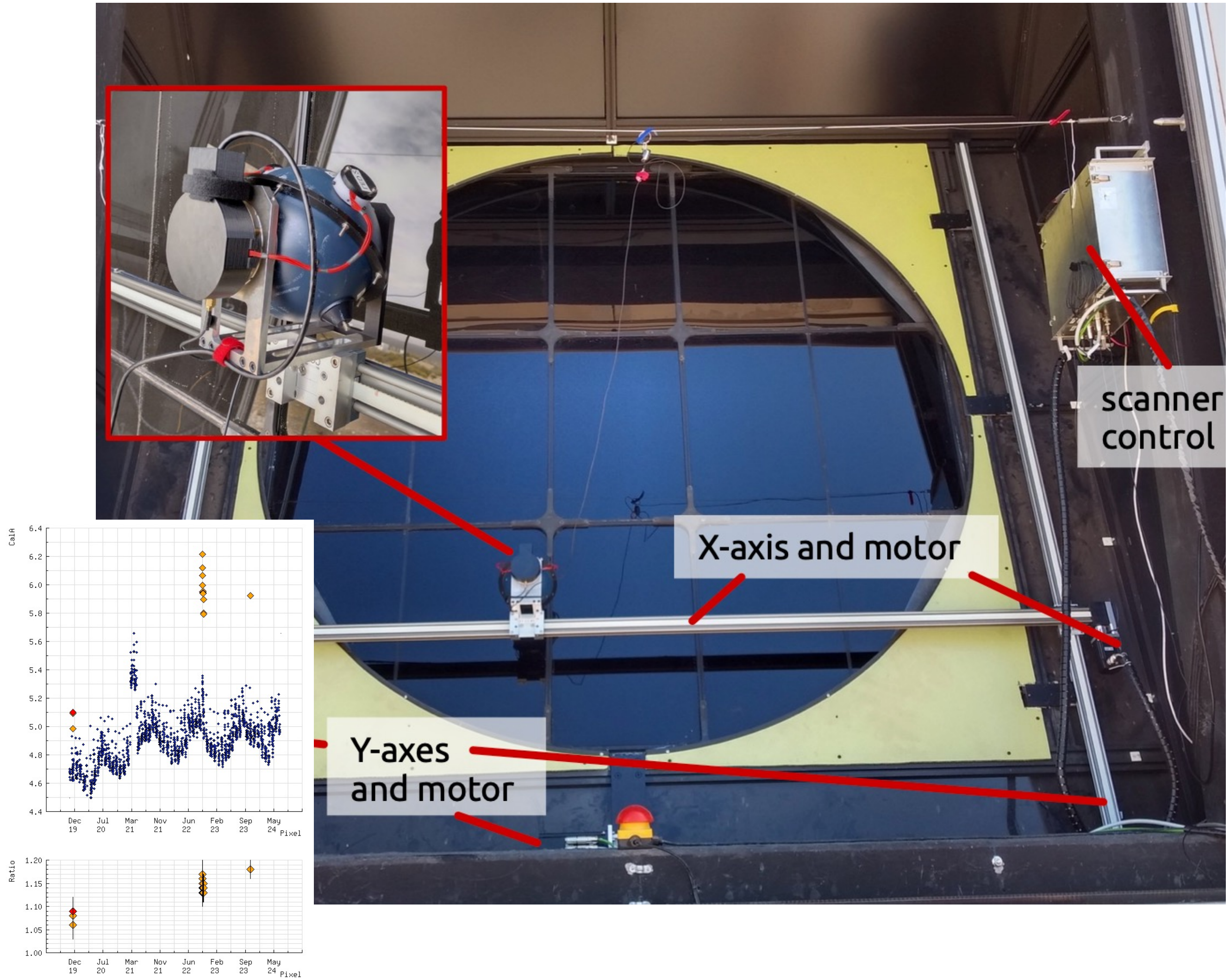
Some notes on XY Calibrations

Gaetano Salina
INFN Sezione di Roma Tor Vergata



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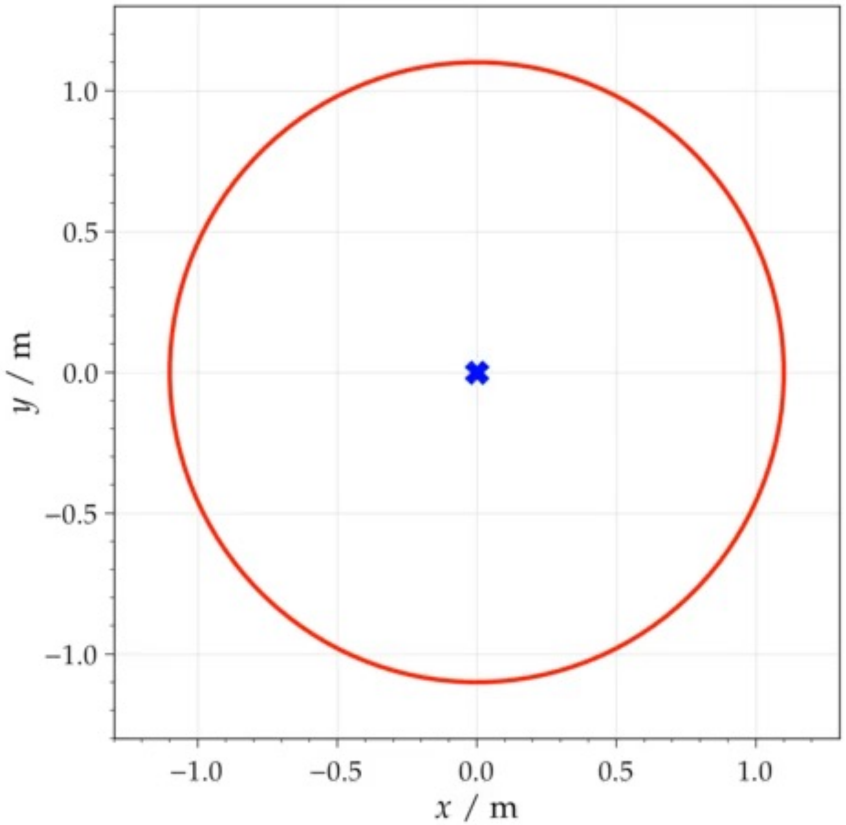
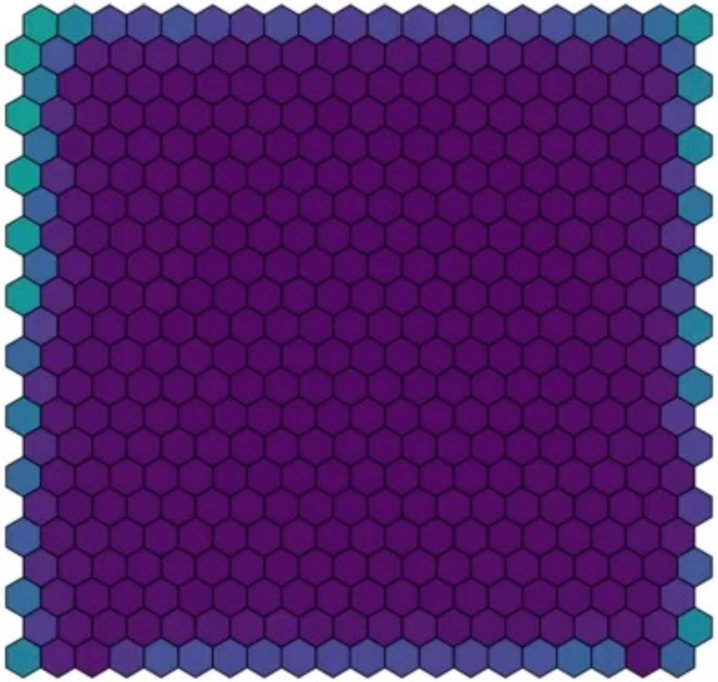




Some note on XY Calibrations

Two different aspects:

- Creating a software environment (FD_Calib_XY DB) integrated with the existing Calibration Database for producing Absolute Calibrations based on XYScanner measurements
- Investigating, through an independent analysis, the reason for the discrepancy between the current CalA and those reconstructed using the XYScanner measurement."

Create A FD_Calib_XY Database

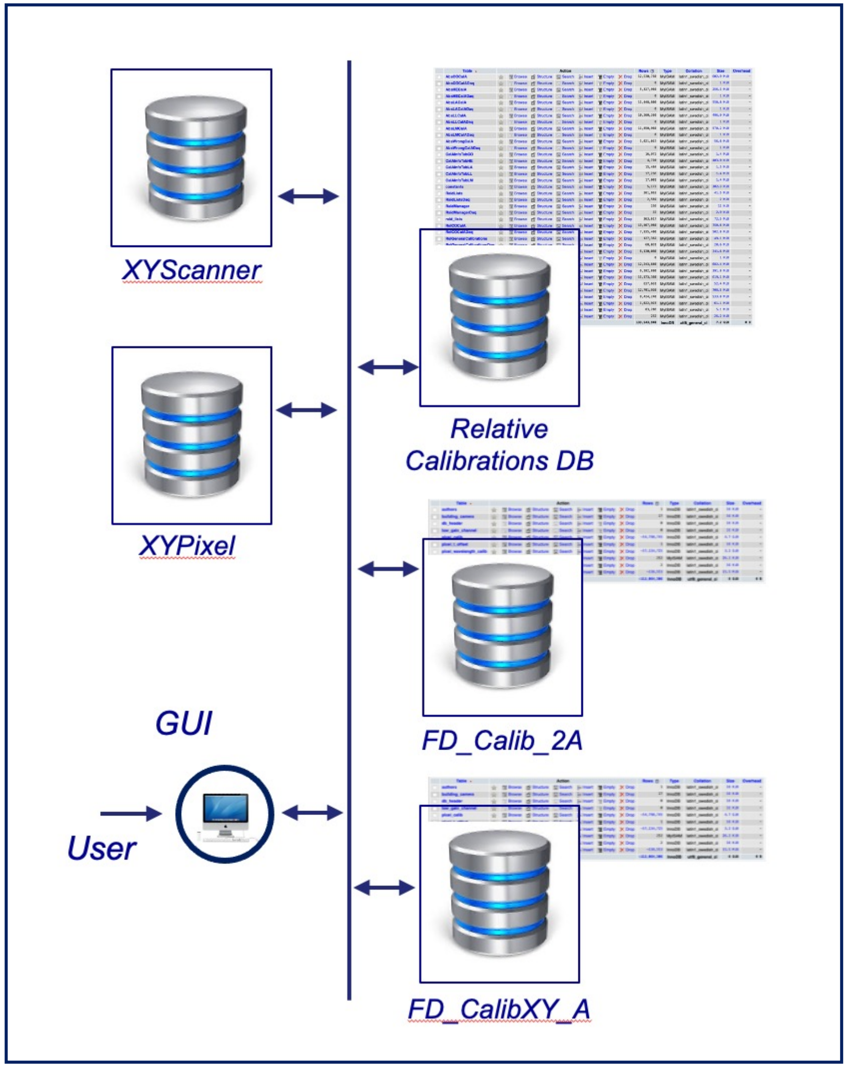
XYScanner

- ***ID_{XY}***
- Source {Kit or Olo or Tube}
- IsOKMeaure
- Time {GPS and UCT}
- CameraMeanValue
- CameraVarianceValue
- PathRootFile
- PathCal$_A$Before
- PathCal$_A$After
- Note

XYPixel

- ***IDP_{XY}***
- ***ID_{XY}***
- Value
- Variance

Easy to to do !



Inserted 90 XY files.

81 from Paul, 9 from Christoph

Mirror 3

2019-11-24 01:41:00	cal_m21_014224x_2019-11-24.01-41.root	P
2019-11-24 05:36:00	cal_m21_014236_2019-11-24.05-36.root	P
2019-11-24 05:36:00	cal_m21_014236_2019-11-24.05-36.root	C
2022-10-15 01:10:00	cal_m21_015427_2022-10-15.01-10.root	P
2022-10-15 01:55:00	cal_m21_015432_2022-10-15.01-55.root	P
2022-10-15 02:20:00	cal_m21_015434_2022-10-15.02-20.root	P
2022-10-15 03:29:00	cal_m21_015437_2022-10-15.03-29.root	P
2022-10-16 02:42:00	cal_m21_015448_2022-10-16.02-42.root	P
2022-10-19 00:53:00	cal_m21_015468_2022-10-19.00-53.root	P
2022-10-19 01:49:00	cal_m21_015470_2022-10-19.01-49.root	P
2022-10-19 02:46:00	cal_m21_015472_2022-10-19.02-46.root	P
2022-10-19 03:38:00	cal_m21_015473_2022-10-19.03-38.root	P
2022-10-23 00:32:00	cal_m21_015483_2022-10-23.00-32.root	P
2022-10-23 01:29:00	cal_m21_015485_2022-10-23.01-29.root	P
2022-10-23 01:53:00	cal_m21_015487_2022-10-23.01-53.root	P
2023-11-08 03:36:00	cal_m21_015941x_2023-11-08.03-36.root	P

Los Leones

Mirror 1

Mirror 2

Mirr

2019-11-21 03:52:00	cal_m03_014
2019-11-22 01:55:00	cal_m03_014
2019-11-22 02:49:00	cal_m03_014
2019-11-22 02:49:00	cal_m03_014
2022-10-25 02:37:00	cal_m03_015
2022-10-25 04:39:00	cal_m03_015

Mirror 4

2019-11-21 02:07:00	cal_m04_014433_2019-11-21.02-07.root	P
2019-11-22 05:11:00	cal_m04_014453_2019-11-22.05-11.root	P
2019-11-22 05:11:00	cal_m04_014453_2019-11-22.05-11.root	C
2022-10-25 00:33:00	cal_m04_015670_2022-10-25.00-33.root	P
2022-10-25 01:32:00	cal_m04_015672_2022-10-25.01-32.root	P

Mirror 5

Mirr

Los Morados

Mirror 1

2023-11-15 04:51:00	cal_m07_012830_2023-11-15.04-51.root	P

Mirror 2

2023-11-15 02:11:00	cal_m08_012822_2023-11-15.02-11.root	P

Mirror 3

2023-11-13 04:15:00	cal_m09_012809_2023-11-13.04-15.root	P

Mirror 4

2023-11-13 02:11:00	cal_m10_012806_2023-11-13.02-11.root	P

Mirror 5

2023-11-15 03:13:00	cal_m11_012825_2023-11-15.03-13.root	P

Mirror 6

Loma Amarilla

Mirror 1

2023-10-20 06:14:00	cal_m13_012328x_2023-10-20.06-14.root	P

Mirror 2

2023-10-19 05:10:00	cal_m14_012292x_2023-10-19.05-10.root	P

Mirror 3

2019-11-29 01:18:00	cal_m15_010702_2019-11-29.01-18.root	P
2019-11-29 01:18:00	cal_m15_010702_2019-11-29.01-18.root	C
2022-10-21 00:28:00	cal_m15_011867_2022-10-21.00-28.root	P
2022-10-21 00:44:00	cal_m15_011868_2022-10-21.00-44.root	P
2023-10-19 01:02:00	cal_m15_012275x_2023-10-19.01-02.root	P
2023-10-19 02:10:00	cal_m15_012279x_2023-10-19.02-10.root	P
2023-10-19 03:11:00	cal_m15_012282x_2023-10-19.03-11.root	P

Mirror 4

2019-11-29 02:25:00	cal_m16_010705_2019-11-29.02-25.root	P
2019-11-29 02:25:00	cal_m16_010705_2019-11-29.02-25.root	C
2019-11-29 03:13:00	cal_m16_010708_2019-11-29.03-13.root	P
2022-10-21 01:10:00	cal_m16_011871_2022-10-21.01-10.root	P
2022-10-21 01:26:00	cal_m16_011872_2022-10-21.01-26.root	P
2022-10-21 01:45:00	cal_m16_011875_2022-10-21.01-45.root	P
2023-10-20 01:04:00	cal_m16_012301x_2023-10-20.01-04.root	P

Mirror 5

2023-10-20 02:48:00	cal_m17_012307x_2023-10-20.02-48.root	P

Mirror 6

2023-10-20 04:30:00	cal_m18_012320x_2023-10-20.04-30.root	P

Coihueco

Mirror 2

cal_m20_015952x_2023-11-08.05-50.root	P
cal_m20_015967_2023-11-11.02-52.root	P

Mirror 3

2019-11-24 01:41:00	cal_m21_014224x_2019-11-24.01-41.root	P
2019-11-24 05:36:00	cal_m21_014236_2019-11-24.05-36.root	P
2019-11-24 05:36:00	cal_m21_014236_2019-11-24.05-36.root	C
2022-10-15 01:10:00	cal_m21_015427_2022-10-15.01-10.root	P
2022-10-15 01:55:00	cal_m21_015432_2022-10-15.01-55.root	P
2022-10-15 02:20:00	cal_m21_015434_2022-10-15.02-20.root	P
2022-10-15 03:29:00	cal_m21_015437_2022-10-15.03-29.root	P
2022-10-16 02:42:00	cal_m21_015448_2022-10-16.02-42.root	P
2022-10-19 00:53:00	cal_m21_015468_2022-10-19.00-53.root	P
2022-10-19 01:49:00	cal_m21_015470_2022-10-19.01-49.root	P
2022-10-19 02:46:00	cal_m21_015472_2022-10-19.02-46.root	P
2022-10-19 03:38:00	cal_m21_015473_2022-10-19.03-38.root	P
2022-10-23 00:32:00	cal_m21_015483_2022-10-23.00-32.root	P
2022-10-23 01:29:00	cal_m21_015485_2022-10-23.01-29.root	P
2022-10-23 01:53:00	cal_m21_015487_2022-10-23.01-53.root	P
2023-11-08 03:36:00	cal_m21_015941x_2023-11-08.03-36.root	P

Mirror 4

2019-11-24 02:43:00	cal_m22_014228_2019-11-24.02-43.root	P
2019-11-24 02:43:00	cal_m22_014228_2019-11-24.02-43.root	C
2019-11-24 04:25:00	cal_m22_014233_2019-11-24.04-25.root	P
2022-10-16 03:50:00	cal_m22_015451_2022-10-16.03-50.root	P
2022-10-16 04:40:00	cal_m22_015453_2022-10-16.04-40.root	P
2022-10-16 05:00:00	cal_m22_015454_2022-10-16.05-00.root	P
2022-10-16 05:20:00	cal_m22_015456_2022-10-16.05-20.root	P
2022-10-16 05:28:00	cal_m22_015457_2022-10-16.05-28.root	P
2023-11-08 02:27:00	cal_m22_015934x_2023-11-08.02-27.root	P

Mirror 5

2019-11-30 02:10:00	cal_m23_014254x_2019-11-30.02-10.root	P
2019-11-30 02:10:00	cal_m23_014254x_2019-11-30.02-10.root	C
2019-11-30 03:44:00	cal_m23_014266x_2019-11-30.03-44.root	P
2019-11-30 04:55:00	cal_m23_014270_2019-11-30.04-55.root	P
2022-10-16 01:29:00	cal_m23_015443x_2022-10-16.01-29.root	P
2023-11-07 04:52:00	cal_m23_015920x_2023-11-07.04-52.root	P
2023-11-17 04:02:00	cal_m23_015984x_2023-11-17.04-02.root	P

Mirror 6

2022-10-23 02:56:00	cal_m24_015490x_2022-10-23.02-56.root	P
2023-11-07 06:11:00	cal_m24_015925x_2023-11-07.06-11.root	P

Heat

Mirror 1

2019-11-27 02:37:00	cal_m25_004520_2019-11-27.02-37.root	P
2022-10-22 00:49:00	cal_m25_005616x_2022-10-22.00-49.root	P
2023-10-13 01:33:00	cal_m25_006020x_2023-10-13.01-33.root	P
2023-11-09 06:21:00	cal_m25_006070_2023-11-09.06-21.root	P

Mirror 2

2019-11-27 04:01:00	cal_m26_004523x_2019-11-27.04-01.root	P
2019-11-28 04:59:00	cal_m26_004547x_2019-11-28.04-59.root	P
2019-11-28 04:59:00	cal_m26_004547x_2019-11-28.04-59.root	C
2022-10-22 02:16:00	cal_m26_005621x_2022-10-22.02-16.root	P
2023-10-13 03:09:00	cal_m26_006667_2023-10-13.03-09.root	P
2023-10-13 03:09:00	cal_m26_006025_2023-10-13.03-09.root	P
2023-11-10 01:23:00	cal_m26_006666_2023-11-10.01-23.root	P
2023-11-10 01:23:00	cal_m26_006075_2023-11-10.01-23.root	P
2023-11-17 07:03:00	cal_m26_006101_2023-11-17.07-03.root	P

Mirror 3

2019-11-28 01:58:00	cal_m27_004530x_2019-11-28.01-58.root	P
2019-11-28 01:58:00	cal_m27_004530x_2019-11-28.01-58.root	C
2019-11-28 03:19:00	cal_m27_004538x_2019-11-28.03-19.root	P
2022-10-22 03:41:00	cal_m27_005626x_2022-10-22.03-41.root	P
2023-10-14 01:00:00	cal_m27_006031x_2023-10-14.01-00.root	P
2023-11-09 04:59:00	cal_m27_006066_2023-11-09.04-59.root	P

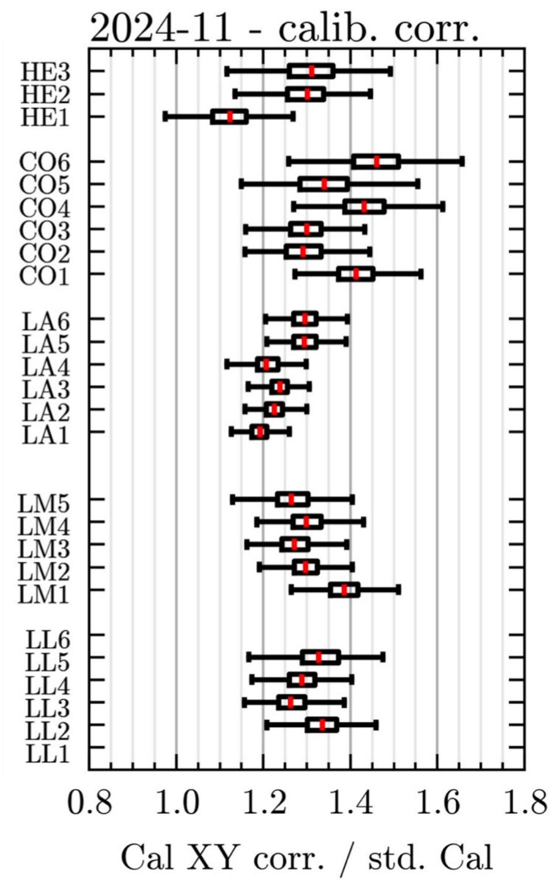
November – December 2024

Shift period from November 20th to 28th

	11-20	11-21	11-22	11-23	11-24	11-25	11-26	11-27	11-28
LL	Rain		Lightning			XY scan, Bay 1 SLT problems	XY scan, LV problems		
LM			Lightning	Bay 1 reattach, Lightning	Power cut	Power cut	Communications problems	Bay 1 reattach	Bay 1 reattach
LA			Lightning					XY scan	XY scan
CO	XY scan	XY scan	Lightning						
HE	Mirror PC 2 and 3 problems	Mirror PC 2 problems	XY scan		Bay 2 Shutter problems				

Shift period from November 29th to December 6th

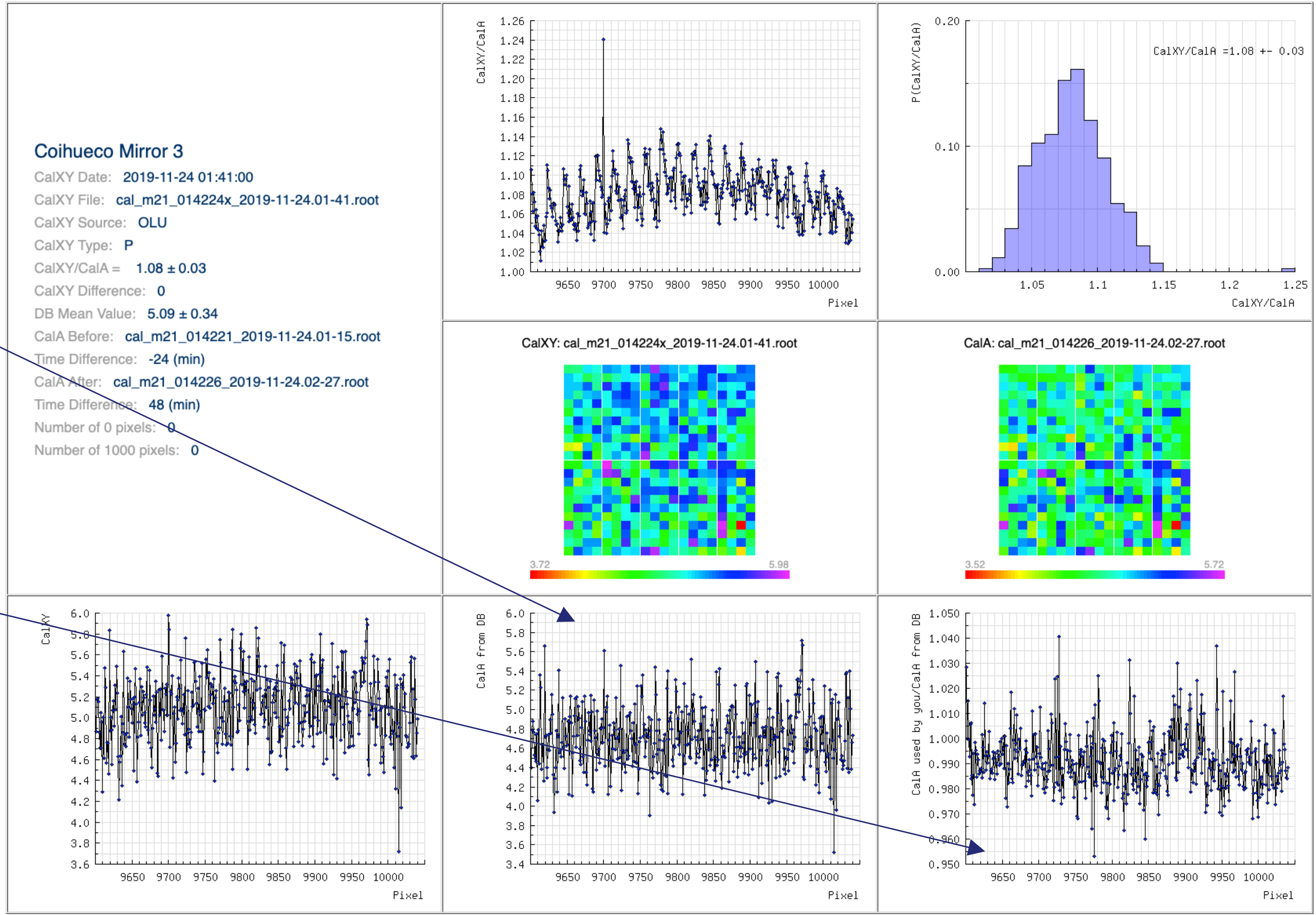
	11-29	11-30	12-01	12-02	12-03	12-04	12-05	12-06
LL				Power cut			Time error	
LM	XY scan	Bay 1 reattach, CAEN	Bay 1 reattach	Power cut	XY scan		Wind	Lightning
LA				Power cut		No LIDAR		Lightning
CO				Power cut	Light in Bay 2, HV, LV problems	Wind	Wind	Lightning
HE		Bay 2 Shutter problems	Bay 2 Shutter problems	Power cut		Wind	Wind	Lightning



Details !

I select the closest CalA after CalXY time.

Selected CalA is not the CalA used by Kit



Details !

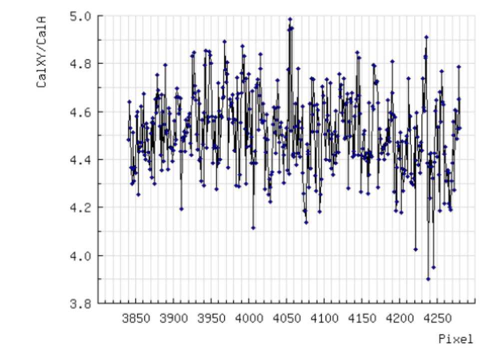
?

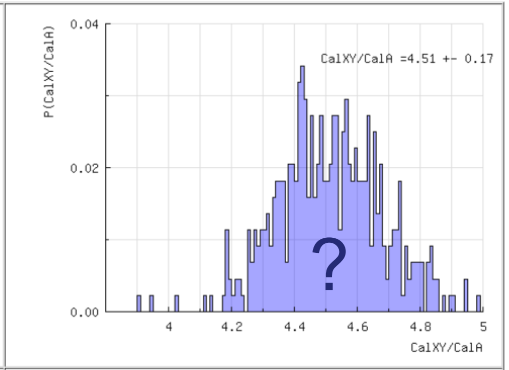
What's happened ?

See below...

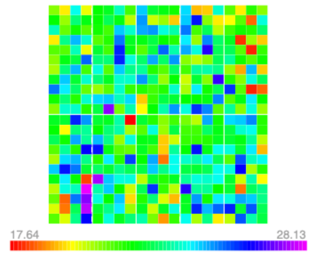
Los Morados Mirror 3

CalXY Date: 2023-11-13 04:15:00
CalXY File: cal_m09_012809_2023-11-13.04-15.root
CalXY Source: OLU
CalXY Type: P
CalXY/CalA = 4.51 ± 0.17
CalXY Difference: 0
CalA Before: cal_m09_012808_2023-11-13.04-10.root
Time Difference: -2 (min)
CalA After: cal_m09_012810_2023-11-13.05-04.root
Time Difference: 52 (min)
Number of 0 pixels: 0
Number of 1000 pixels: 0

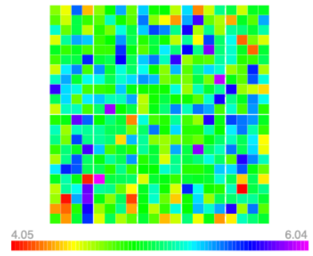


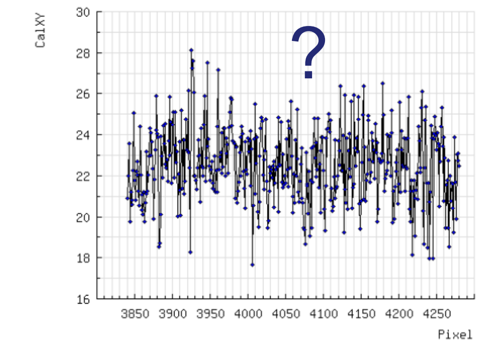


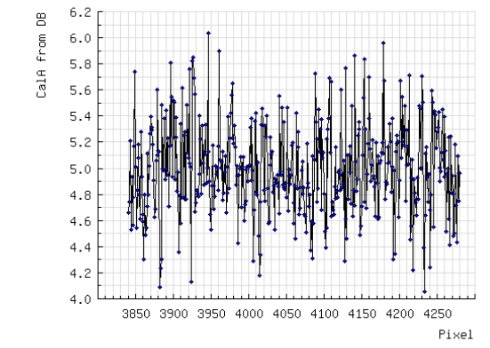
CalXY: cal_m09_012809_2023-11-13.04-15.root

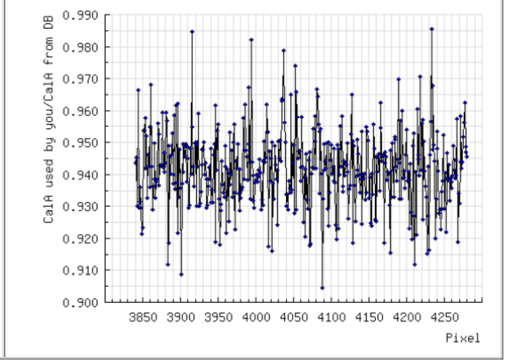


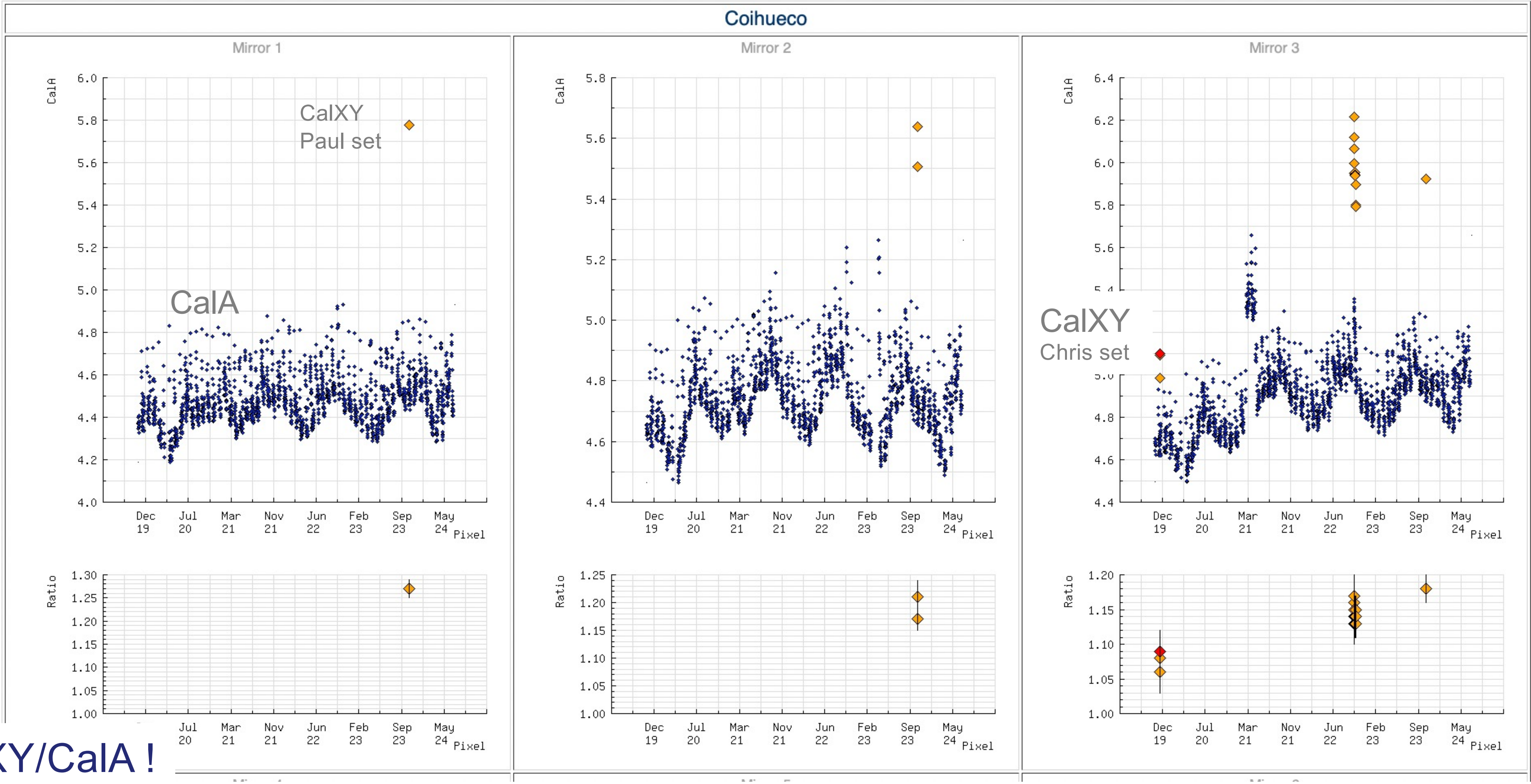
CalA: cal_m09_012810_2023-11-13.05-04.root









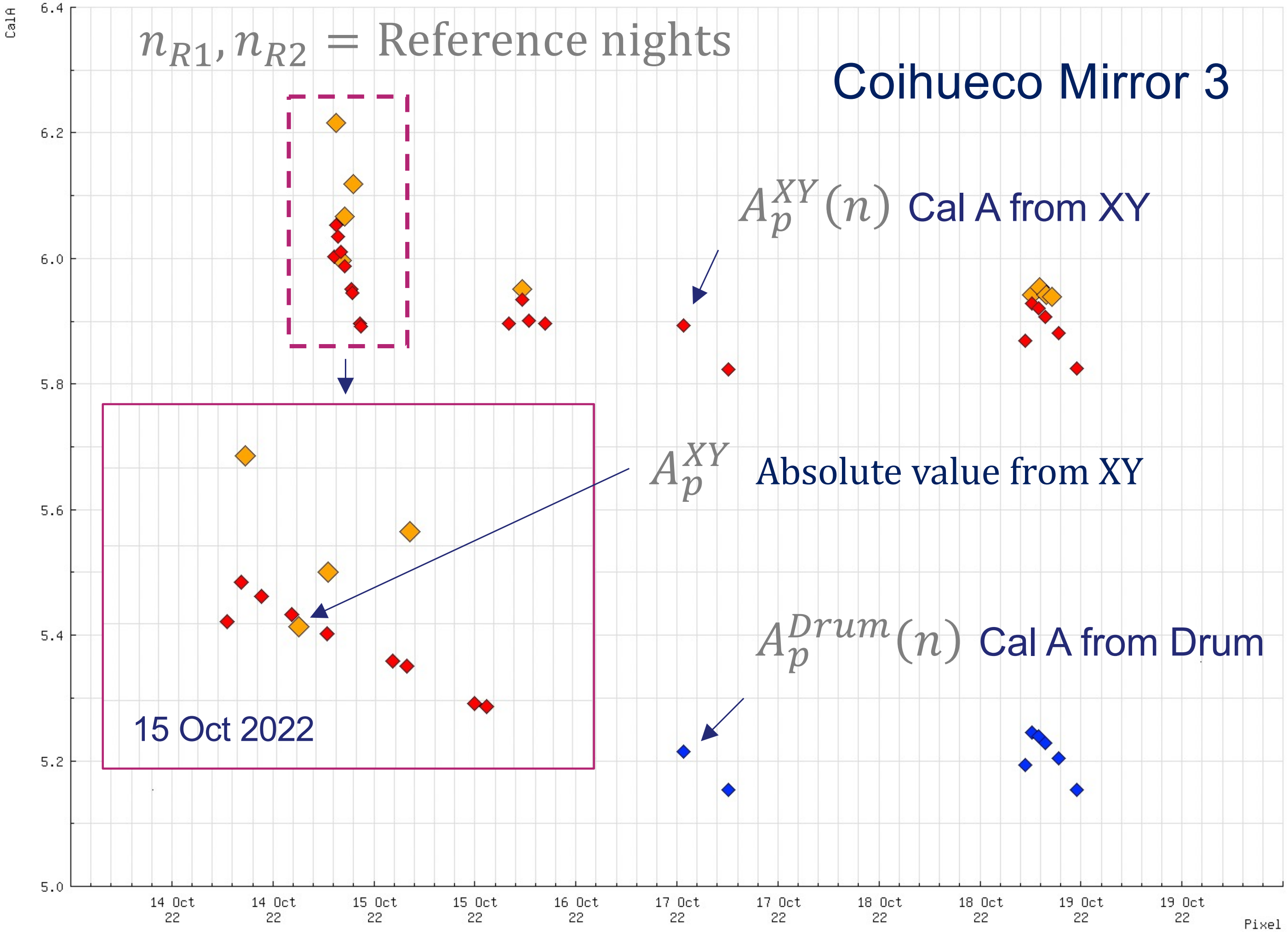

Coihueco
Mirror 1
Mirror 2
Mirror 3
CalA
CalXY
Paul set
CalA
CalXY
Chris set
Ratio
Pixel
Dec 19
Jul 20
Mar 21
Nov 21
Jun 22
Feb 23
Sep 23
May 24

CalXY/CalA !

Generate,pixel by pixel, new CalAs $A_p^{XY}(n)$ given a reference CalXY n_{R2} taken right after an XY measurement A_p^{XY}.

$$A_p^{Drum}(n) = C_p^{halo} \frac{C^{LCU}(n)}{C^{LCU}(n_{R1})} \frac{R_p(n_{R1})}{R_p(n)} C_{Cor}^{LCU} A_p^{Drun}$$

$$A_p^{XY}(n) = \frac{C^{LCU}(n)}{C^{LCU}(n_{R2})} \frac{R_p(n_{R2})}{R_p(n)} A_p^{XY}$$



Generate,pixel by pixel, new CalAs $A_p^{XY}(n)$ given the drum value $A_p^{Drum}(n)$

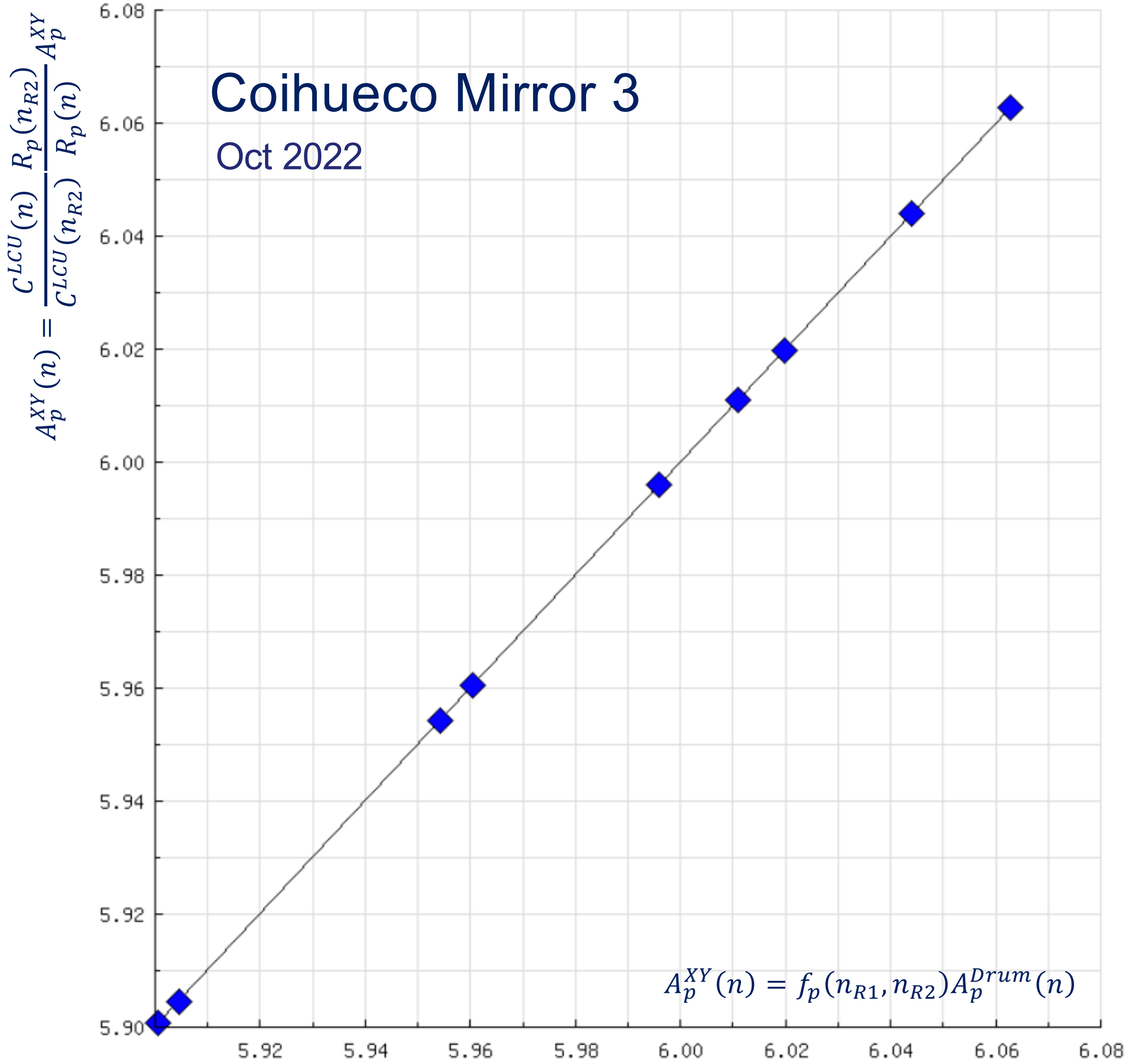
$$A_p^{Drum}(n) = C_p^{halo}\frac{C^{LCU}(n)}{C^{LCU}(n_{R1})}\frac{R_p(n_{R1})}{R_p(n)}C_{Cor}^{LCU}A_p^{Drun}$$

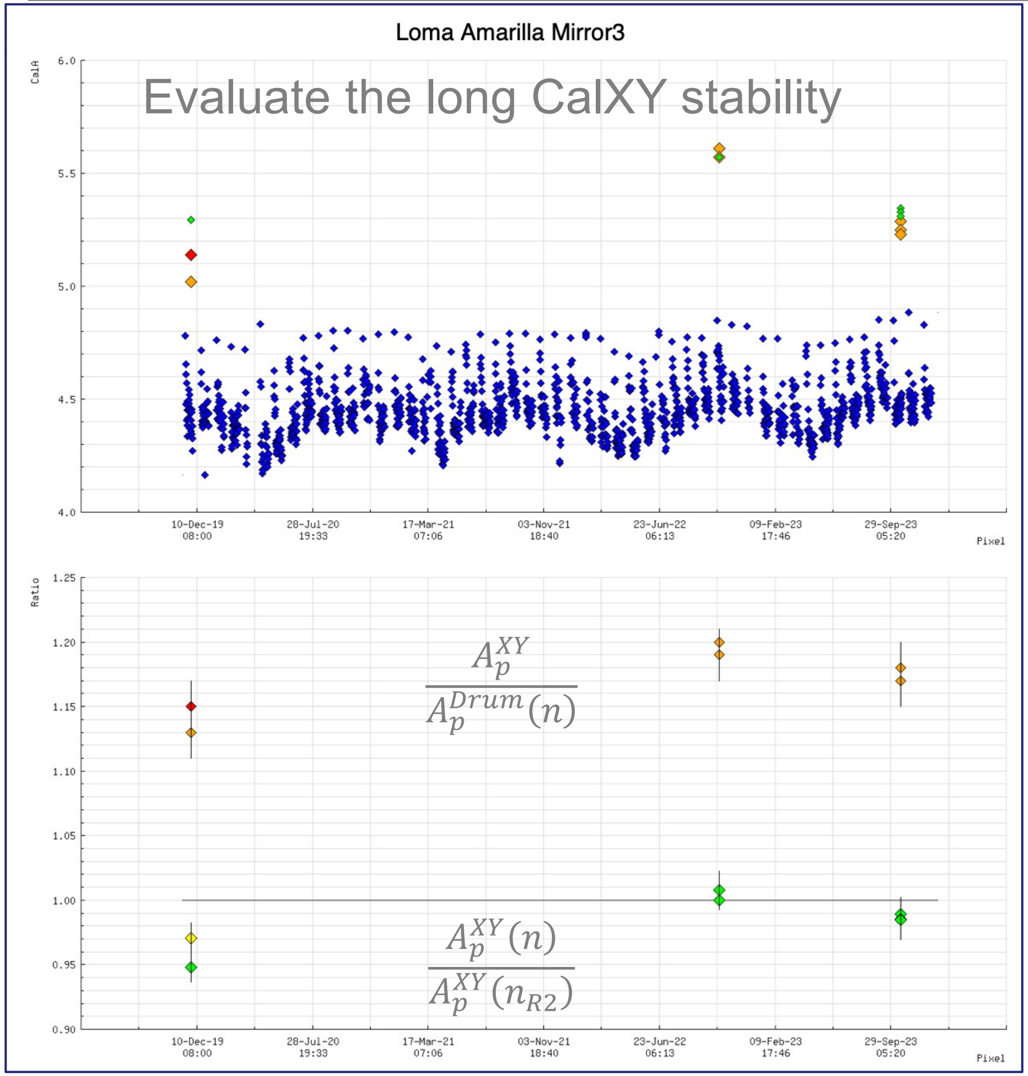
$$A_p^{XY}(n) = \frac{C^{LCU}(n)}{C^{LCU}(n_{R2})}\frac{R_p(n_{R2})}{R_p(n)}A_p^{XY}$$

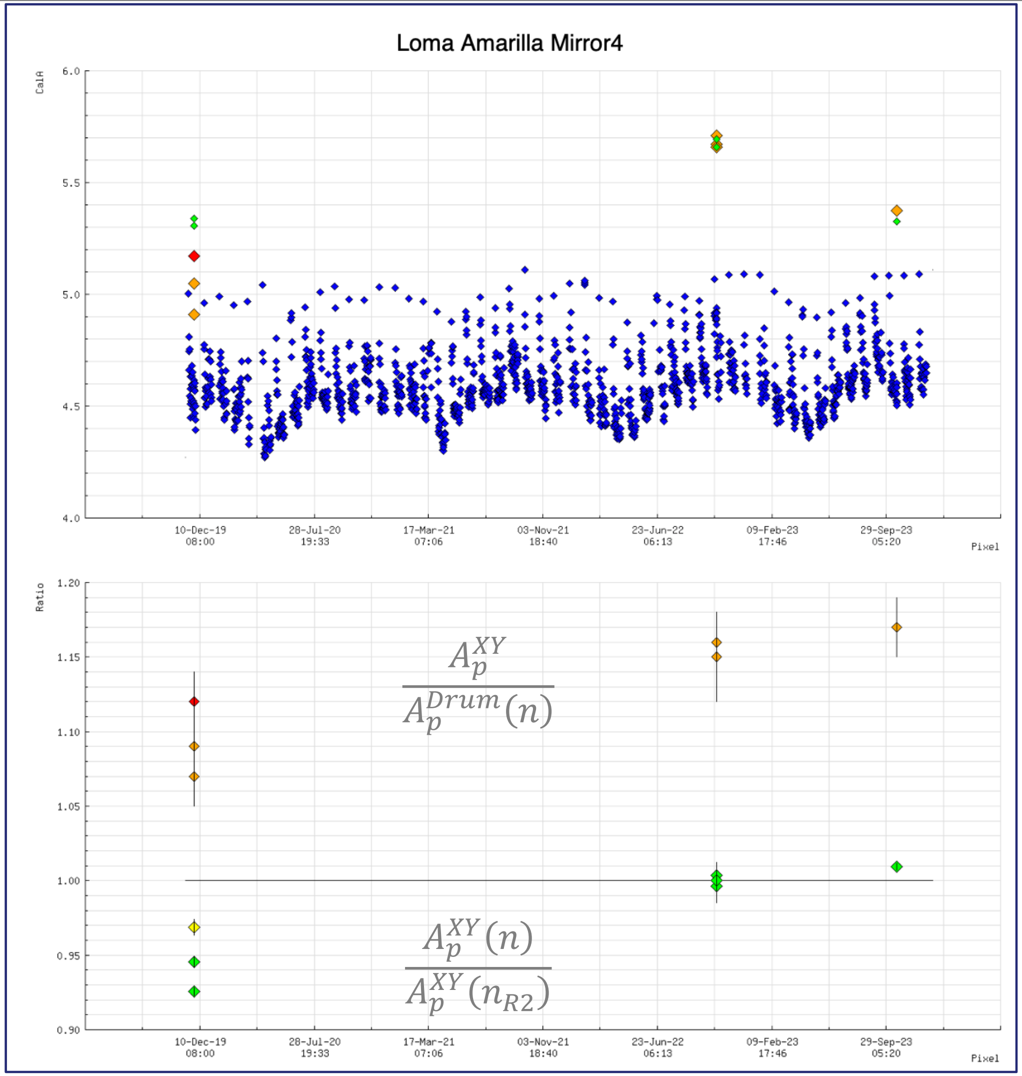
With a bit of algebra

$$A_p^{XY}(n) = f_p(n_{R1}, n_{R2})A_p^{Drum}(n)$$

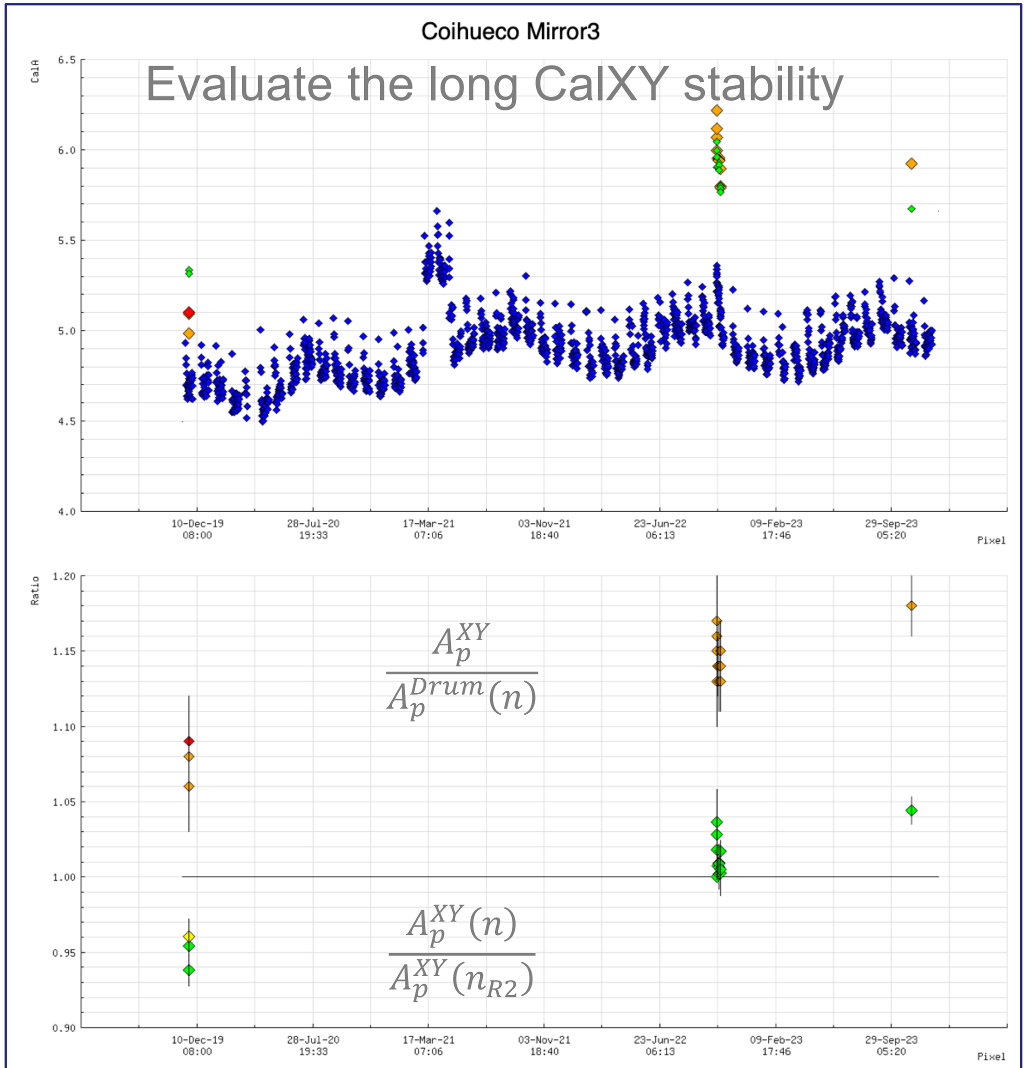
$$f_p(n_{R1}, n_{R2}) = \frac{1}{C_p^{halo}C_{Cor}^{LCU}}\frac{C^{LCU}(n_{R1})}{C^{LCU}(n_{R2})}\frac{R_p(n_{R2})}{R_p(n_{R1})}\frac{A_p^{XY}}{A_p^{Drun}}$$

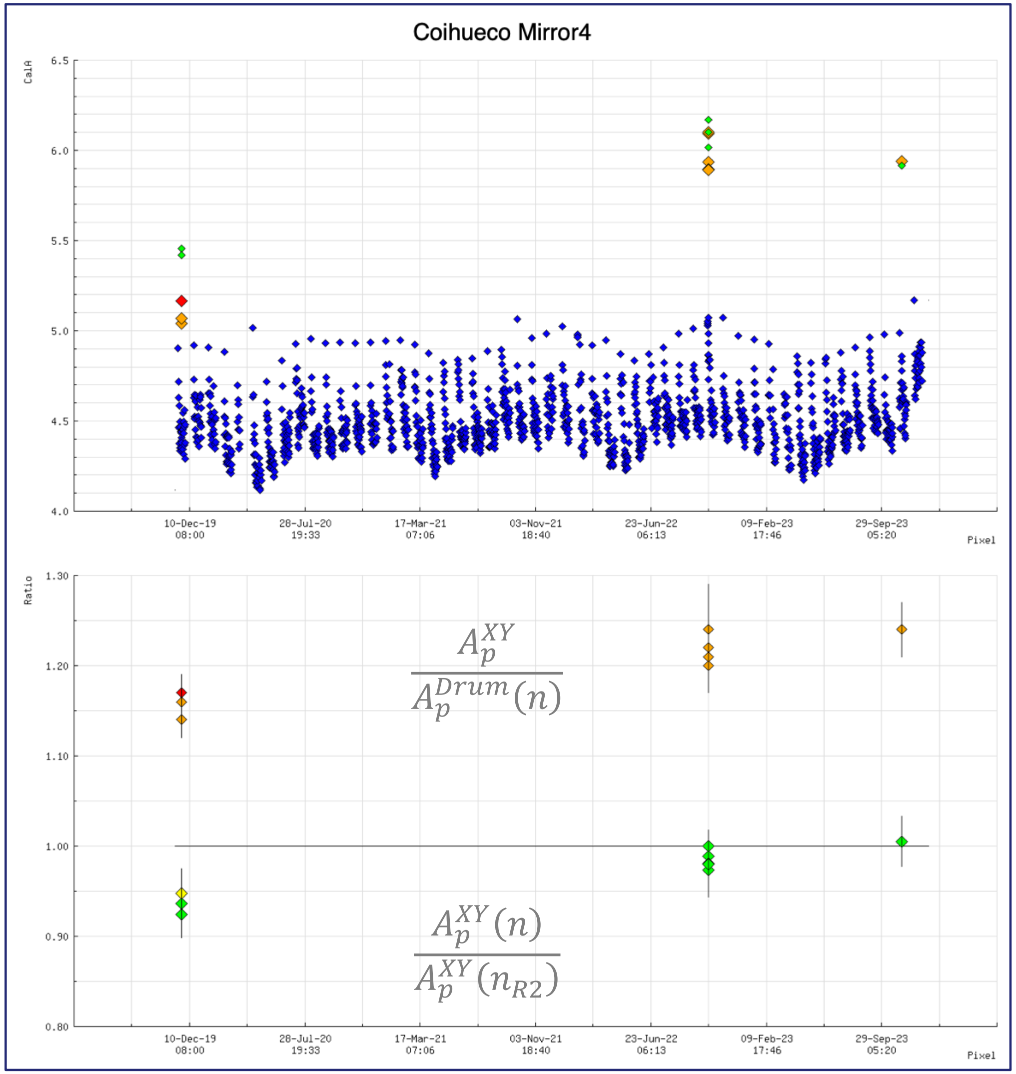



Loma Amarilla Mirror3
Evaluate the long CalXY stability
CalA
6.0
5.5
5.0
4.5
4.0
10-Dec-19 08:00
28-Jul-20 19:33
17-Mar-21 07:06
03-Nov-21 18:40
23-Jun-22 06:13
09-Feb-23 17:46
29-Sep-23 05:20
Pixel
Ratio
1.25
1.20
1.15
1.10
1.05
1.00
0.95
0.90
$\frac{A_p^{XY}}{A_p^{Drum}(n)}$
$\frac{A_p^{XY}(n)}{A_p^{XY}(n_{R2})}$

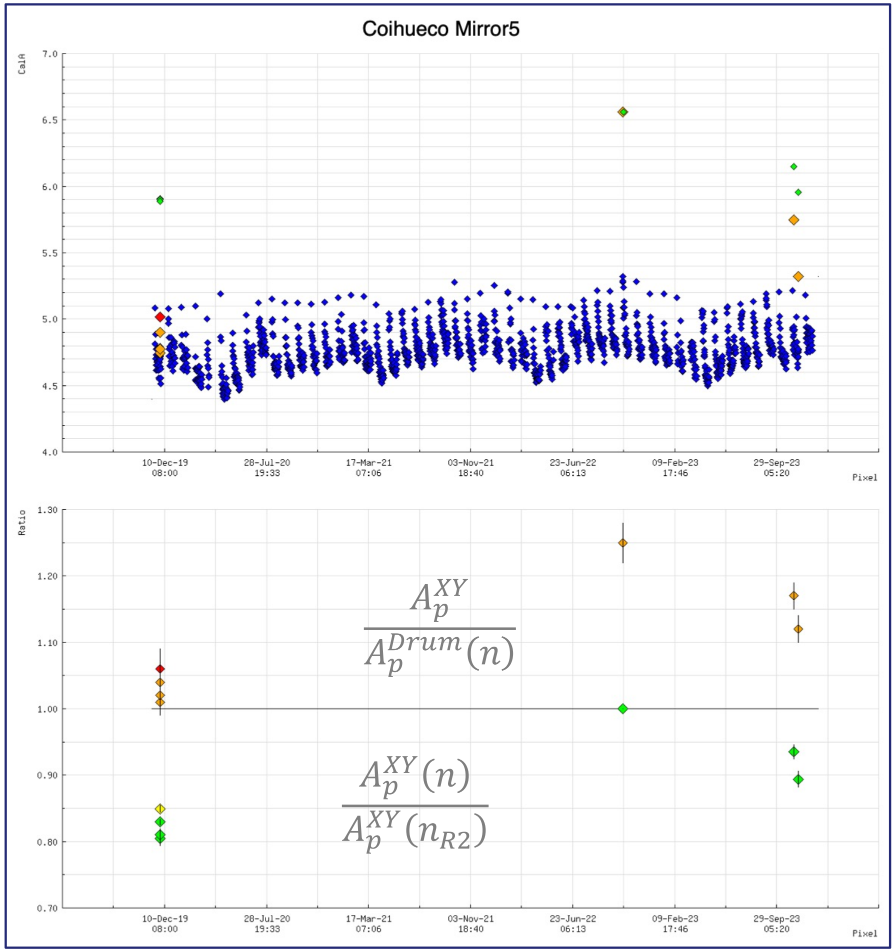

Loma Amarilla Mirror4
CalA
6.0
5.5
5.0
4.5
4.0
10-Dec-19 08:00
28-Jul-20 19:33
17-Mar-21 07:06
03-Nov-21 18:40
23-Jun-22 06:13
09-Feb-23 17:46
29-Sep-23 05:20
Pixel
Ratio
1.20
1.15
1.10
1.05
1.00
0.95
0.90
$\frac{A_p^{XY}}{A_p^{Drum}(n)}$
$\frac{A_p^{XY}(n)}{A_p^{XY}(n_{R2})}$

Evaluate the long CalXY stability

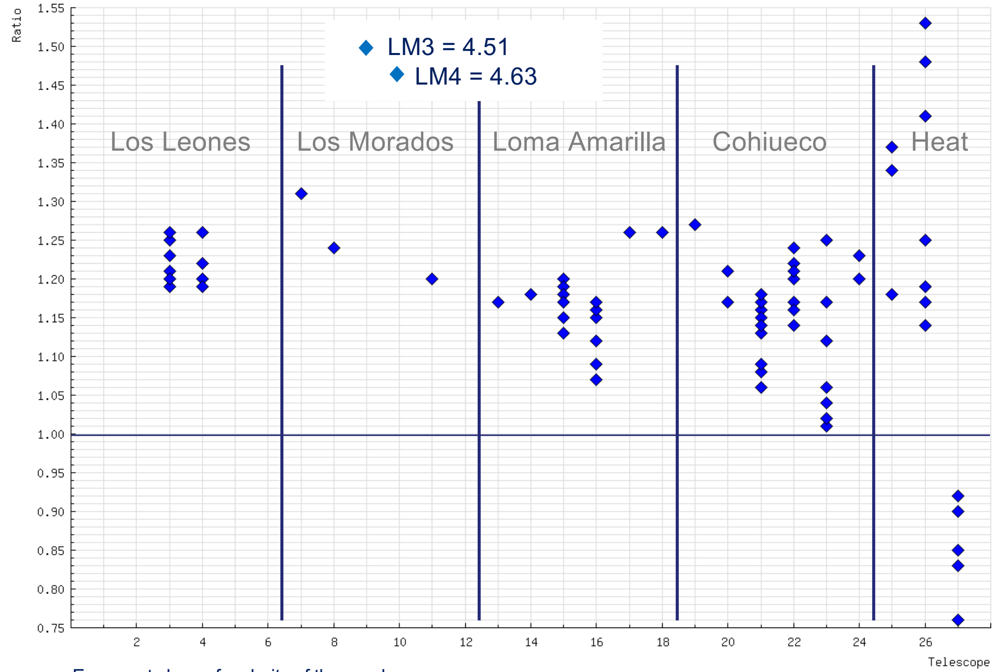




Evaluate the long CalXY stability

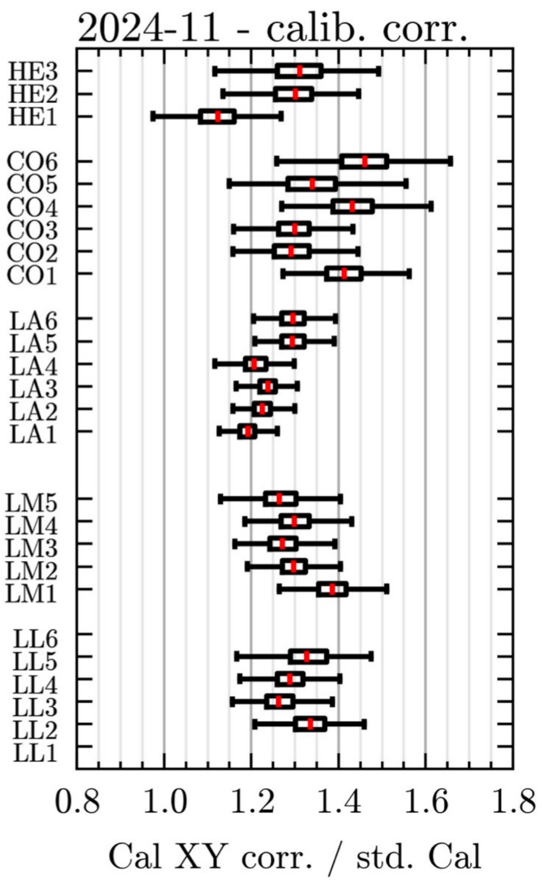


The XYScanner values fluctuate a bit.

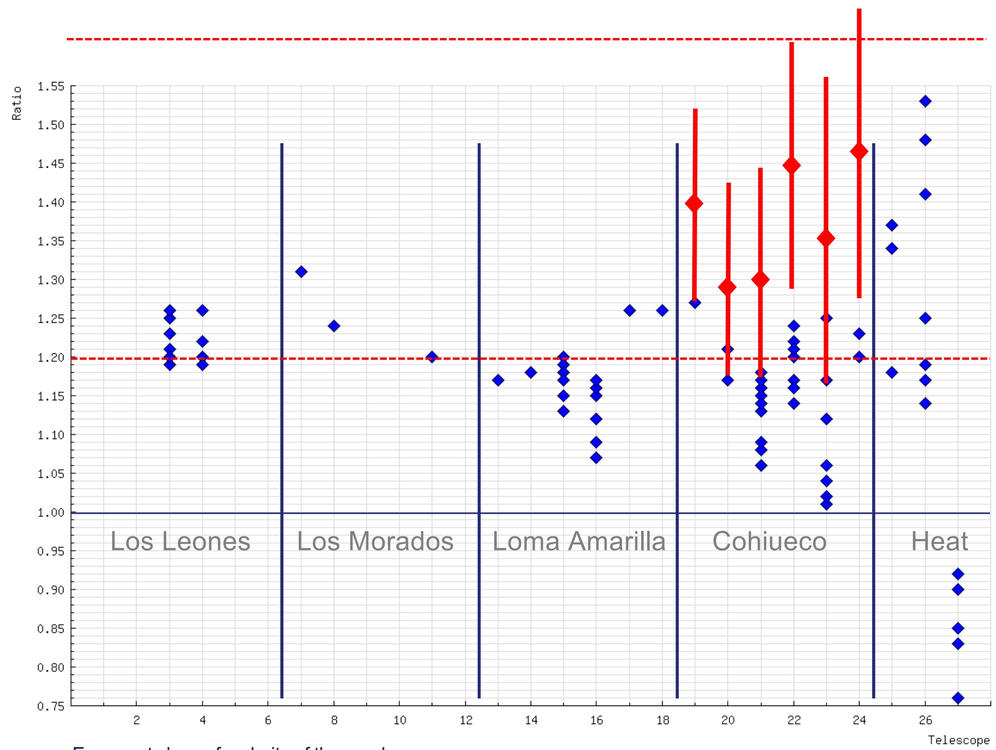


Errors not shown for clarity of the graph

Evaluate the long CalXY stability

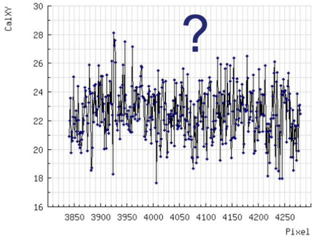


The XYScanner values fluctuate a bit.



Errors not shown for clarity of the graph

- LM3 = 4.51
- LM4 = 4.63



Los Morados 3:
What's happened ?

File cal_m09_012809_2023-11-13.04-15.root

A) Analyzed at 2023/11/14 by Christoph, I suppose ! It is part of the 81 original files.

B) Analyzed at 2024/10/29 by myself using the Kit scripts.

Were different scripts used ?

A

```
# /home/quizznor/xy-data/2023nov/cal_m09_012809_2023-11-13.04-15.root
# analyzed at 2023-11-14 20:23 on beep-boop
# spherCalib: 2.37507e+09
# pixel calibConst adcSum stdCalib calibConstCorr
# nEvents 1567
1 20.4957 2.60012e+07 4.39925 20.896451740271402
2 21.4255 2.47439e+07 4.48018 21.996089073680263
3 22.9302 2.31549e+07 4.84272 23.588864658774373
4 19.2326 2.75933e+07 4.37448 19.76852732611296
5 20.6546 2.57323e+07 4.58927 21.227148937391792
6 20.2317 2.62295e+07 4.45127 20.822895852750293
7 19.9066 2.67053e+07 4.27214 20.603027326616438
8 21.5683 2.45844e+07 4.80376 22.275676186571204
9 24.1211 2.20762e+07 5.28742 25.045667286355002
10 21.0772 2.51606e+07 4.62884 21.775549539005695
```

B

```
# /storage/gpfs_data/auger/fabiocon/2022oct/cal_m09_012809_2023-11-13.04-15.root
# analyzed at 2024-10-29 19:23 on ui7-auger.cr.cnaf.infn.it
# spherCalib: 2.34323e+09
# pixel calibConst adcSum stdCalib
# nEvents 1567
1 5.34362 9.8392e+07 4.49041
2 5.5939 9.35027e+07 4.58813
3 5.98037 8.75914e+07 4.94985
4 5.02146 1.04268e+08 4.50644
5 5.38168 9.74353e+07 4.70463
6 5.28205 9.91196e+07 4.51515
7 5.19299 1.00999e+08 4.38244
8 5.62843 9.29452e+07 4.76335
9 6.29541 8.34518e+07 5.24158
10 5.50317 9.50738e+07 4.70519
```

Start and Stop detection !

An independent and systematic analysis of XY Scanner data needs to be conducted !

What is the algorithm used for detecting the start and stop?

Is it stable ?

Start and Stop detection may not be so easy

CHAPTER 7. NOVEL CALIBRATION OF FLUORESCENCE TELESCOPES

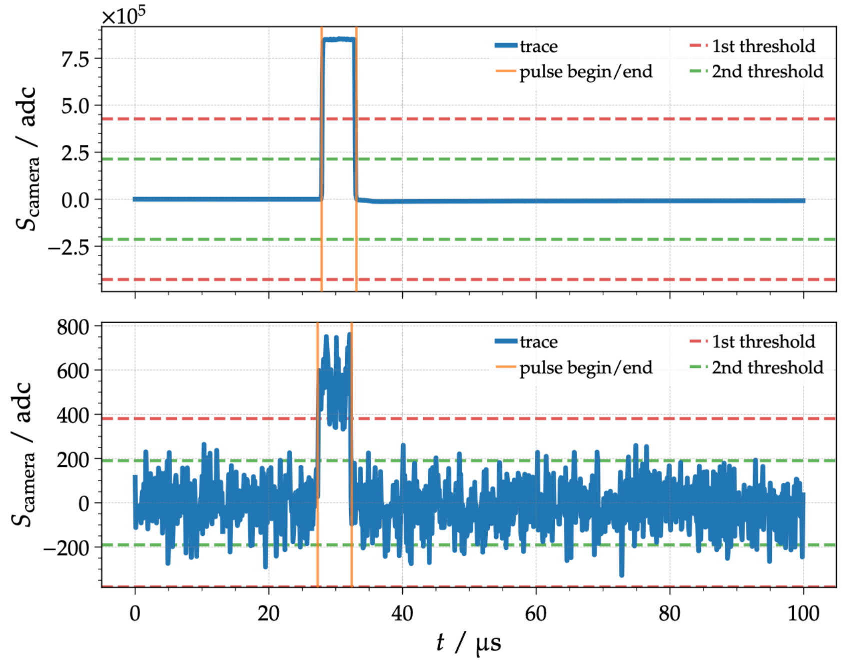
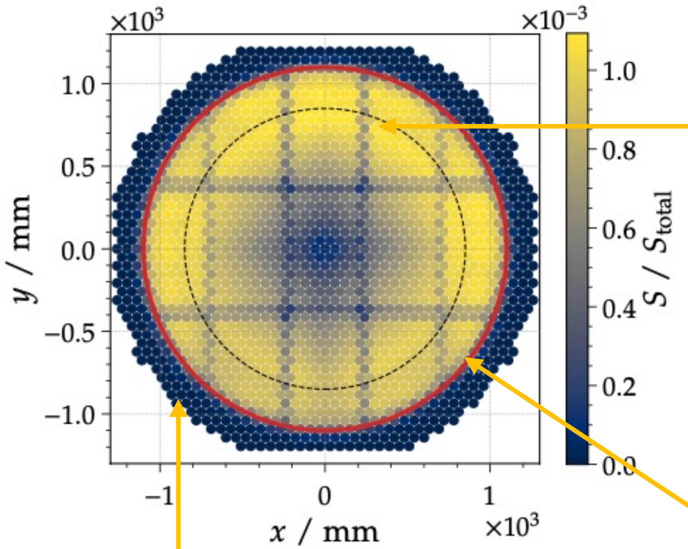
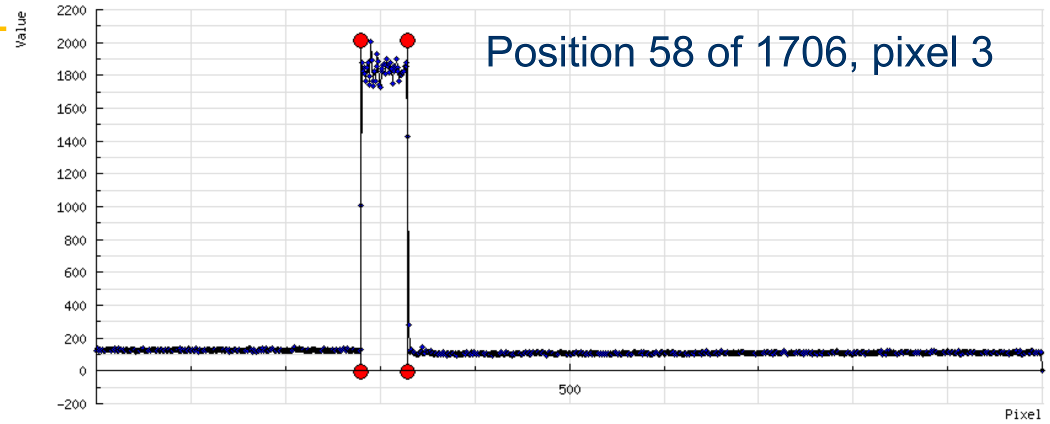


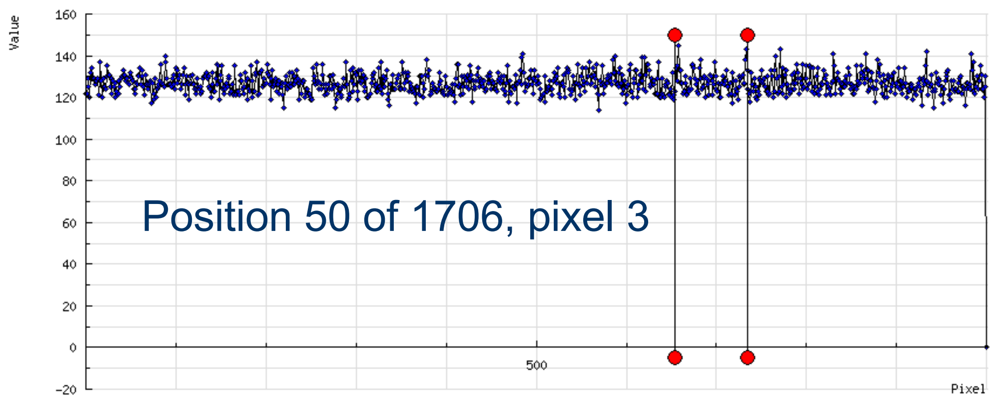
Figure 7.1: Typical trace captured by the telescope camera for an event during an XY-Scanner measurement. The plotted trace is the sum of all 440 pixel-PMT traces for a single event. Additionally we draw the thresholds for the pulse-finding algorithm as horizontal lines and the determined pulse begin/end as vertical lines. *Top:* The light source is well contained in the aperture opening. *Bottom:* Light source is located at a large radius, already partially obscured by the telescope diaphragm. Note the large change if the signal scale between the two plots.

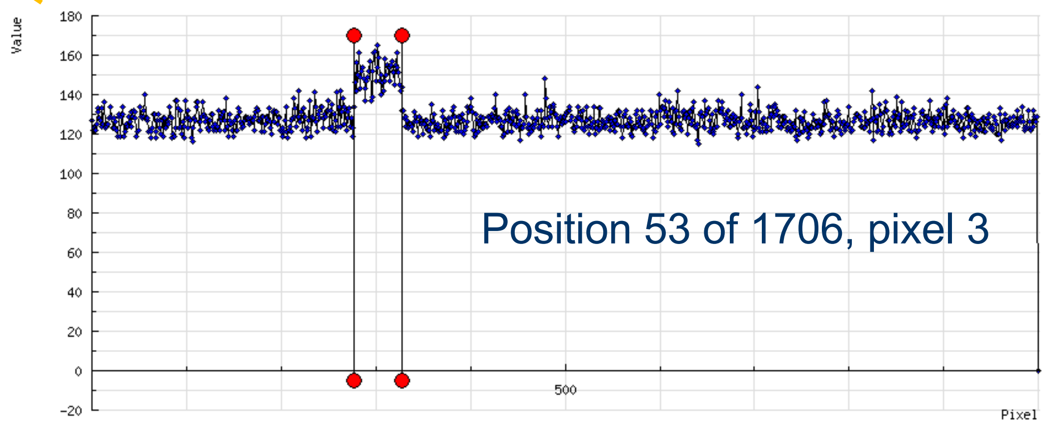
Cohiueco
Mirror 3
Run 15487
OLO
Step = 6

Start and Stop detection: ADC Trace







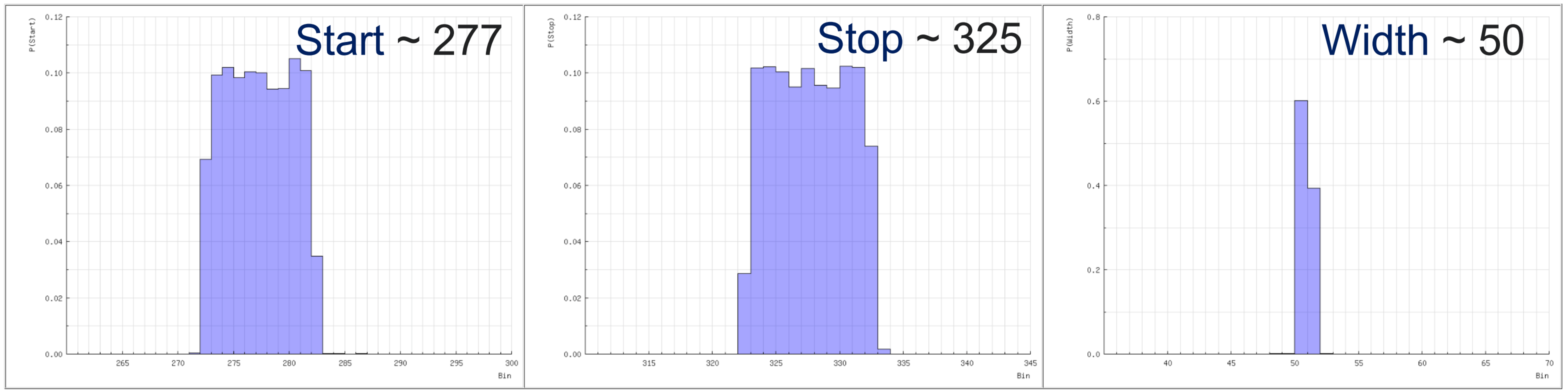


Start and Stop detection: Start, Stop Time

Cohiueco
Mirror 3
Run 15437
Run 15468
Run 15470
Run 15472
Run 15487
OLO
Step = 6

Kit Code

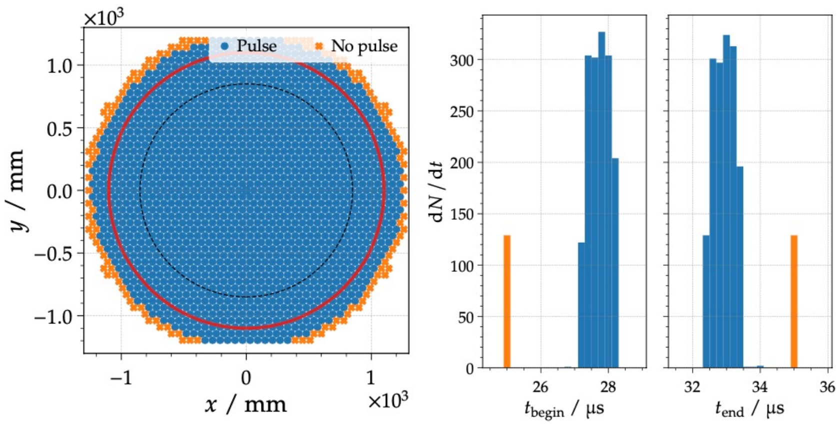
Rome Code



Start and Stop detection: Start, Stop Time

Cohiueco
Mirror 3
Run 15437
Run 15468
Run 15470
Run 15472
Run 15487
OLO
Step = 6

Kit Code



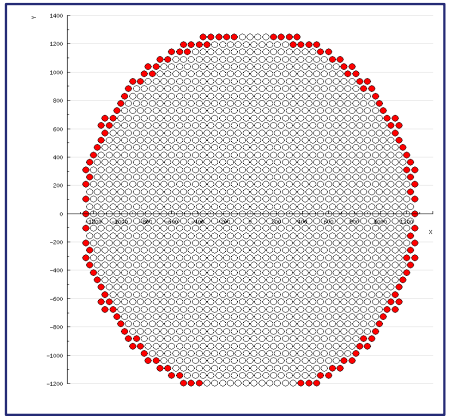
The Start and Stop values shown by Christoph in his thesis match those found by the Rome code. Is there an error in using Kit's scripts?

100 and 350 are the default values

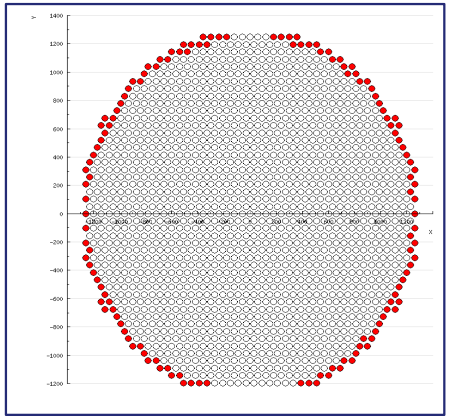
Default values must be tuned !

Start and Stop detection: Start, Stop Time

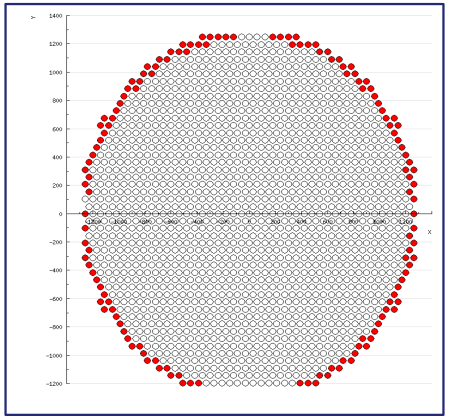
Run 15437



Run 15470

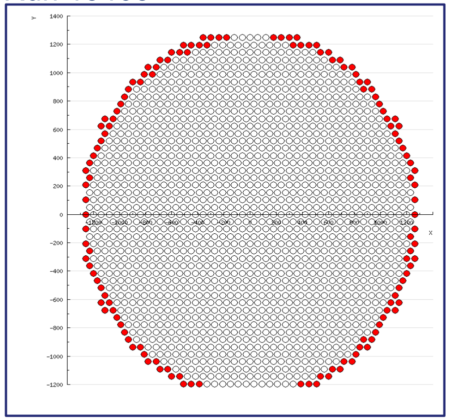


Run 15487

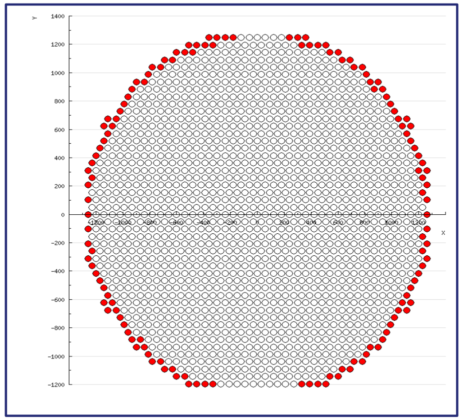


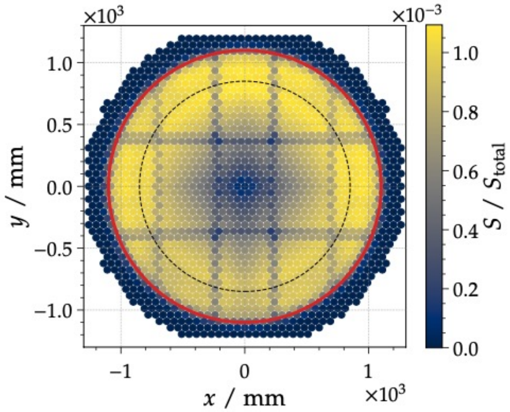
Cohiueco
Mirror 3
Run 15437
Run 15468
Run 15470
Run 15472
Run 15487
OLO
Step = 6

Run 15468



Run 15472





● No Start & Stop Detection

Start and Stop detection: Integral evaluation

Pixel	Integral			Ratio	
	Kit	RKit	Rome	Kit/Rkit	Kit/Rome
0	99931287.0	99948779.0	97237261.5	0.999825	1.028
1	92854817.0	92878049.5	90389067.8	0.999750	1.027
2	93154661.2	93177229.4	90741536.8	0.999758	1.027
3	91945389.0	91971828.7	89551963.8	0.999713	1.027
4	99932191.7	99957329.3	97228042.2	0.999749	1.028
5	102756496.7	102783750.5	99998429.0	0.999735	1.028
6	95502293.8	95528092.4	93035984.2	0.999730	1.027
7	101235248.4	101250708.6	98372974.7	0.999847	1.029

Cohiueco
Mirror 3
Run 15487
OLO
Step = 6
Only the first 8 pixels

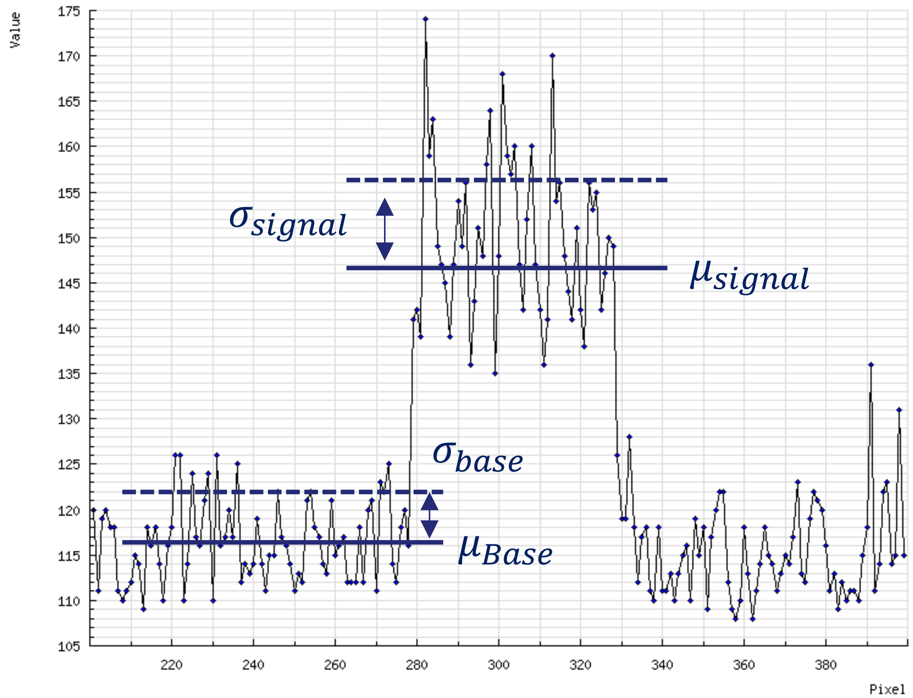
The evaluation of the integral is sufficiently robust with respect to errors in the start and stop

Start and Stop detection: Integral evaluation

Cohiueco Mirror 3
Run 15487
OLO. Step = 6
Only the first 8 pixels

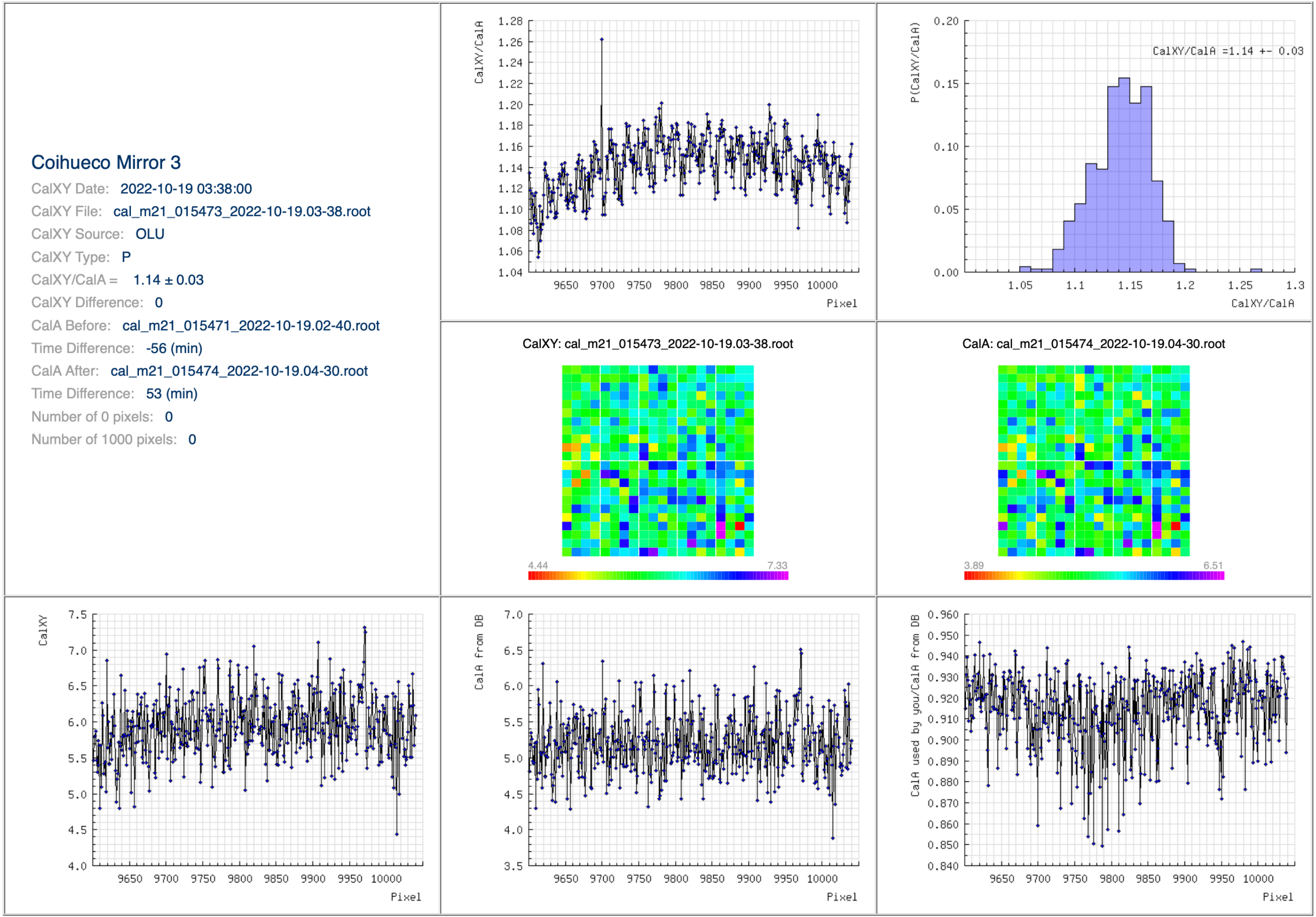
$$Zscore = \frac{\mu_{signal} - \mu_{Base}}{\sigma_{signal} + \sigma_{base}}$$

Zscore	Pixel 0		Pixel 1		Pixel 2	
	ADC	%	ADC	%	ADC	%
-1	-1805.2	1.9E-5	-1932.0	2.1E-5	-1586.1	1.7E-5
0	17314.6	0.000178	17691.7	0.000196	24513.2	0.00027
1	114455.9	0.001177	95748.6	0.001059	115084.5	0.001268
2	355826.1	0.003659	267213.6	0.002956	257110.3	0.002833
3	843937.0	0.008679	711019.1	0.007866	706980.2	0.007791
4	38606641.2	0.397035	37324608.5	0.412933	36077889.1	0.39759
5	17882912.1	0.18391	16078226.4	0.177878	17220034.1	0.18977
6	39417979.7	0.405379	35896491.9	0.397133	36341511.5	0.400495
Rome	97237261.5	1	90389067.8	1	90741536.8	1



98% of the integral value is due to signals with a Z-score > 3

Start and Stop detection: Integral evaluation



We find an integral value that is 3% lower than Kit's; unfortunately, this increases the value of the CalXY/CalA ratio

Stability of the integrating sphere signal

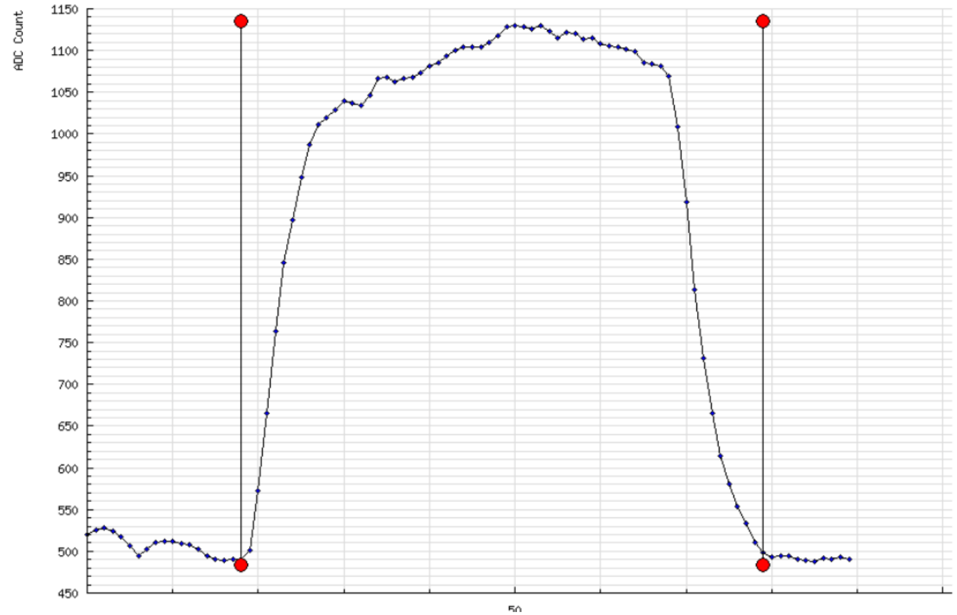
The light pulse emitted by the sphere is detected by an LED and recorded in a CSV file for each position of each measurement

For each pulse we calculate the integral

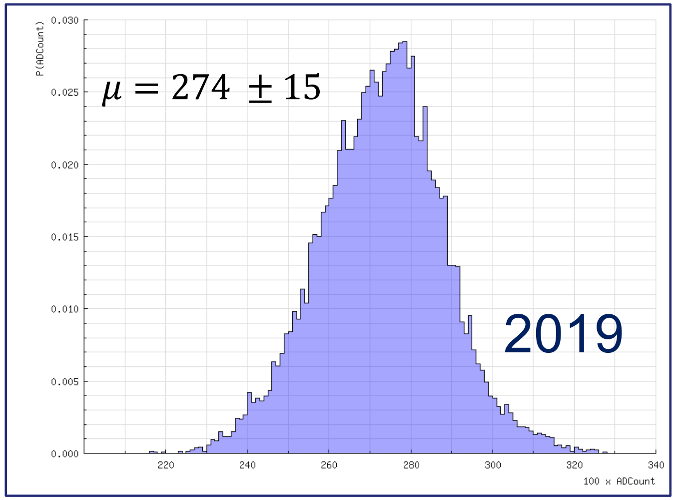
Position: 100,Pulse Signal. Integrale = 28687 Run Number: 14453

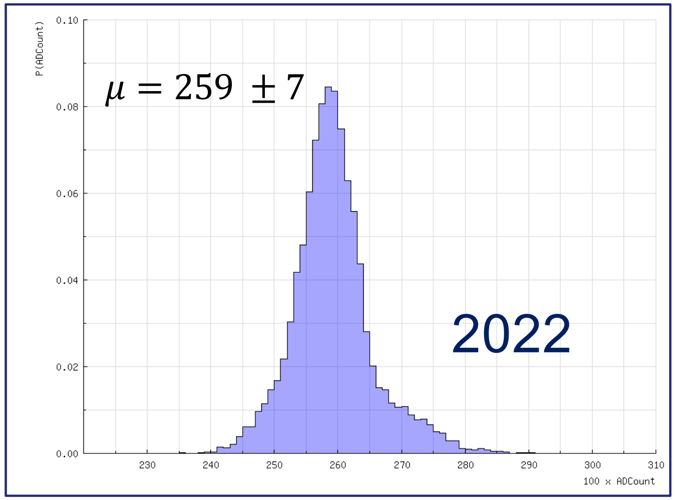
Start: 18

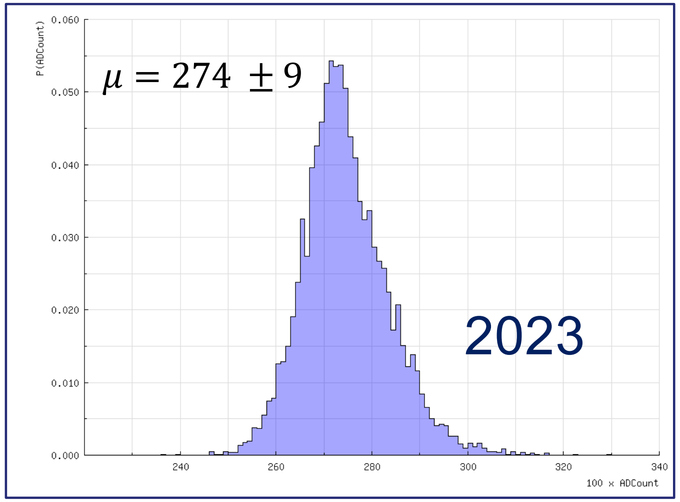
Stop: 79

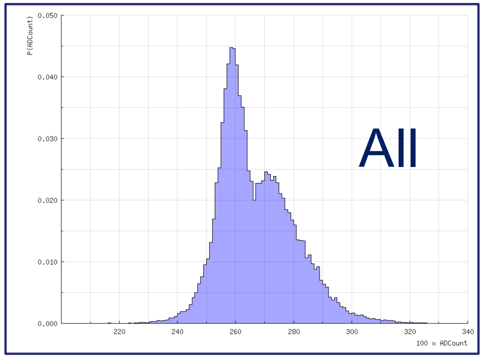


Stability of the integrating sphere signal: Distribution









Do we need some kind of LCU correction ?

NO ! Fluttuazioni dell'elettronica di lettura del segnale !

Entirety of Light-Source Positions: Coverage

The combined intensity I_{XY} for all XY-Scanner positions of the light source is estimated as

$$I_{XY} = L_{src}\, f_{cov}\, A_{aperture} \tag{7.19}$$

for a FD telescope with a aperture area $A_{aperture}$ and a light source with radiance L_{src}. The nominal aperture area of the FD telescopes of the Pierre-Auger Observatory is defined to be $A_{aperture} = \pi\,(1.1\,\mathrm{m})^2$. Next, the total number of photons N_γ^{pixel} emitted by the light source into the angular acceptance Ω_{pixel} of the pixel is then calculated as

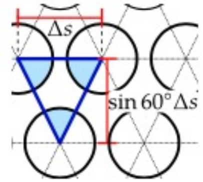
$$N_\gamma^{pixel} = I_{XY}\,\Omega_{pixel}\,\xi_{pixel}\,c_{pixel}^{halo} \tag{7.20}$$

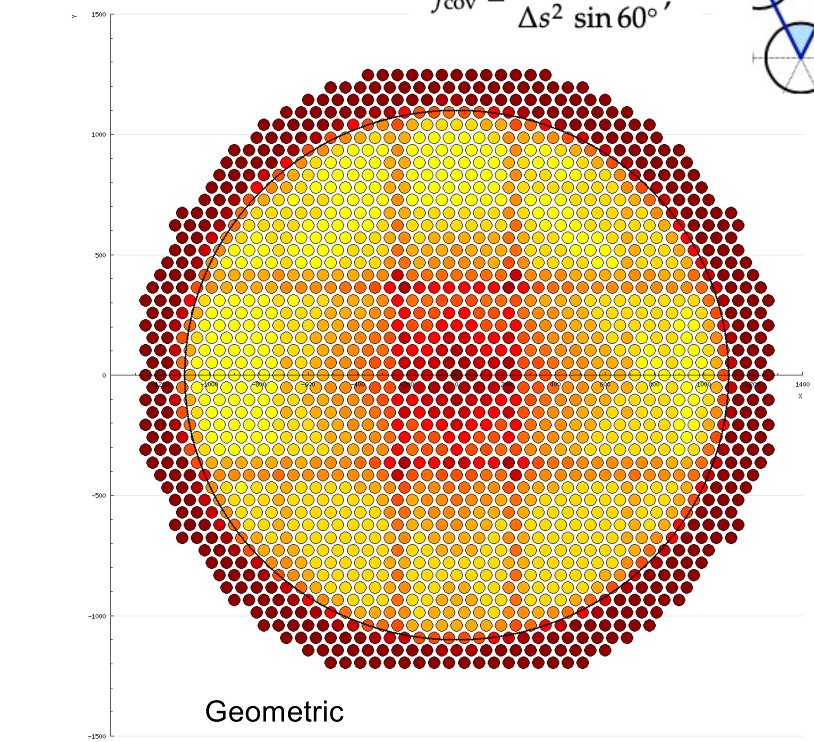
$$= L_{src}\,\Omega_{pixel}\,\xi_{pixel}\,c_{pixel}^{halo}\,f_{cov}\,A_{aperture} \tag{7.21}$$

where ξ_{pixel} is the correction for the deviation of the source from an ideal Lambertian emitter as discussed in Section 6.5. We also directly include the correction factors c_{pixel}^{halo} for the reflections on the camera surface, as discussed in Section 4.4.5. This is not the case of the absolute calibration obtained with the drum measurements, but rather the camera reflection is accounted for in the tracking method. It makes no difference at which point we include this correction, but we have to be careful to not count it twice.

$$C_{abs}^{pixel} = \frac{N_\gamma^{pixel}}{S_{ADC}^{pixel}}$$

$$f_{cov} = \frac{A_{src}}{\Delta s^2\,\sin 60^\circ},$$





Geometric

$$f_{cov}A_{aper} = 2.471(1)$$

MonteCarlo

$$f_{cov}A_{aper} = 2.473(1)$$

1) L' analisi dei run pre-2024 e' dubbia. Dovrebbe essere rifatta completamente, ponendo attenzione alla convergenza della procedura di Start-Stop e inserita nel DB creato.

2) L' analisi dei run 2024 dovrebbe essere corretta e va solo controllata.

3) Nessun dato a mia disposizione delle misura in laboratorio di L_{src} (Misura assoluta)

4) In generale il code di analisi e' sensibile all'algoritmo di start e stop che deve essere tunato caso per caso. Sarebbe preferibile l'eliminazione di quello attuale nella catena di analisi di KIT e la sostituzione con un altro.

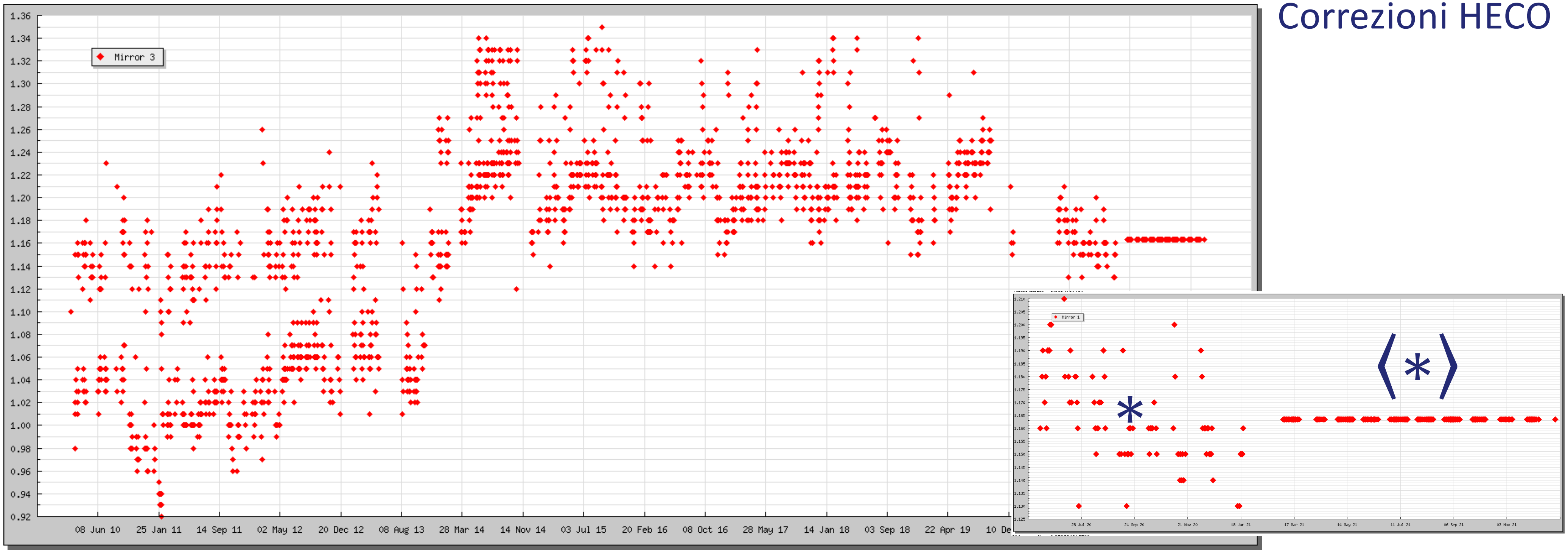
5) Kit non ha man-power sul progetto. La parte di analisi e' in mano a studenti di PHD con tesi su un altro argomento.

Si torna al solito problema metodologico-organizzativo:

Problemi che toccano la produzioni dei dati di supporto all’analisi devono essere completamente in mano a un gruppo ristretto di personale Staff, per evitare perdite di conoscenza e di tempo lavoro all’evaporazione dello studente di PHD. Poche chiacchiere e molto lavoro di gomito.

Va da se se questa condizione e’ necessaria ma non sufficiente …

Correzioni HECO



Anni di appassionate discussioni in frequenti e affollati meeting, ore di lavoro sull'off-line, presentazioni, GAP e presentazioni ICRC … ridotti ad una banale media aritmetica per poter continuare a runnare …