AGATA Analysis

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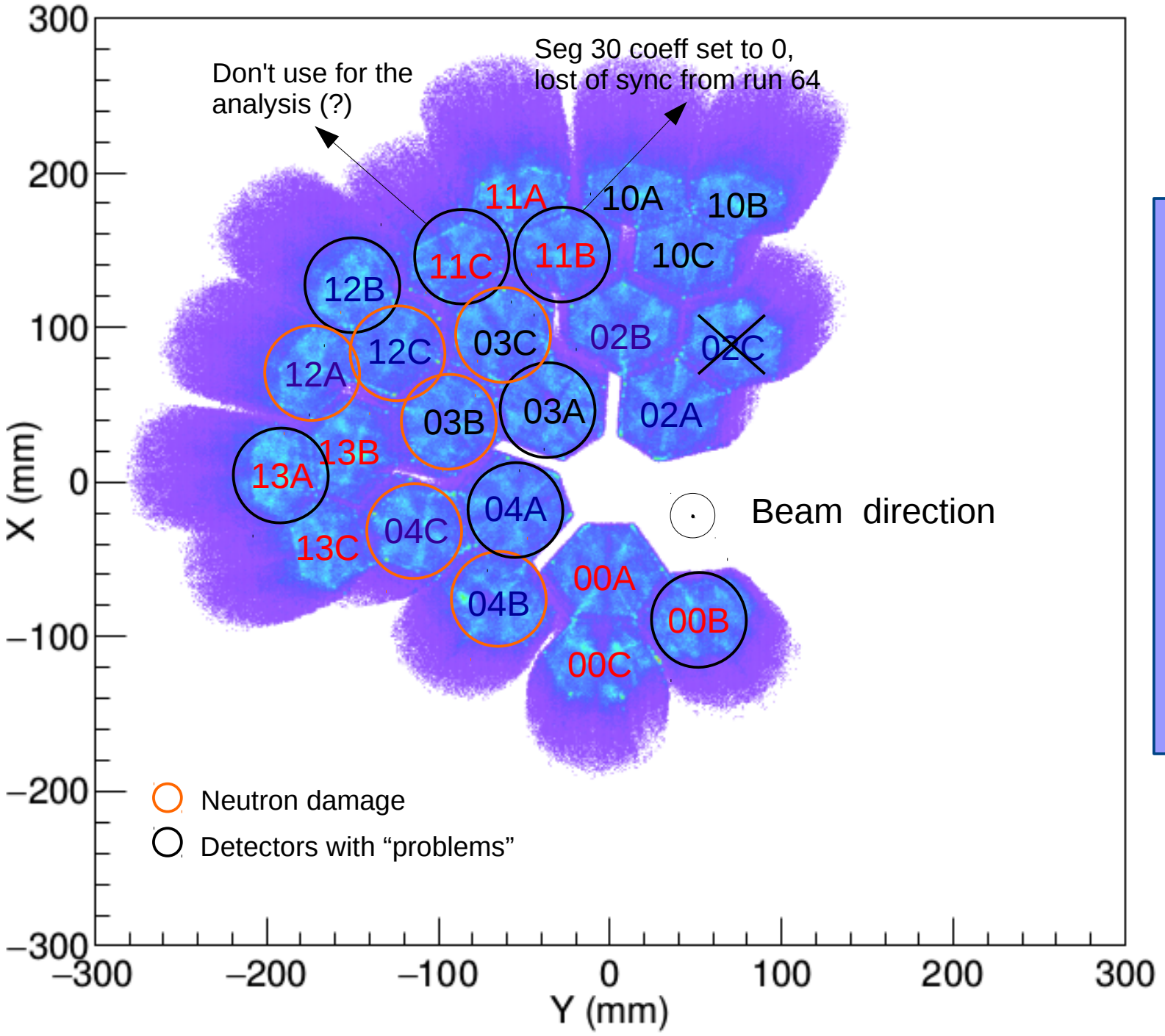
For the e682 collaboration

Detectors Status e682



23 AGATA crystals Nominal Position

AGATA DATA REPROCESSING ON GRID

- Total number of runs 44
- Total number of cdat files 1651 (3.9T)

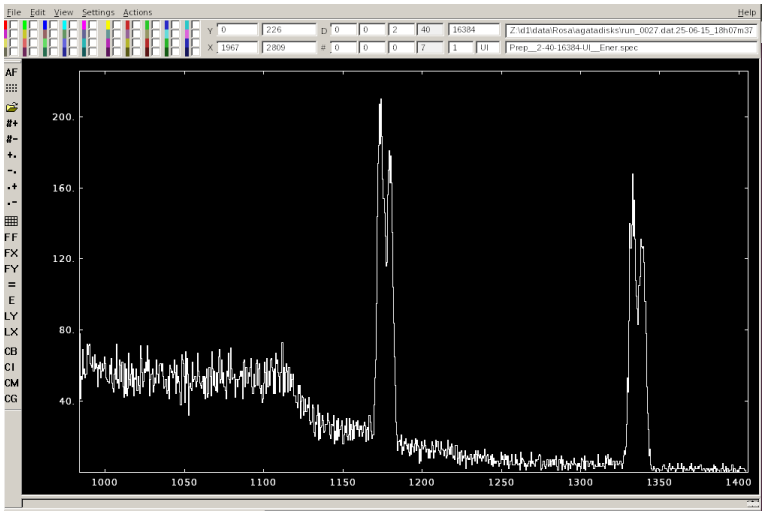
- Task of 1651 jobs submitted to Grid for PSA
- Task of 44 jobs submitted to Grid for γ-ray TRACKING

Counting rate per crystal 50 kHz

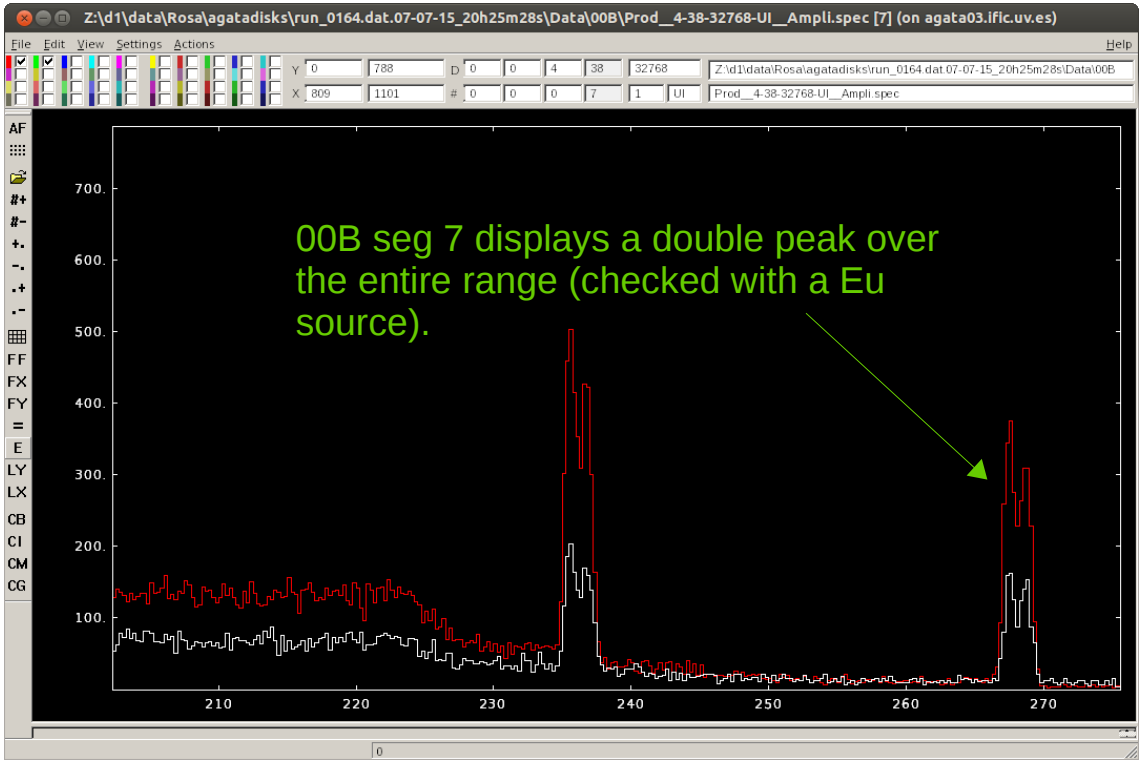
Detectors Status e682

Crystal B004 ATC6 position **00B**

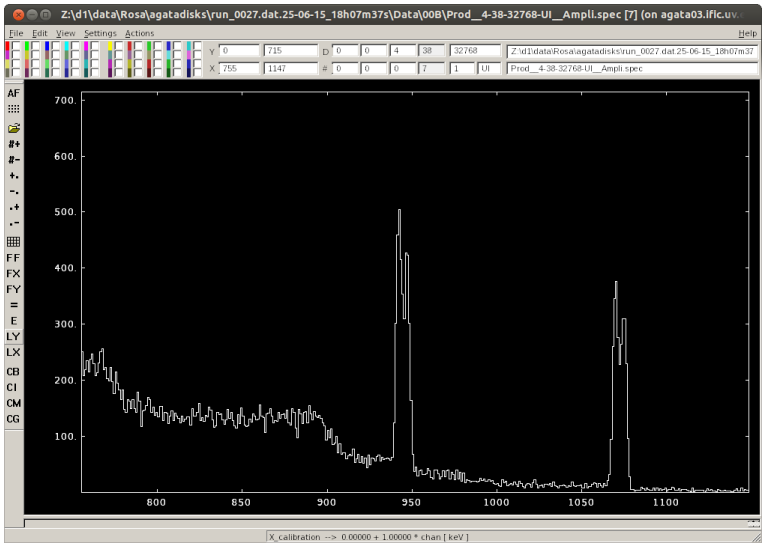
- 00B **seg 7** Prep__2-40-16384__Ener.spec [0][7]



- 00B **seg 7** Prod__4-38-32768__Ampli.spec [0][7] before (red) and after (white) the experiment



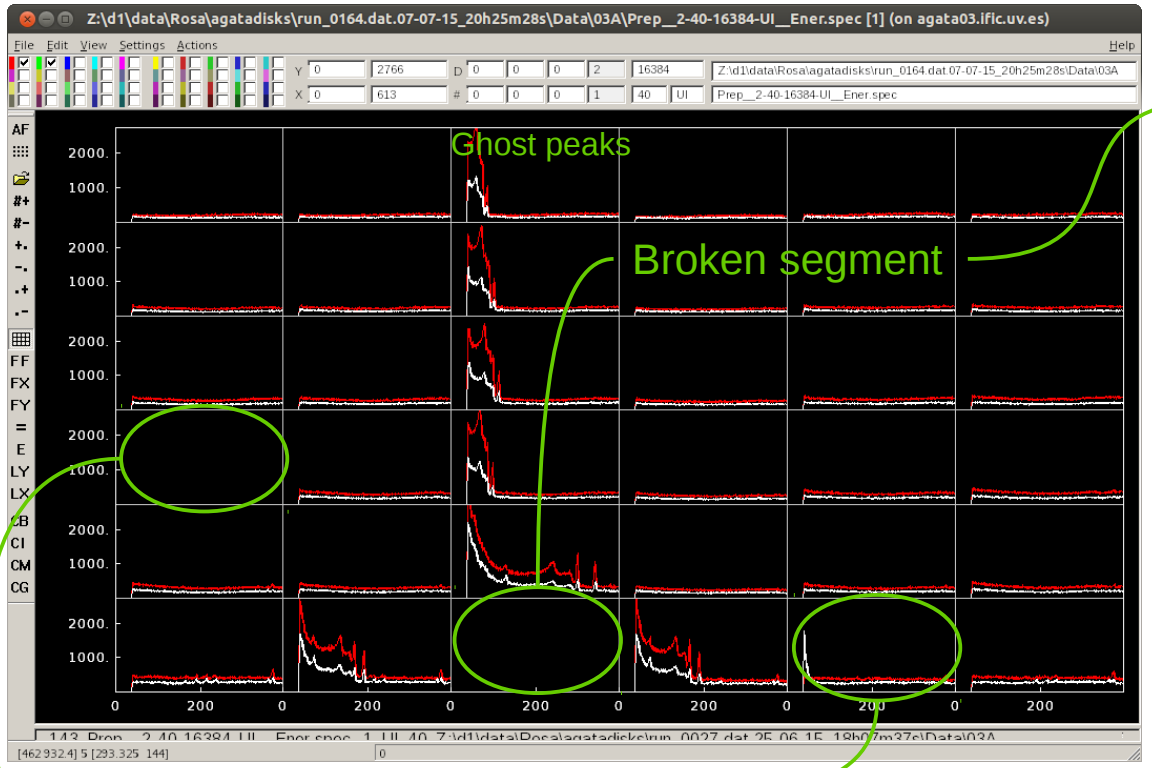
- 00B **seg 7** Prod__4-38-32768__Ampli.spec [0][7]



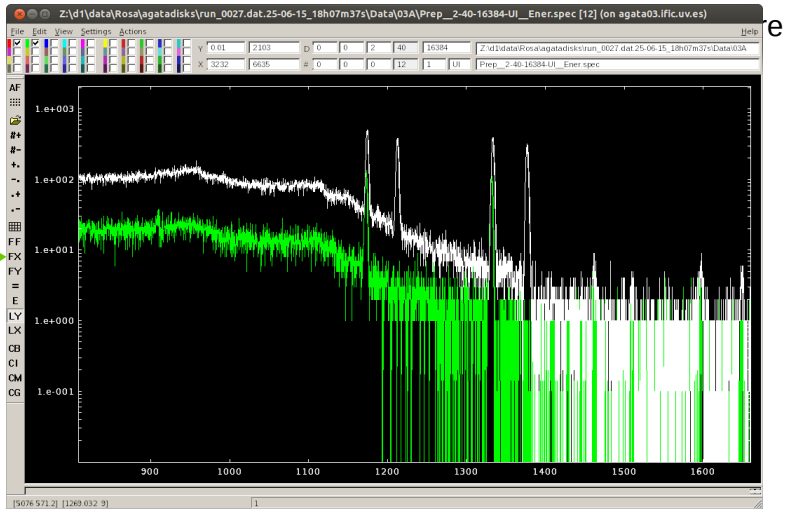
Detectors Status e682

Crystal A005 ATC5 position **03A**

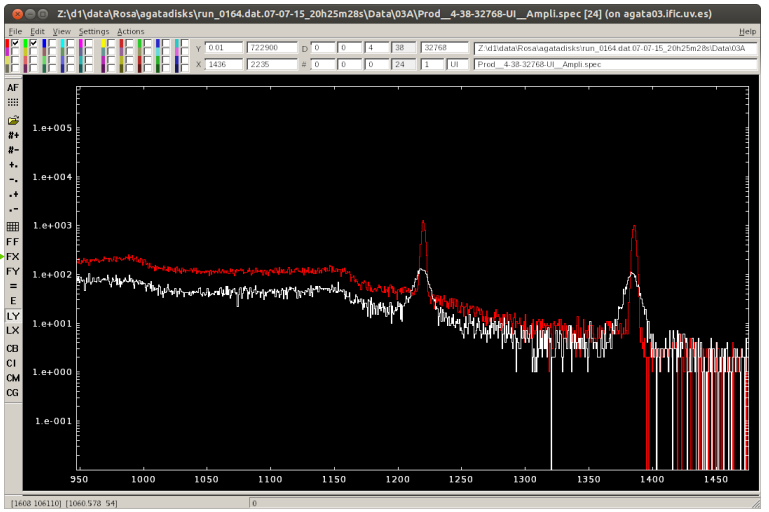
- 00B Prep__2-40-16384__Ener.spec [1][all] before (red) and after (white) the experiment



- 00B **seg 12** “corrected” in (white) and seg 13 (green) Prep__2-40-16384__Ener.spec [0][12]&[0][13]



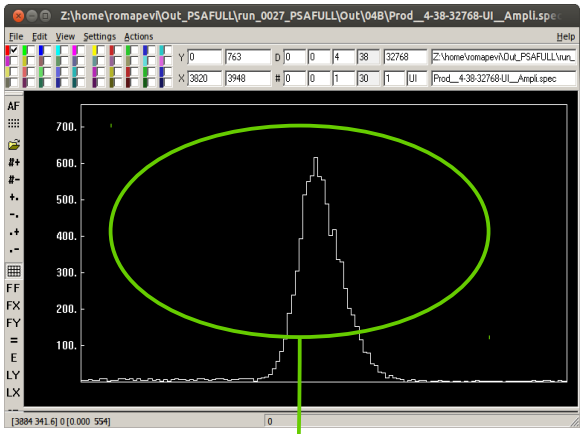
- 00B **seg 24** Prep__2-40-16384__Ener.spec [0][24] before (red) and after (white) the experiment



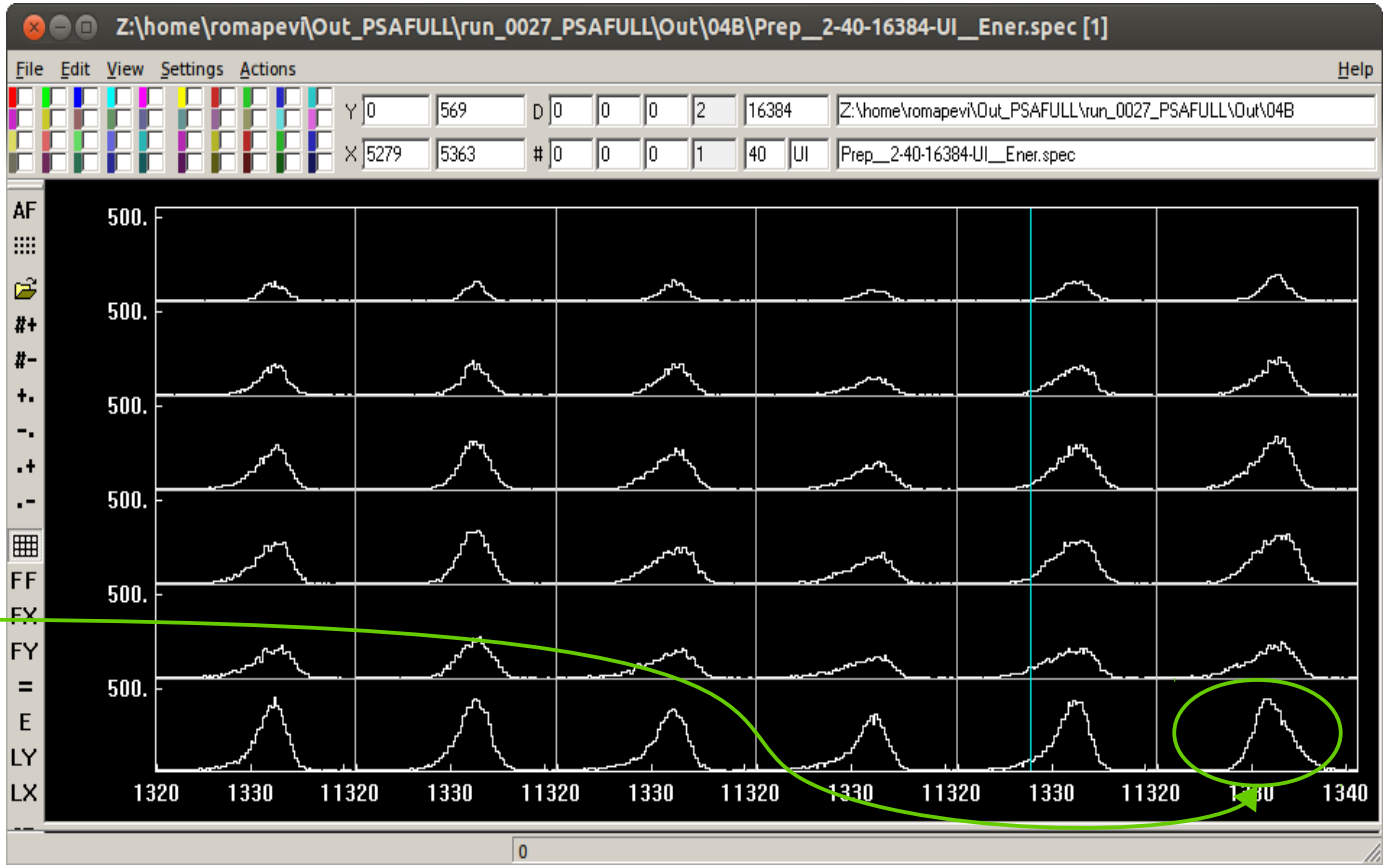
Detectors Status e682

Crystal B001 ATC1 position **04B**

- 04B **seg 30** Prod__4-38-32768__Ampli.spec [1][30]



- 04B Prep__2-40-16384__Ener.spec [0][all]

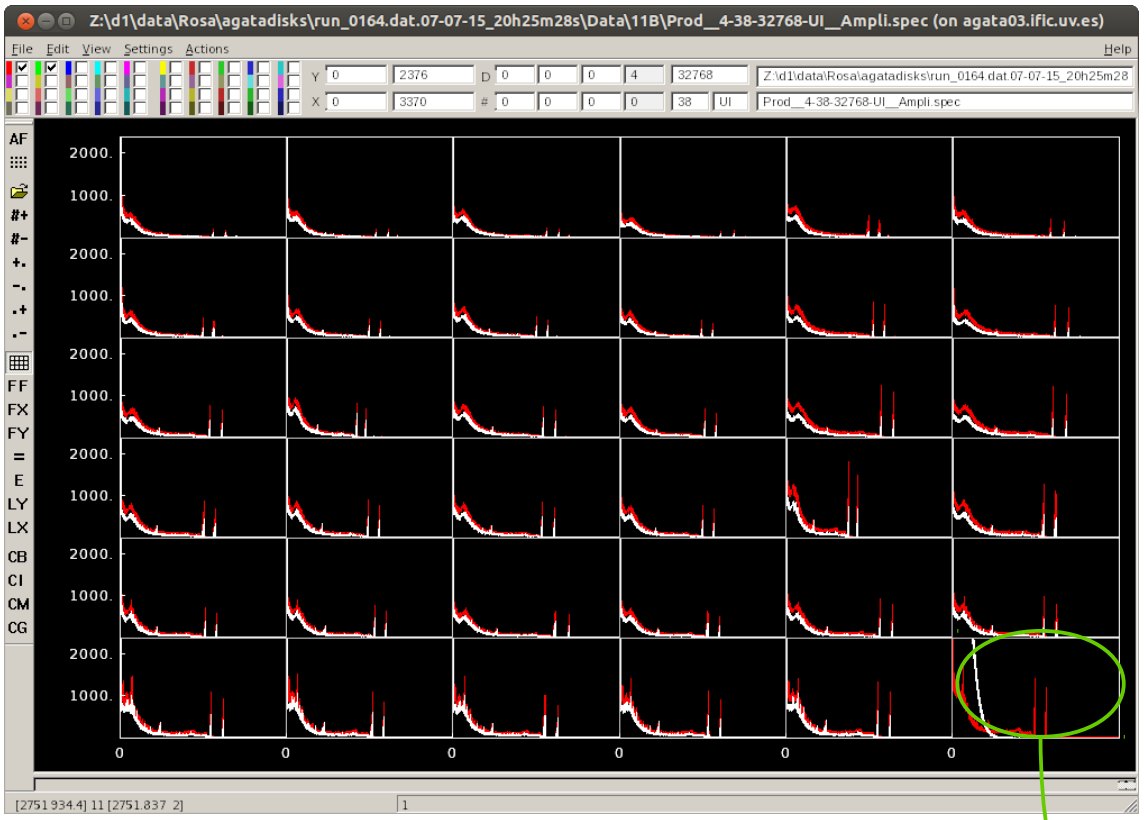


Right tail

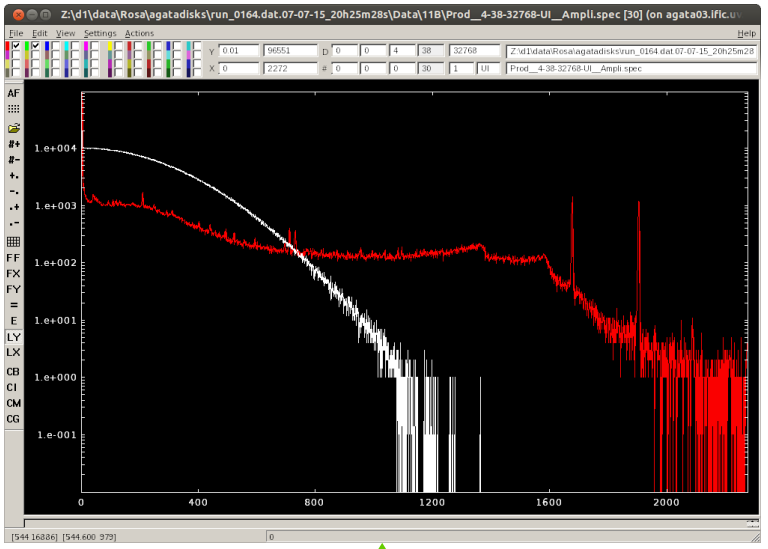
Detectors Status e682

Crystal B013 ATC7 position **11B**

- 11B Prod__4-38-32768__Ampli.spec [0][all] before (red) and after (white) the experiment



- 11B **seg 30** Prod__4-38-32768__Ampli.spec [0][30] before (red) and after (white) the experiment



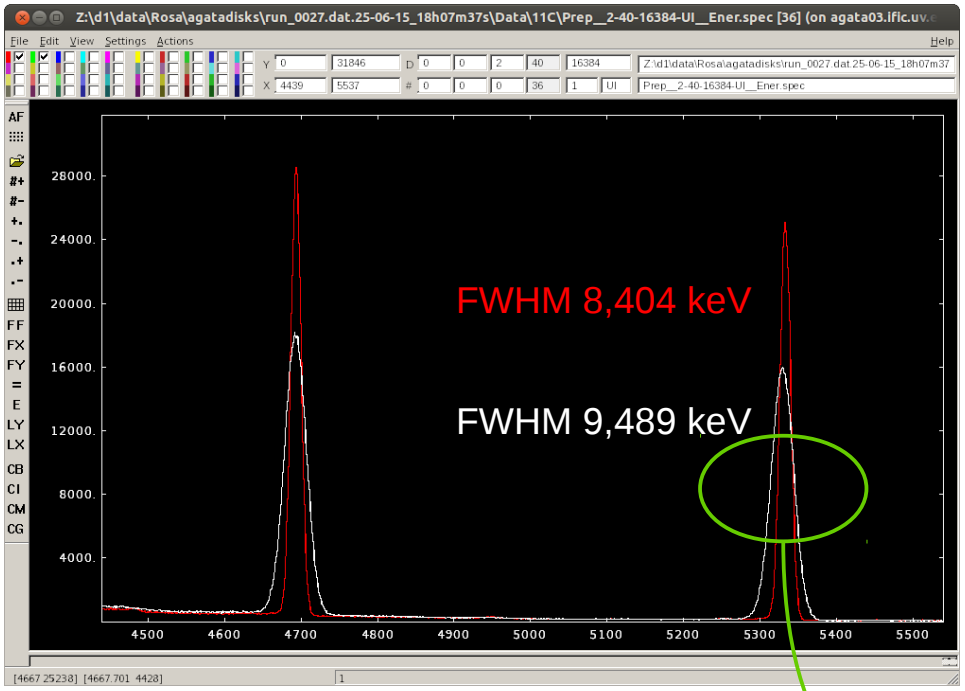
Lost synch during the experiment

Detectors Status e682

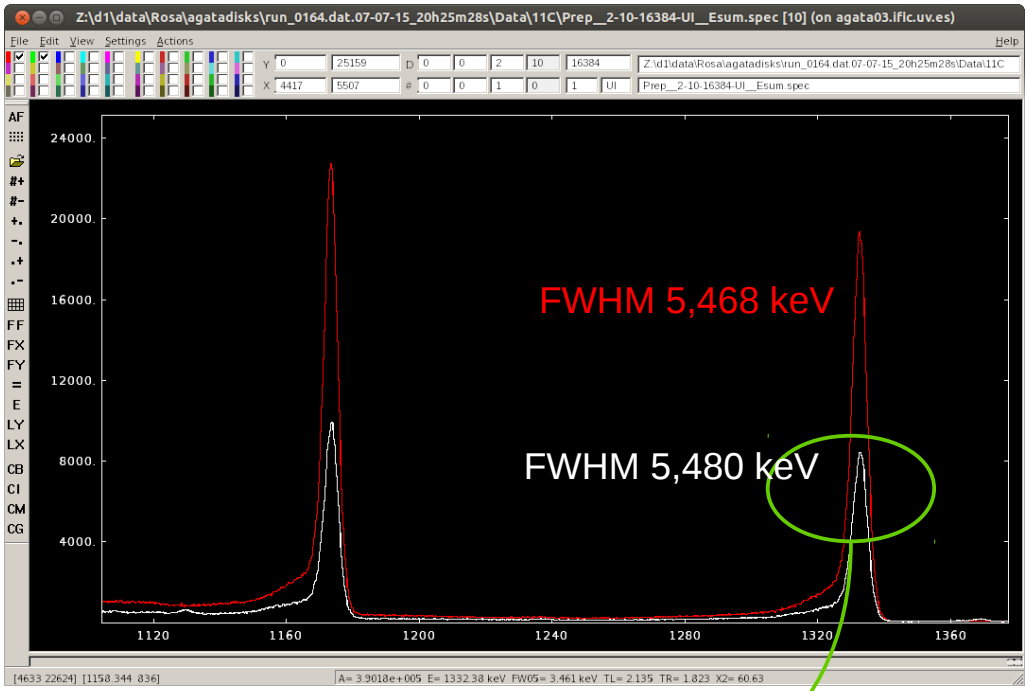
Crystal C006 ATC7 position **11C**

Exclude from the analysis?

- 11C **core 0** Prep__2-40-16384__Ener.spec [0][36] before (red) and after (white) the experiment



- 11C **sum segments** Prep__2-10-16384__Esum.spec [1][0] before (red) and after (white) the experiment

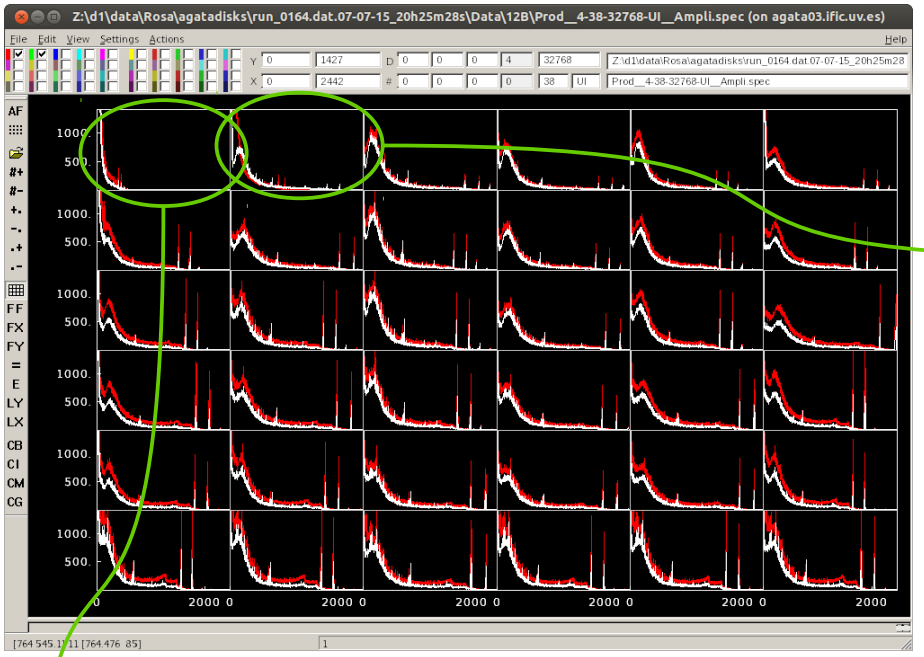


Bad energy resolution

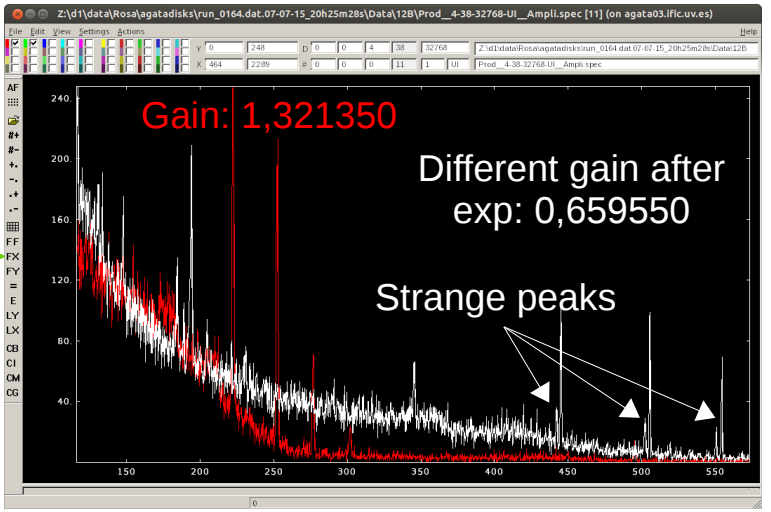
Detectors Status e682

Crystal B010 ATC3 position **12B**

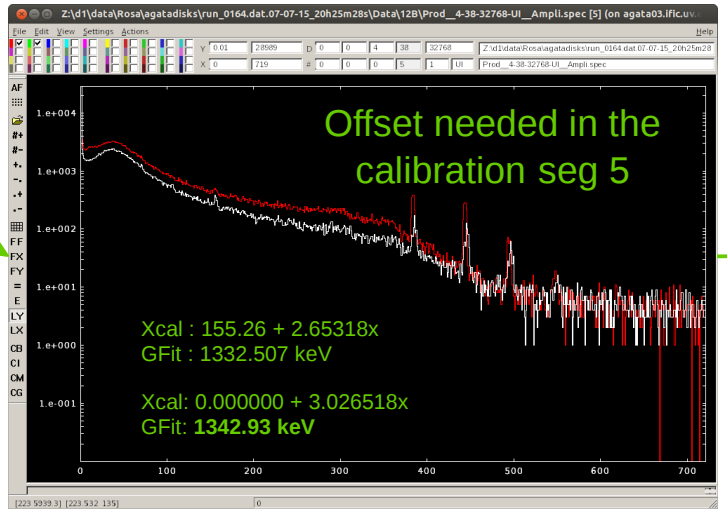
- 12B Prod__4-38-32768__Ampli.spec [0][all] before (red) and after (white) the experiment



- 12B **seg 11** Prod__4-38-32768__Ampli.spec [0][11] before (red) and after (white) the experiment



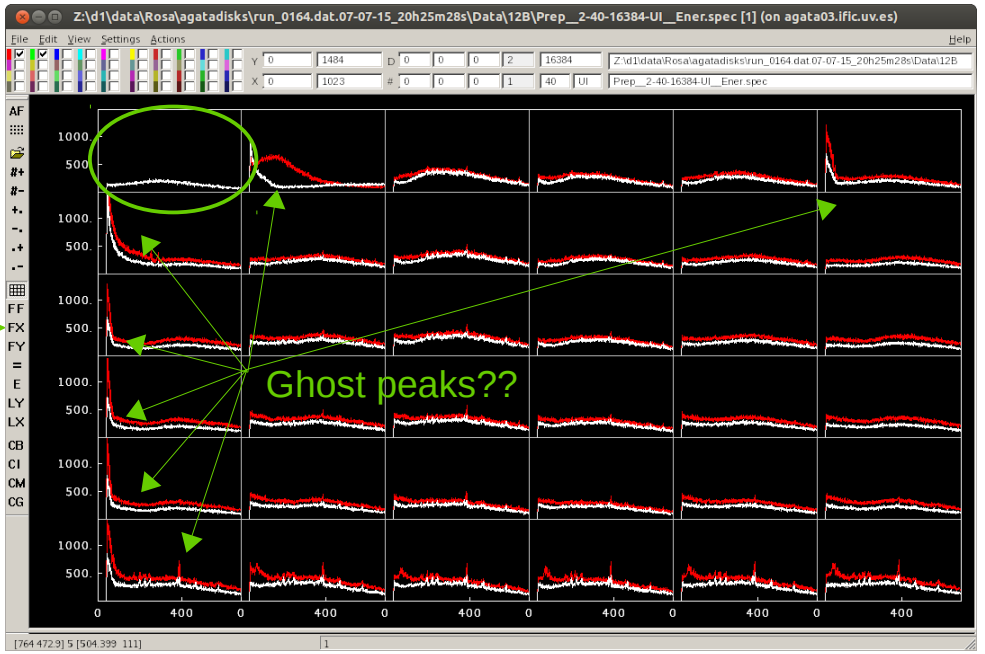
- 12B **seg 5** Prod__4-38-32768__Ampli.spec [0][5] before (red) and after (white) the experiment



Broken segment??

Calibration coeff seg 5 set to zero before the experiment (!)

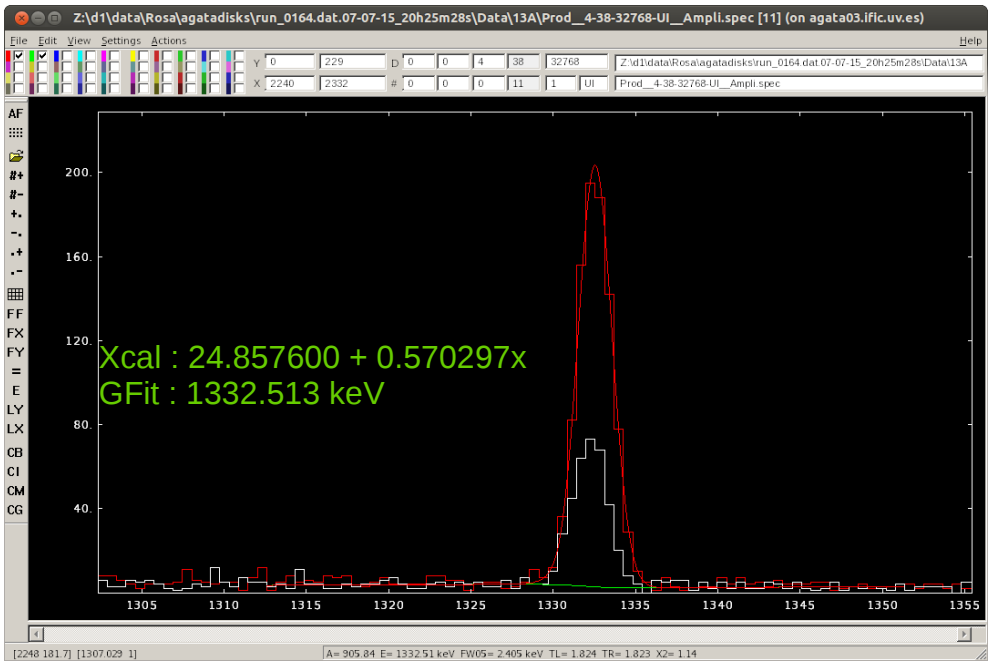
- 12B Prep__2-40-16384__Ener.spec [0][all] before (red) and after (white) the experiment



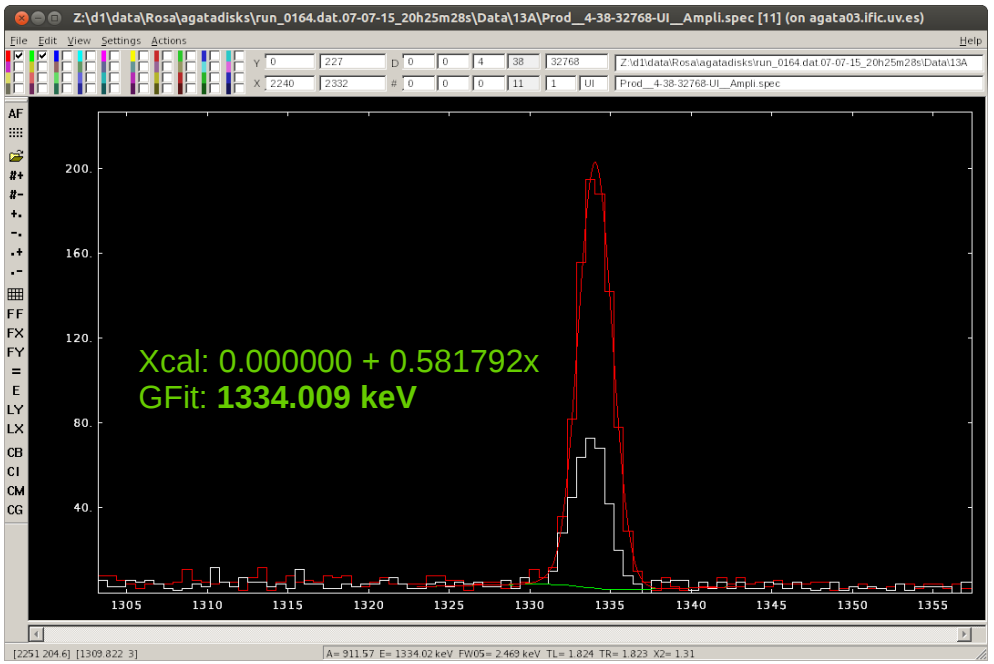
Detectors Status e682

Crystal C007 ATC4 position **13A**

- 13A **seg 11** Prod__4-38-32768__Ampli.spec [0][11] before (red) and after (white) the experiment with offset



- 13A **seg 11** Prod__4-38-32768__Ampli.spec [0][11] before (red) and after (white) the experiment without offset



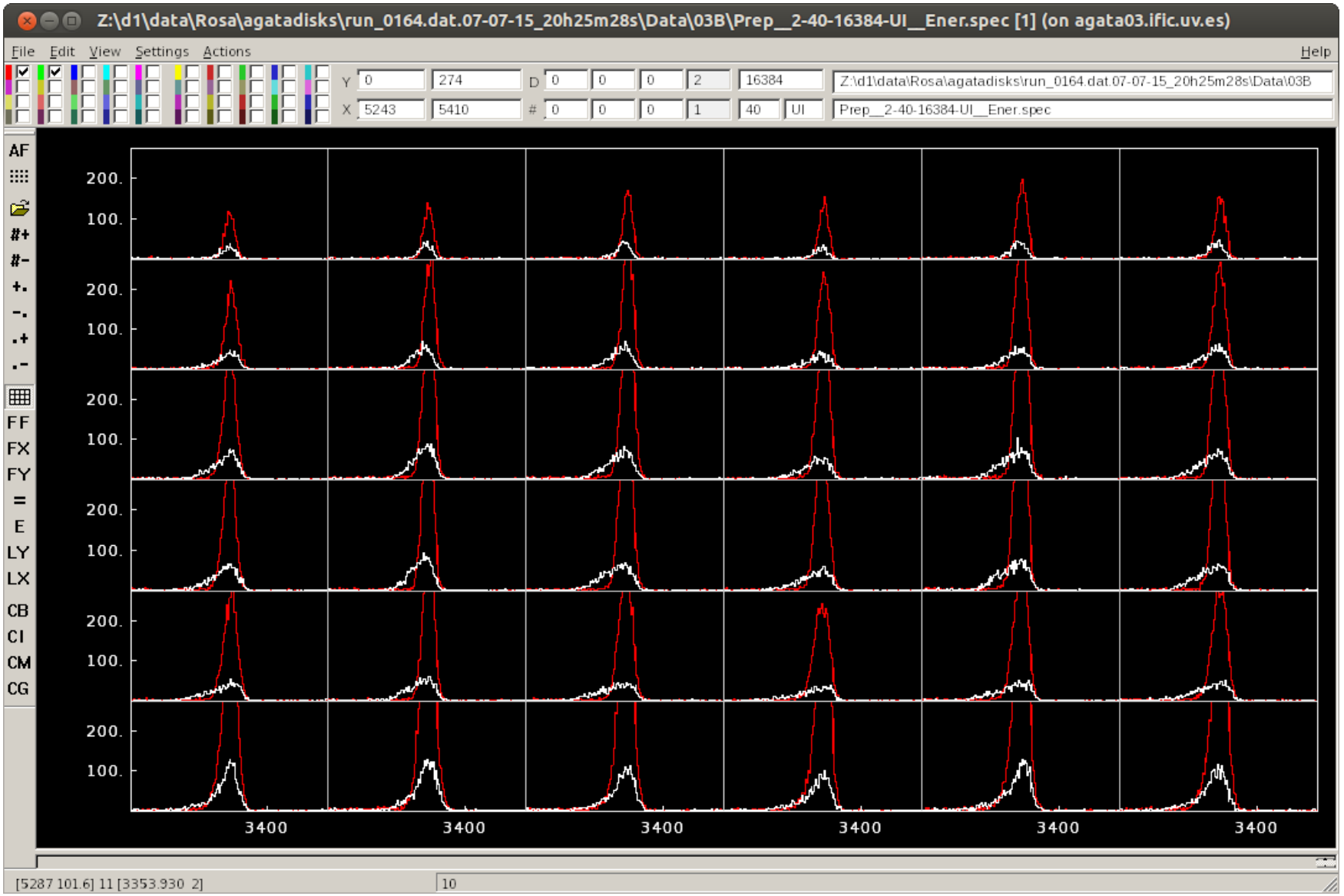
Offset needed in the calibration seg 11

Detectors Status e682

Crystal B002 ATC5 position **03B**

Neutron damage??

- 03B Prep__2-40-16384__Ener.spec [1][all] before (red) and after (white) the experiment

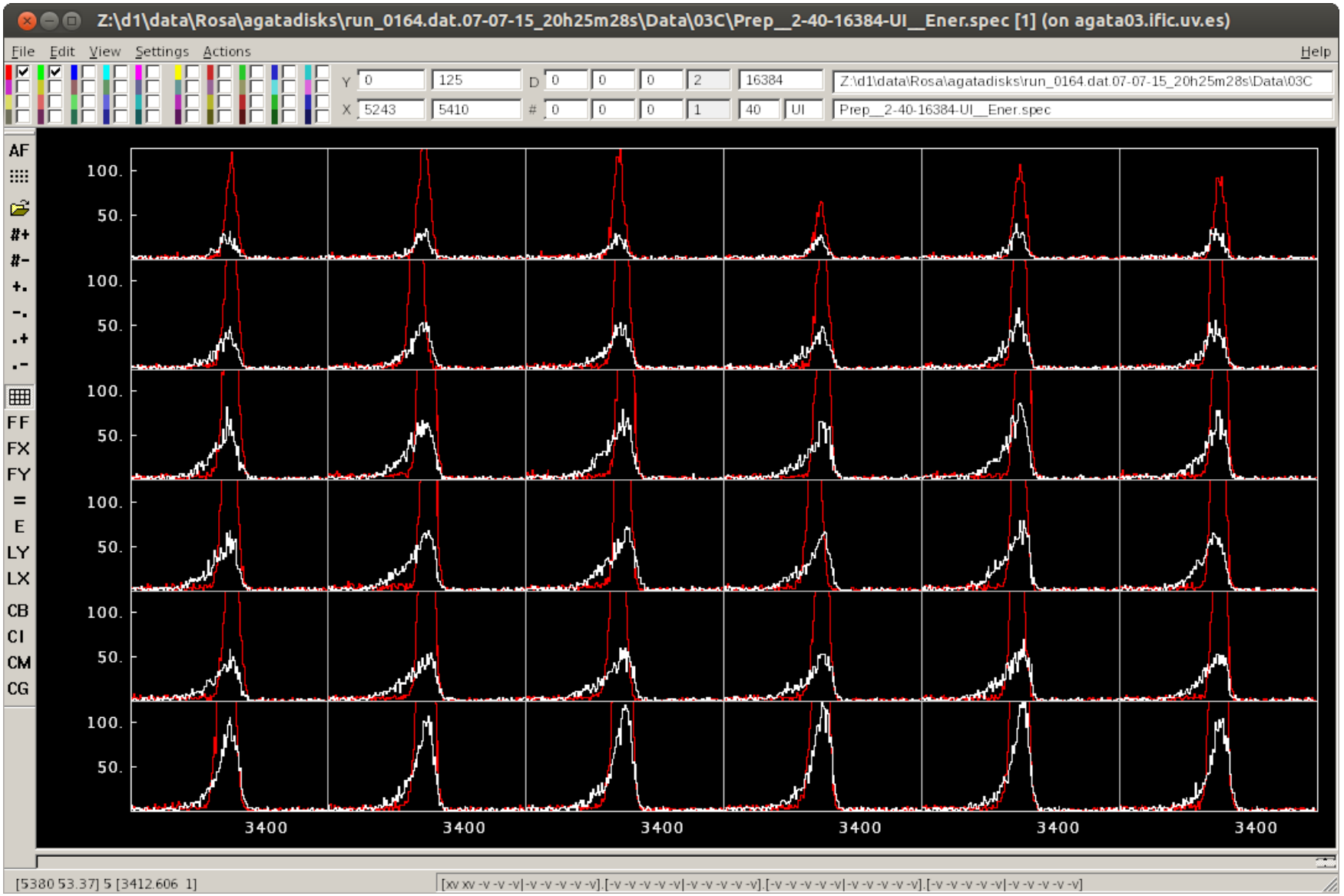


Detectors Status e682

Crystal C009 ATC5 position **03C**

Neutron damage??

- 03C Prep__2-40-16384__Ener.spec [1][all] before (red) and after (white) the experiment

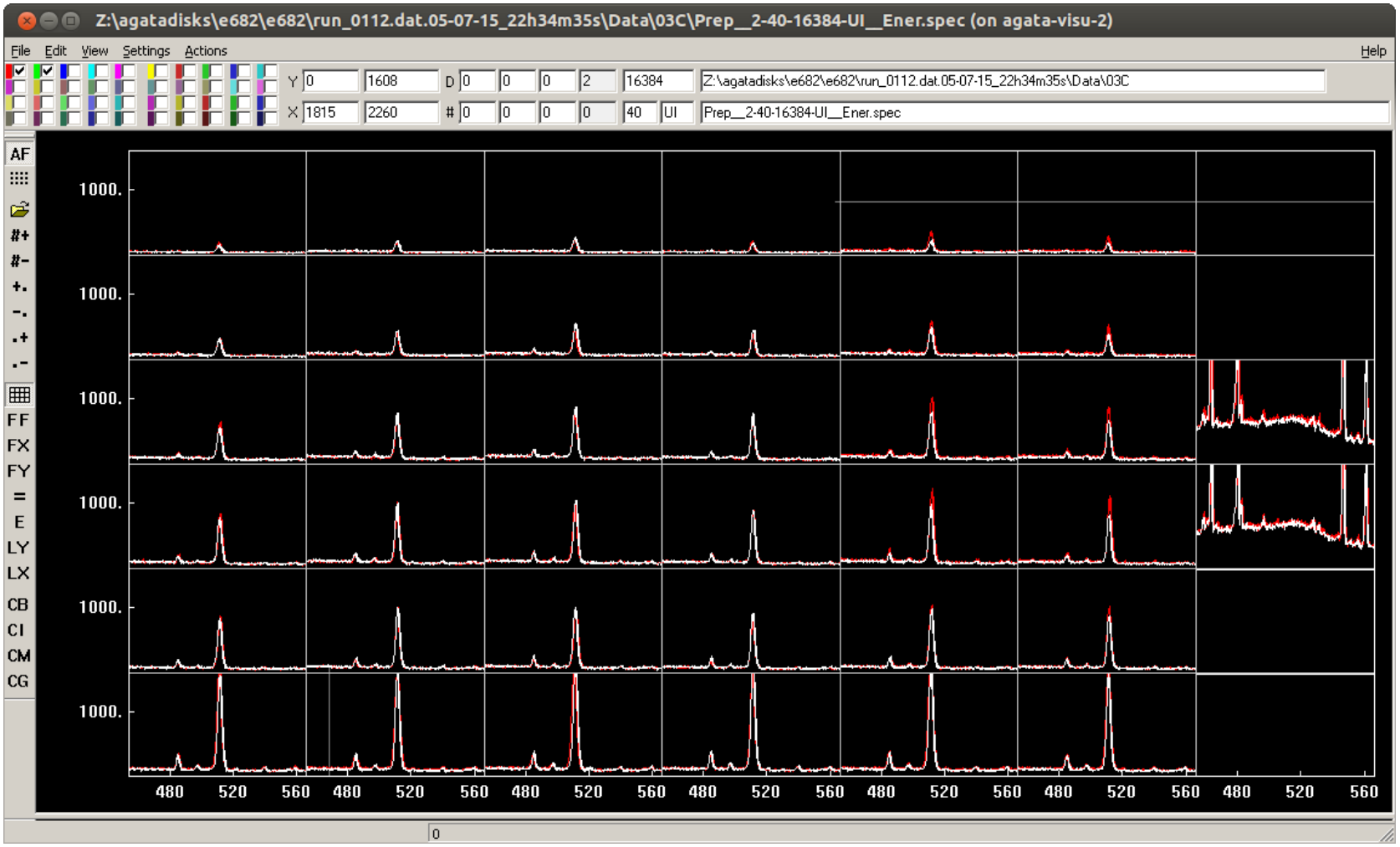


Detectors Status e682

Crystal B002 ATC5 position **03B & 03C**

Not Neutron damage

- Prep__2-40-16384__Ener.spec [1][all] 03B (red) and 03C (white) run 112 after the experiment

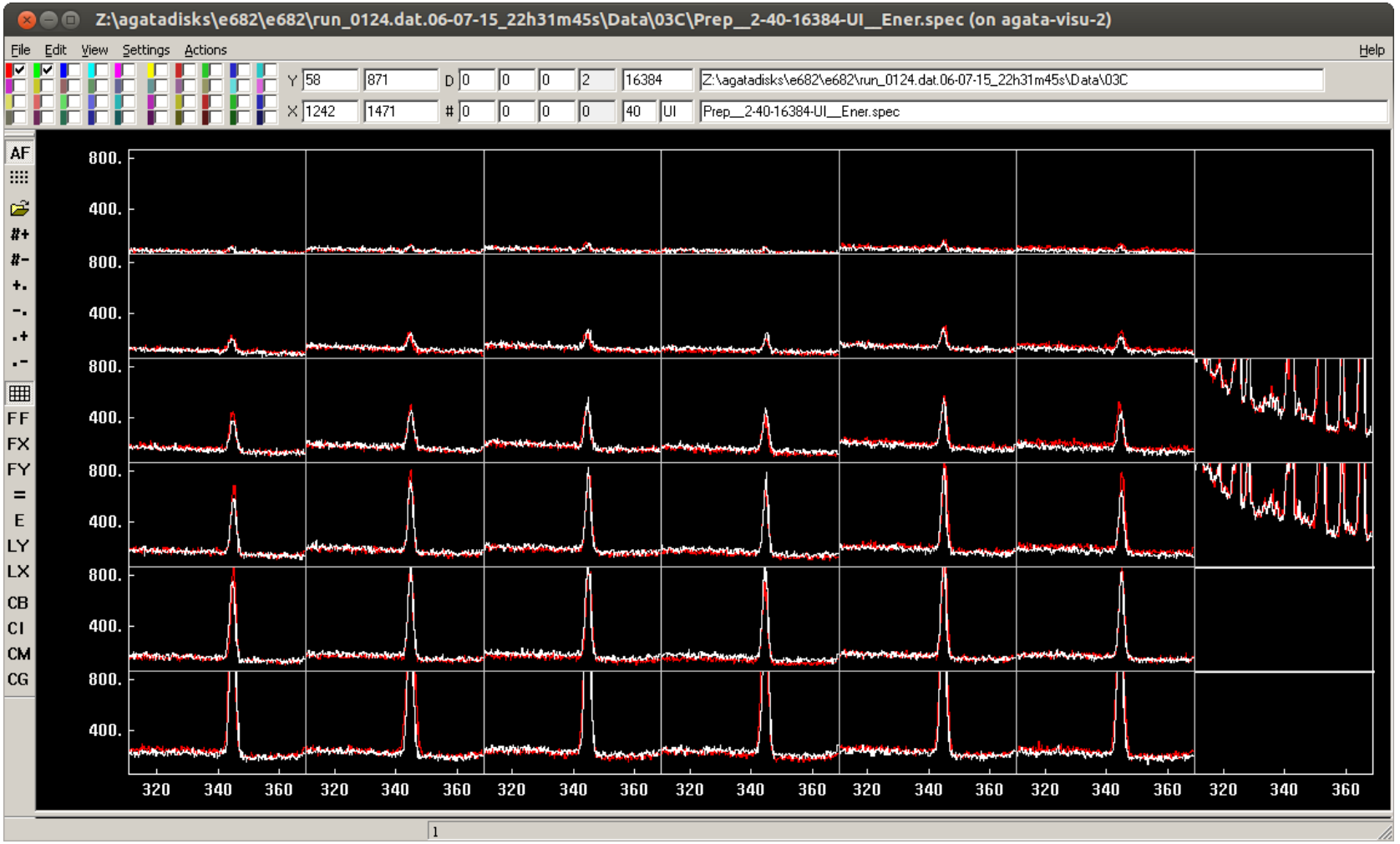


Detectors Status e682

Crystal B002 ATC5 position **03B & 03C**

Not Neutron damage

- Prep__2-40-16384__Ener.spec [1][all] 03B (red) and 03C (white) run 124 after the experiment



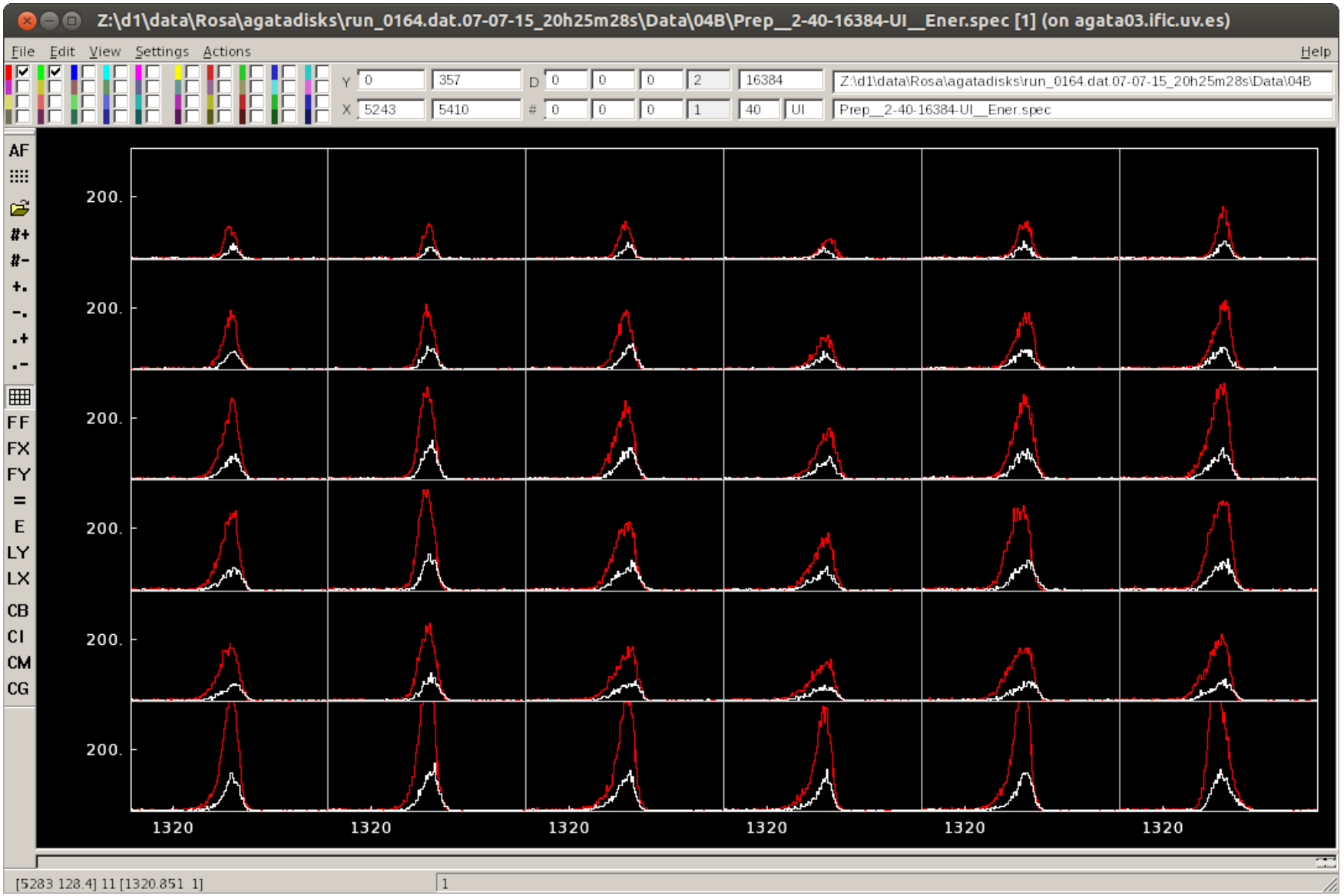
This run it was found with issues in 03C (back pressure and strange validation behaviour) which probably causes the fake neutron damage in run 164.

Detectors Status e682

Crystal B001 ATC1 position **04B**

Neutron damage

- 04B Prep__2-40-16384__Ener.spec [1][all] before (red) and after (white) the experiment

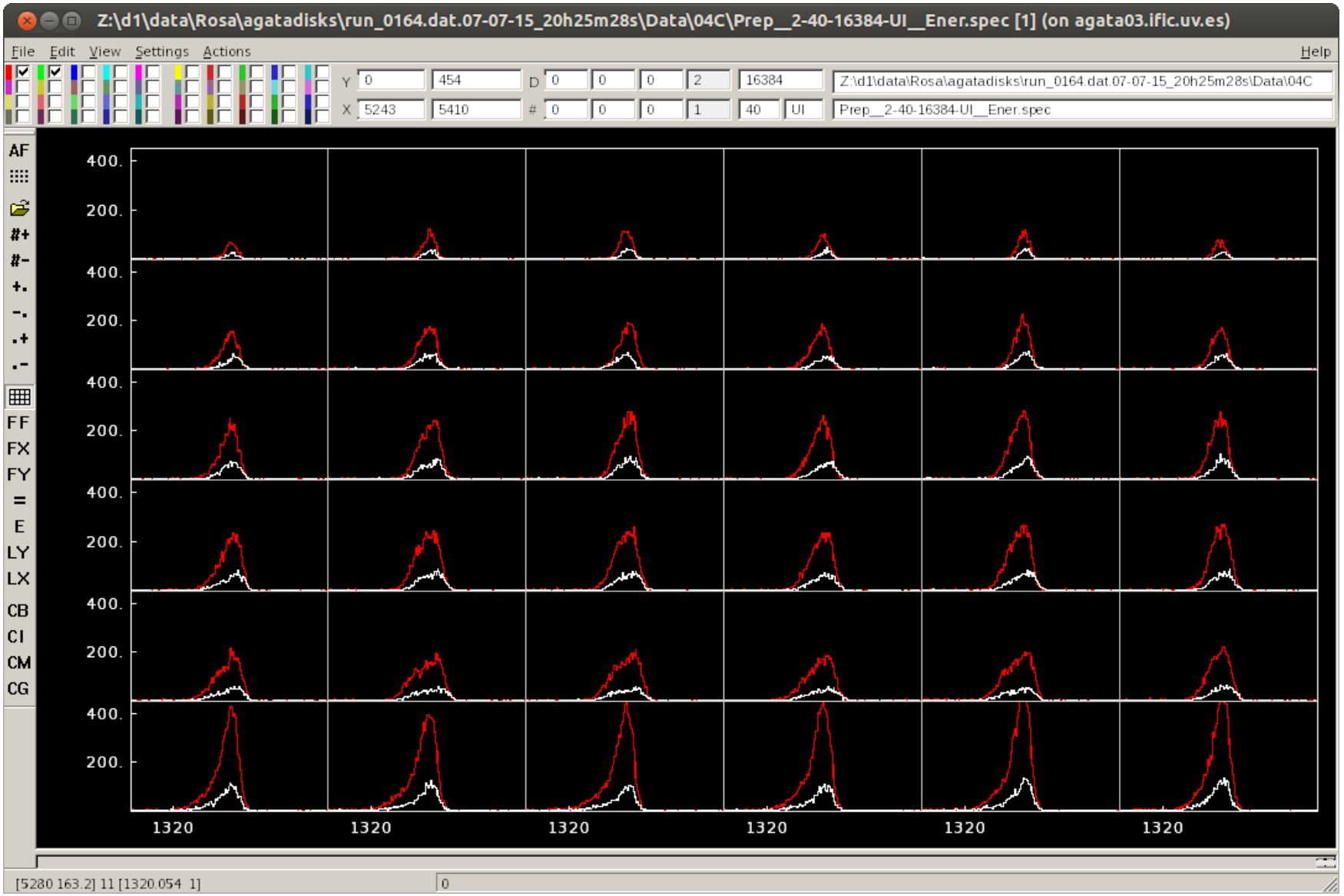


Detectors Status e682

Crystal C003 ATC1 position **04C**

Neutron damage

- 04C Prep__2-40-16384__Ener.spec [1][all] before (red) and after (white) the experiment

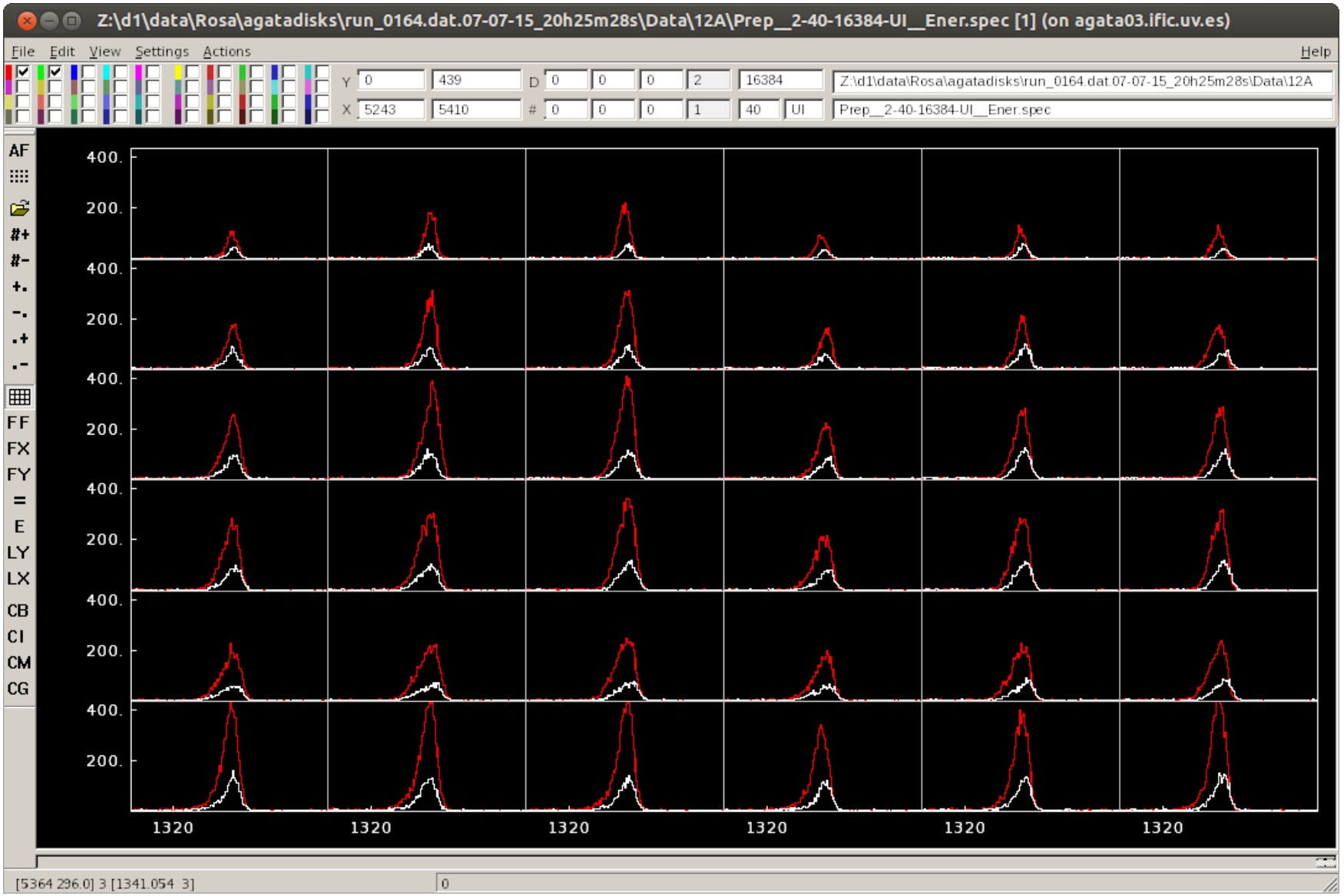


Detectors Status e682

Crystal A002 ATC3 position **12A**

Neutron damage

- 12A Prep__2-40-16384__Ener.spec [1][all] before (red) and after (white) the experiment

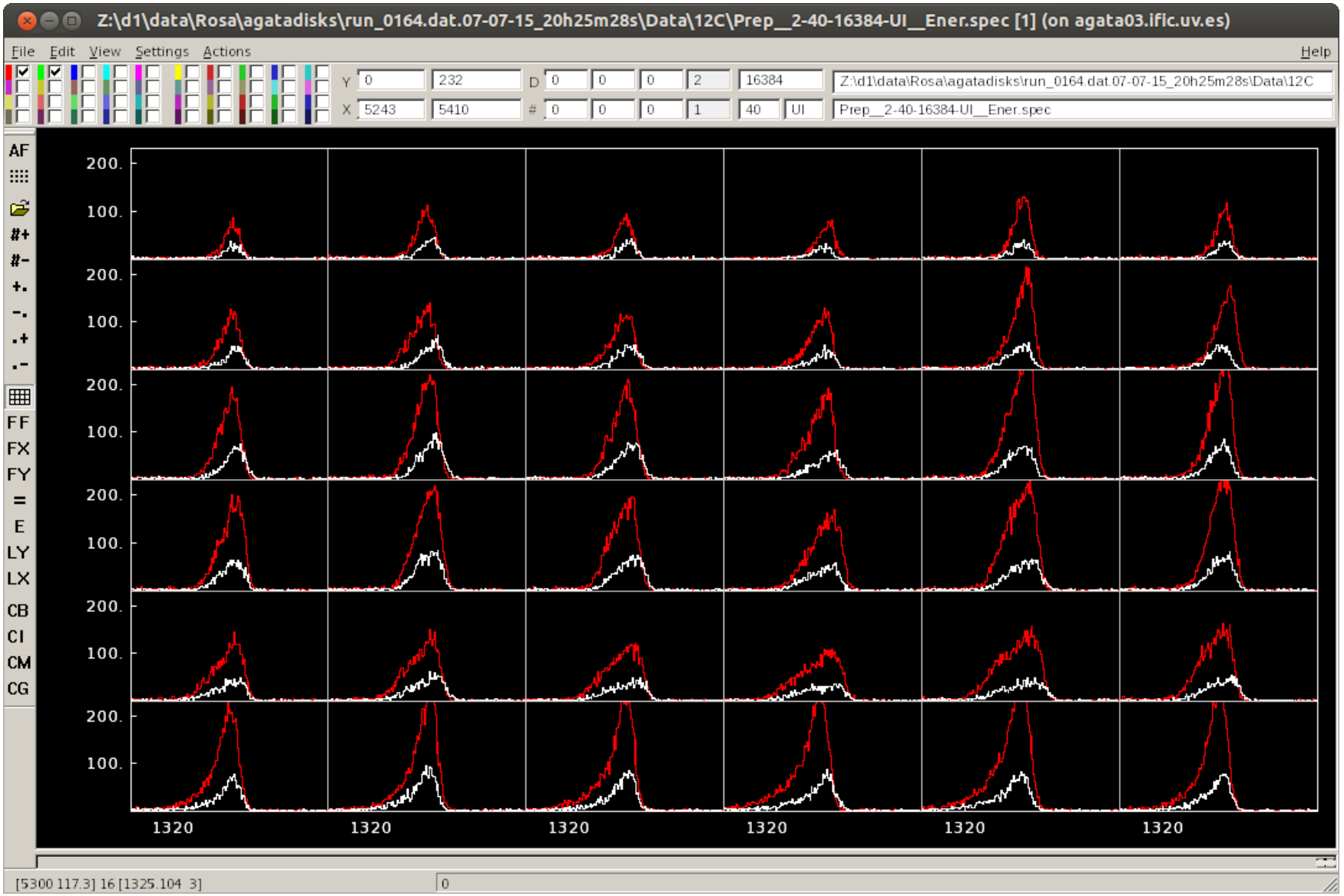


Detectors Status e682

Crystal C001 ATC3 position **12C**

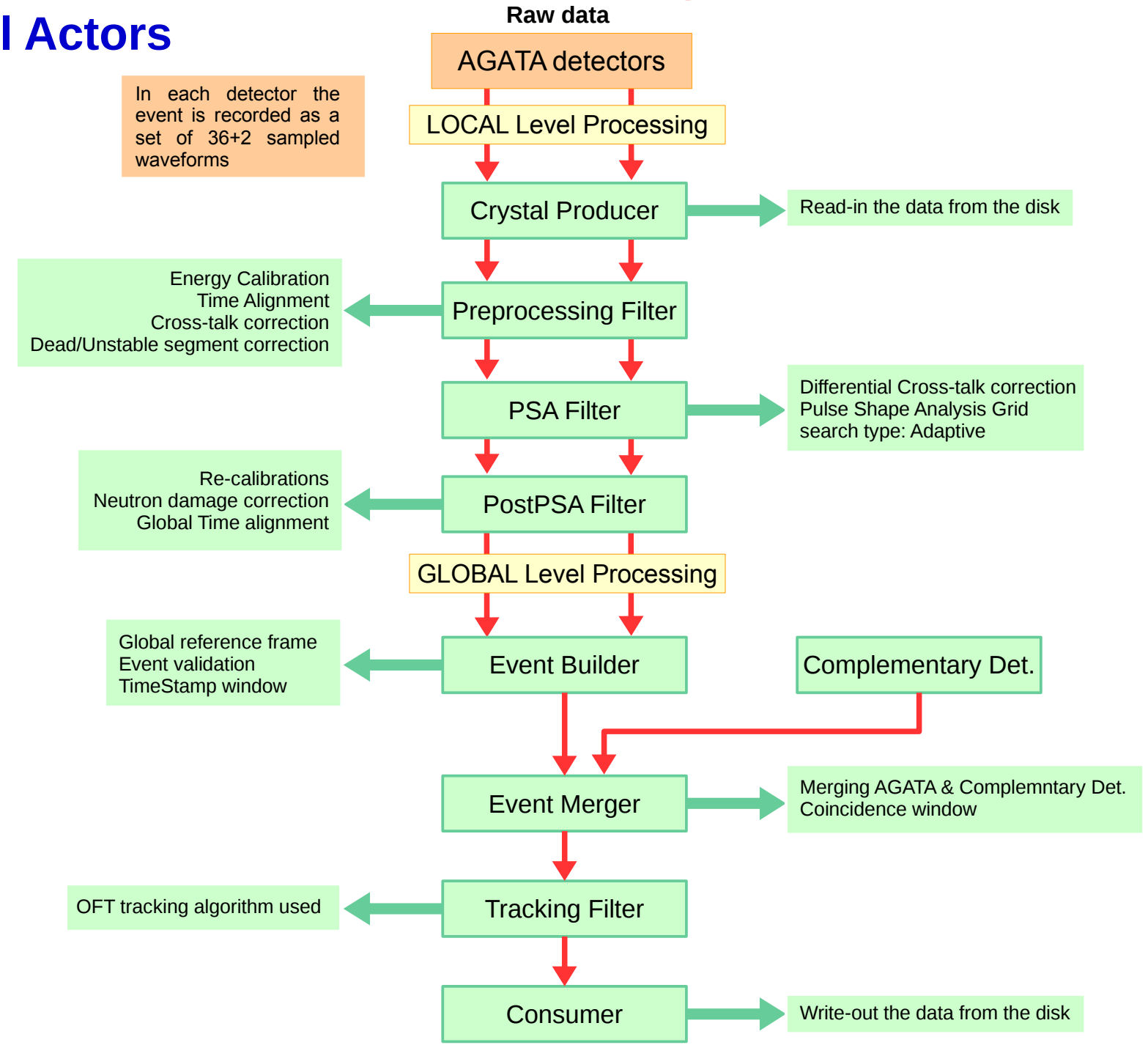
Neutron damage

- 12C Prep__2-40-16384__Ener.spec [1][all] before (red) and after (white) the experiment



Data processing. Replay

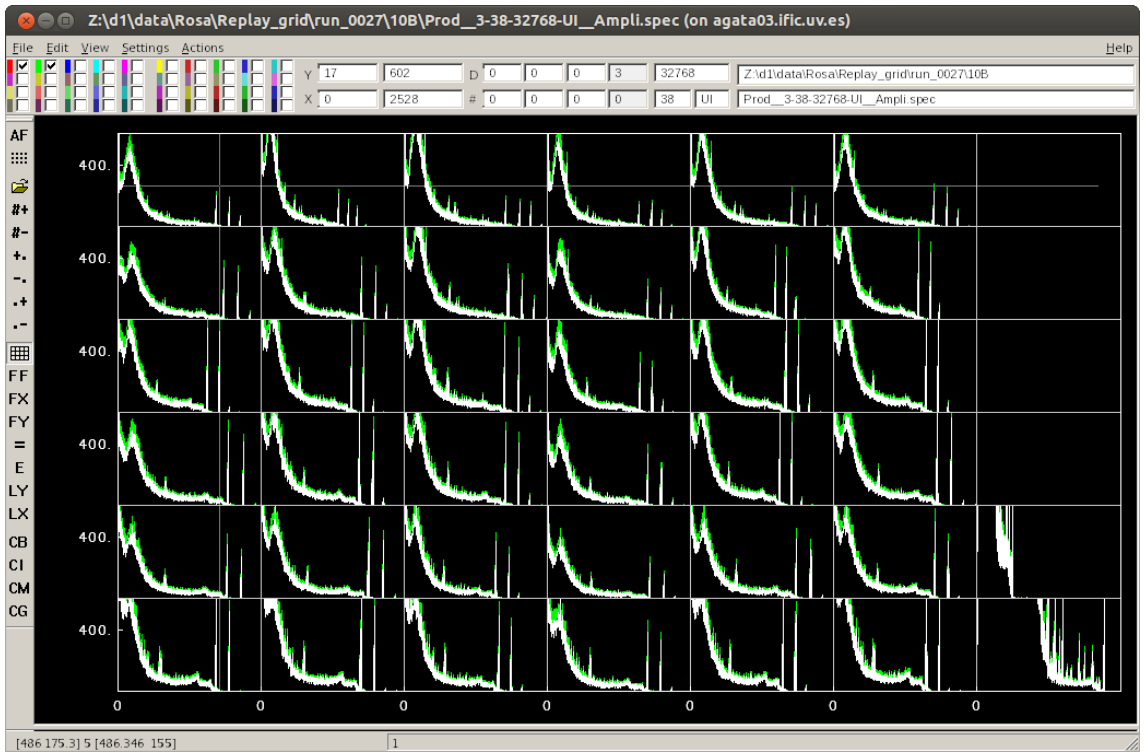
Narval Actors



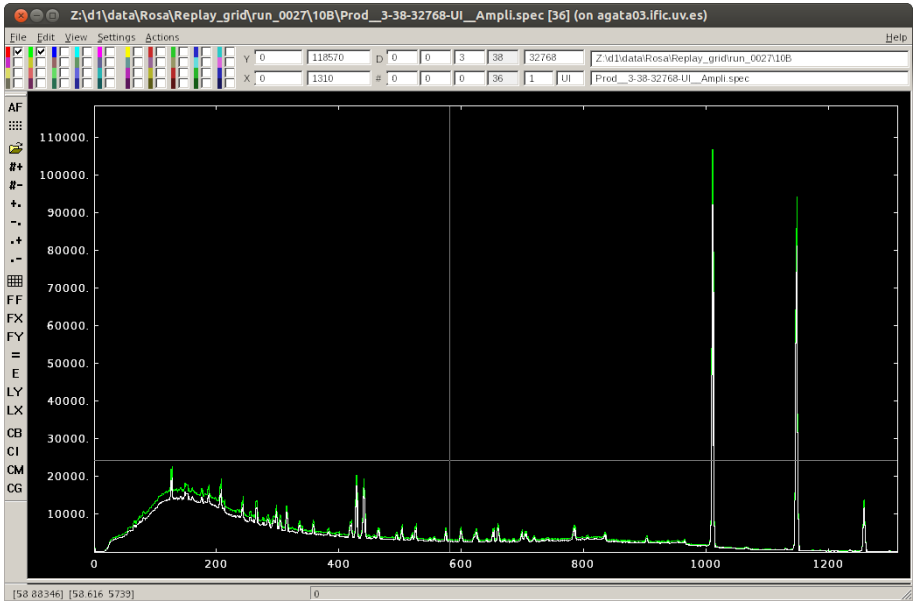
Replay

Crystal B003 ATC2 position **10B**

- **10B** Prod__3-38-32768__Ampli.spec [0][*] online data (green) and after (white) the Replay on GRID run 27



- **10B Core** Prod__3-38-32768__Ampli.spec [0][36] online data (green) and after (white) the Replay on GRID run 27

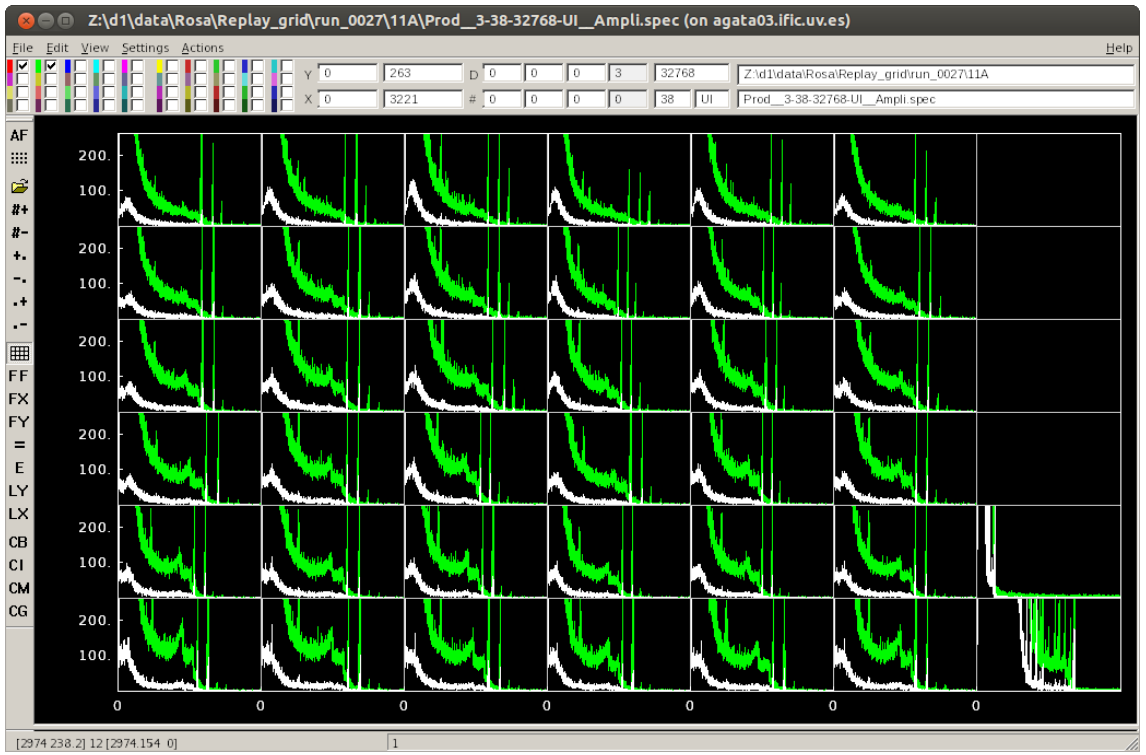


Losing 13,5% of statistics after the replay on GRID. Calculated from the spectrum area of the online data and after the replay data.

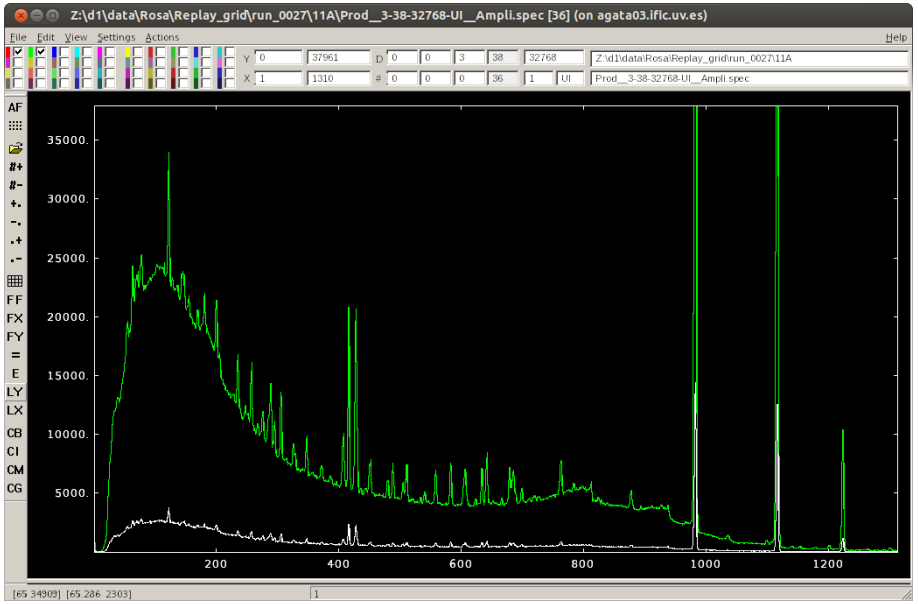
Replay

Crystal A006 ATC7 position **11A**

- **11A** Prod__3-38-32768__Ampli.spec [0][*] online data (green) and after (white) the Replay on GRID run 27



- **11A Core** Prod__3-38-32768__Ampli.spec [0][36] online data (green) and after (white) the Replay on GRID run 27



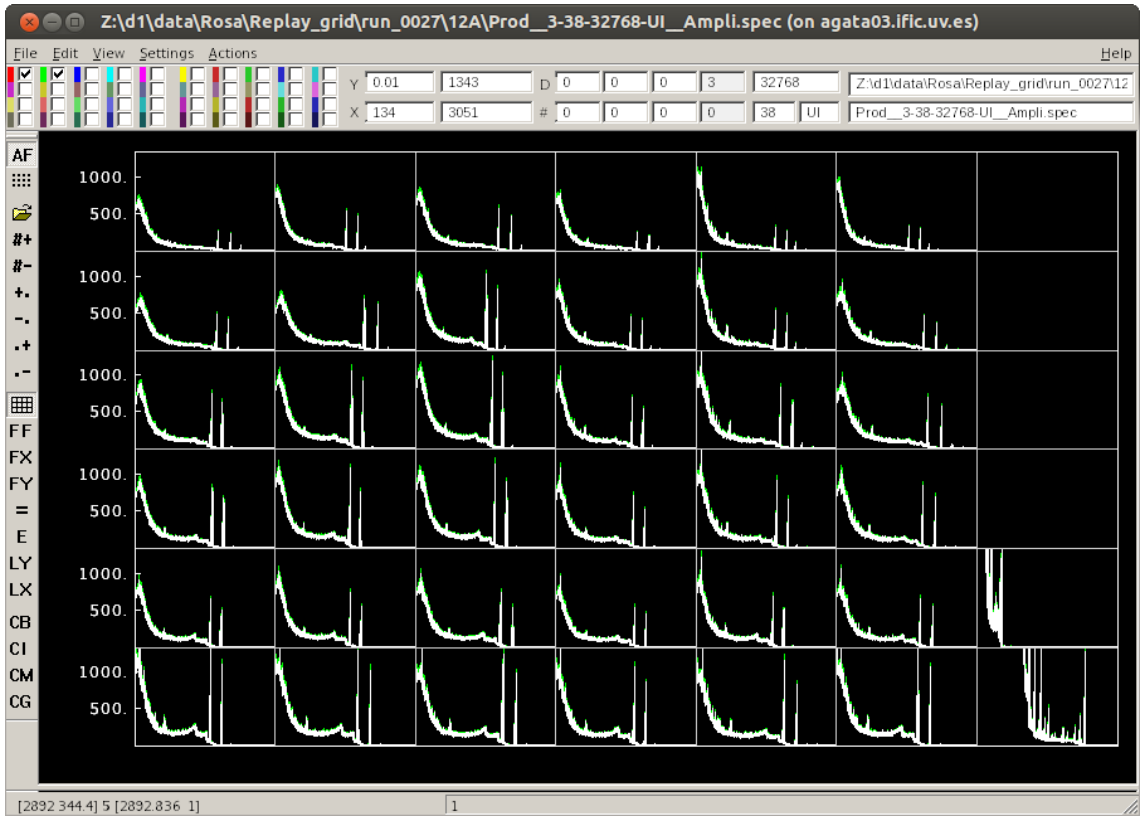
Losing 89,0% of statistics after the replay on GRID. Calculated from the spectrum area of the online data and after the replay data.

Error message: “Read from file-184 First word is 0xd803: this is not a mezzanine header”

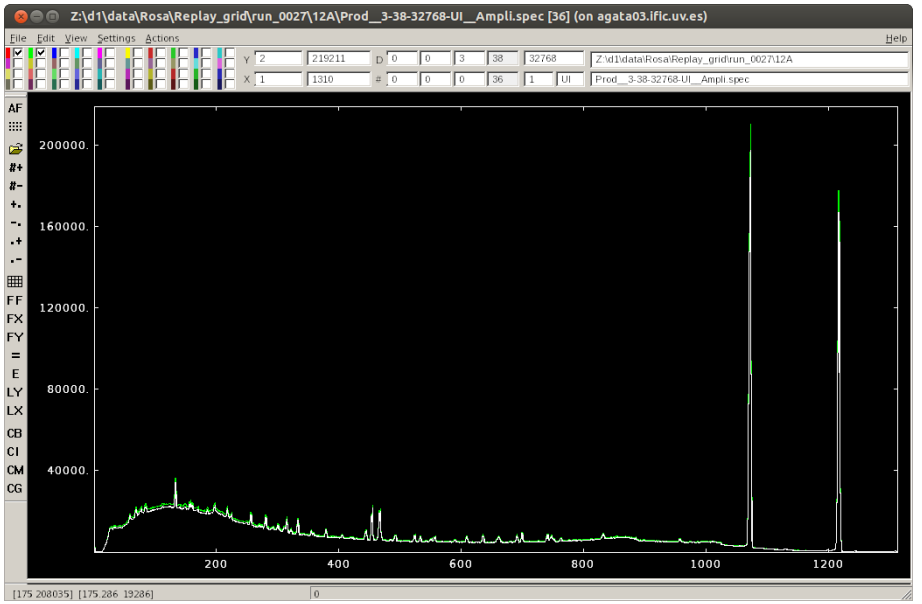
Replay

Crystal A002 ATC3 position **12A**

- **12A** Prod__3-38-32768__Ampli.spec [0][*] online data (green) and after (white) the Replay on GRID run 27



- **12A Core** Prod__3-38-32768__Ampli.spec [0][36] online data (green) and after (white) the Replay on GRID run 27



Losing 6,2% of statistics after the replay on GRID. Calculated from the spectrum area of the online data and after the replay data.

Losses recovered after installing new FEMUL

Local Level

Replay to generate event_energy.bdat files

Segment Corrections

- Correction in the crosstalk matrices to recover the signal of problematic segments considering that the sum of the energies released in the segments is equal to the energy in the core.
- Possible only if all other segments in the detector work correctly
- **Types of correction (FEMUL keywords):**

Dead segment correction: recovers E and T ⇒
- Broken
- Lost
- "Noisy"

- 03A: seg 2 lost, seg 12 broken ⇒ correction not possible
- 11B: seg 30 lost synch
- 12B: seg 5 about to be broken

Correction procedure
Broken: deadXsg, deadXcc
Lost: deadXsg, deadXcc=0

Replay:
- add new cross talk files
- add in the gen_conf.py Prep: **'Det' : ("DeadSegment Seg FactorS FactorC"),**
- add in the gen_conf.py PSA: **'Det' : ("DeadSegment Seg "),**
- set coeff seg to 0 in the PreprocessingFilterPsa.conf

Unstable segment correction: recovers E ⇒
- Gain shift, etc

- 00B: seg 7 double peak
- 04B: seg 30 right tail

Correction procedure treatment as a "lost" segment: deadXsg

Replay:
- add new cross talk files
- add in the gen_conf.py **'Det' : "UnstableSegment Seg FactorS"**
- keep de old coeff of calibration for the seg (different from 0) in the PreprocessingFilterPsa.conf

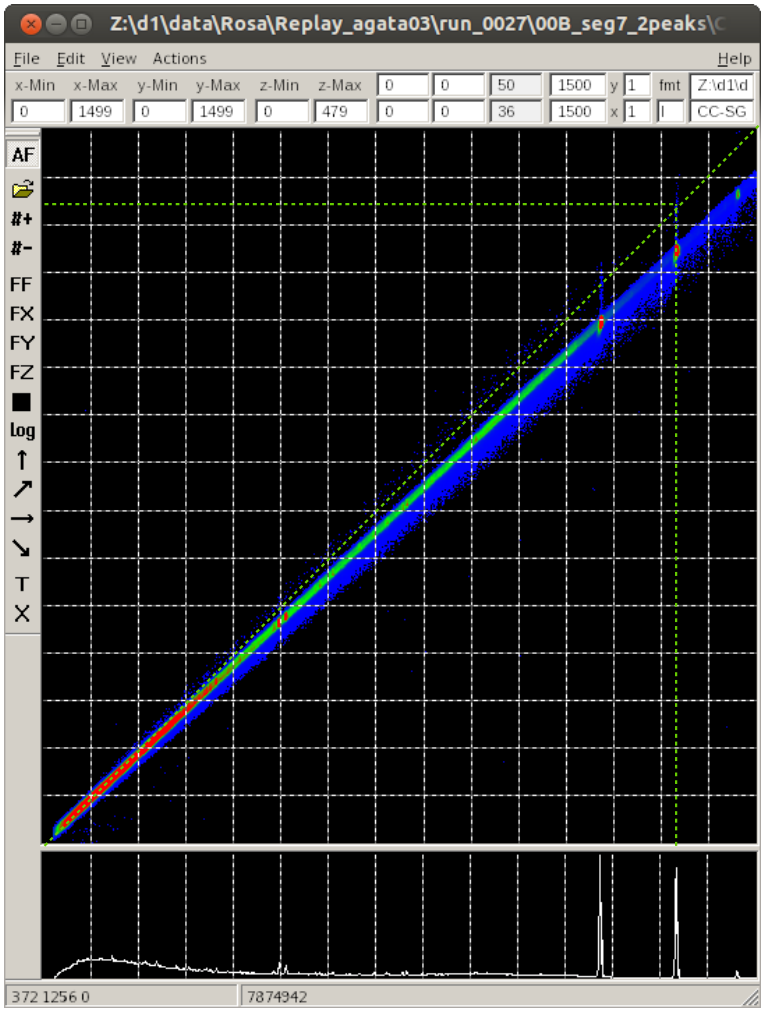
Local Level

Replay to generate event_energy.bdat files

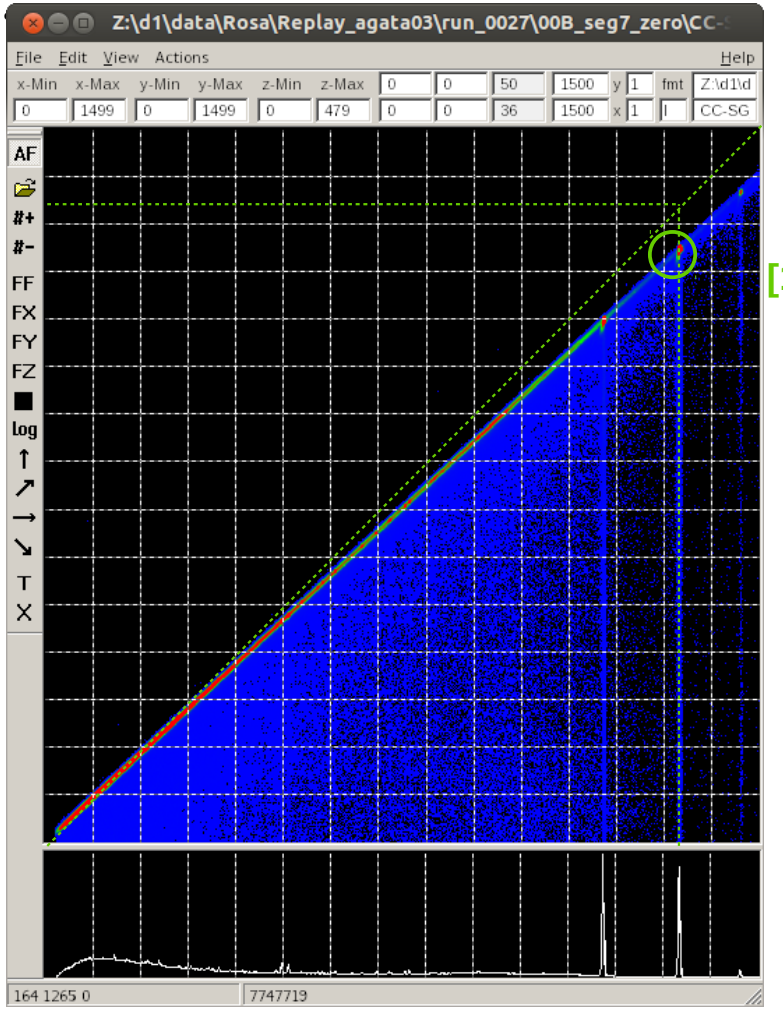
Unstable Segment Correction

Crystal B004 ATC6 position **00B.**

- 00B CC-SG__50-1500-1500-US__ma.matr [36] ecalF1.cal file seg 7 **coeff 1.242457**



- 00B CC-SG__50-1500-1500-US__ma.matr [36] ecalF1.cal file seg 7 **coeff 0.00000** to treat seg 7 as a lost segment in the correction



[x,y] = **[1332.42,1246.8]**

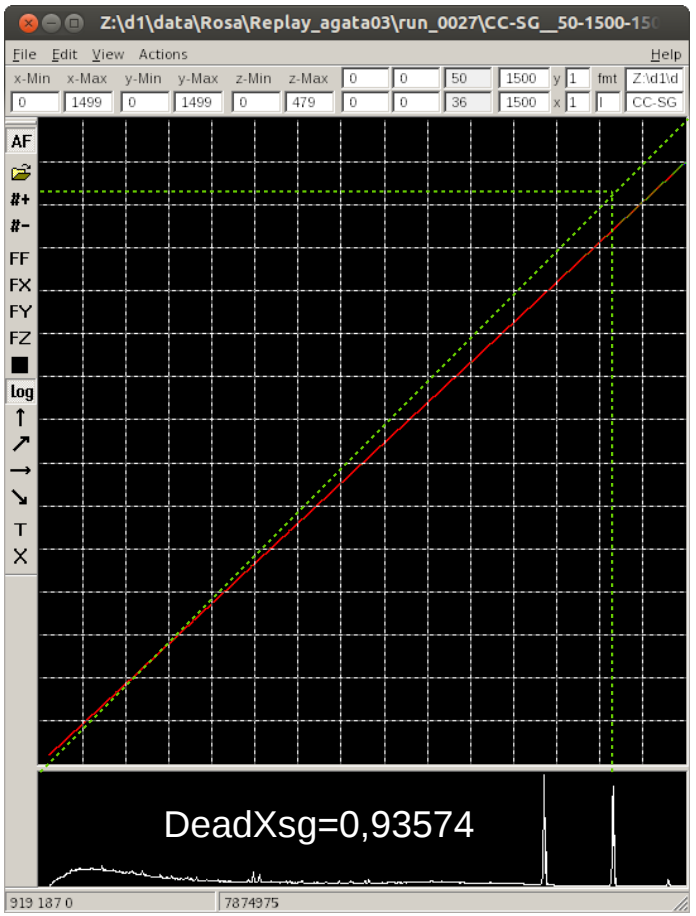
Slope of main diagonal ==> **DeadXsg=y/x=0,93574**
No core loss ==> **DeadXcc=0**

Local Level

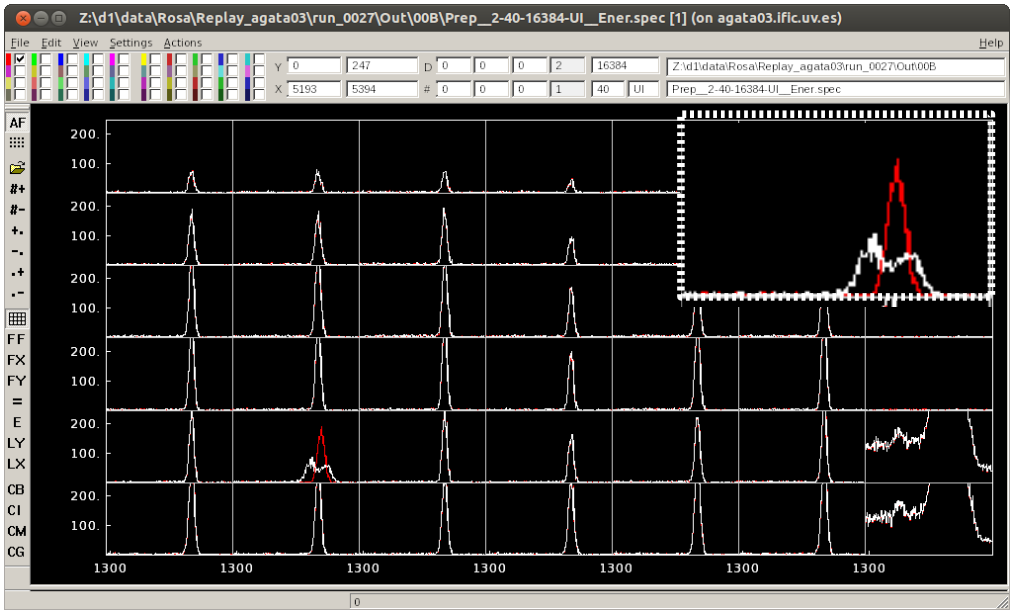
Unstable Segment Correction

Crystal B004 ATC6 position **00B.**

- 00B CC-SG__50-1500-1500-US__ma.matr [36]



- 00B **seg 7** Prep__2-40-16384__Ener.spec [0][7] (red) & [1][7] (white)



- **Generate new crosstalk matrix**
  xTalkSort -ifile event_energy.bdat -ecalF1 ecalF1.cal -egain 5 -deadSeg 7 0.93574 0 -matx1
- **Generate crosstalk coefficients**
  xTalkMake -f xSG__36-36-100-1536-US__ij.matr

Replay:
- add new cross talk files
- add in the gen_conf.py **'00B' : "UnstableSegment 7 0.9331"**
- keep de old coeff of calibration for seg 7 (different from 0) in the PreprocessingFilterPsa.conf

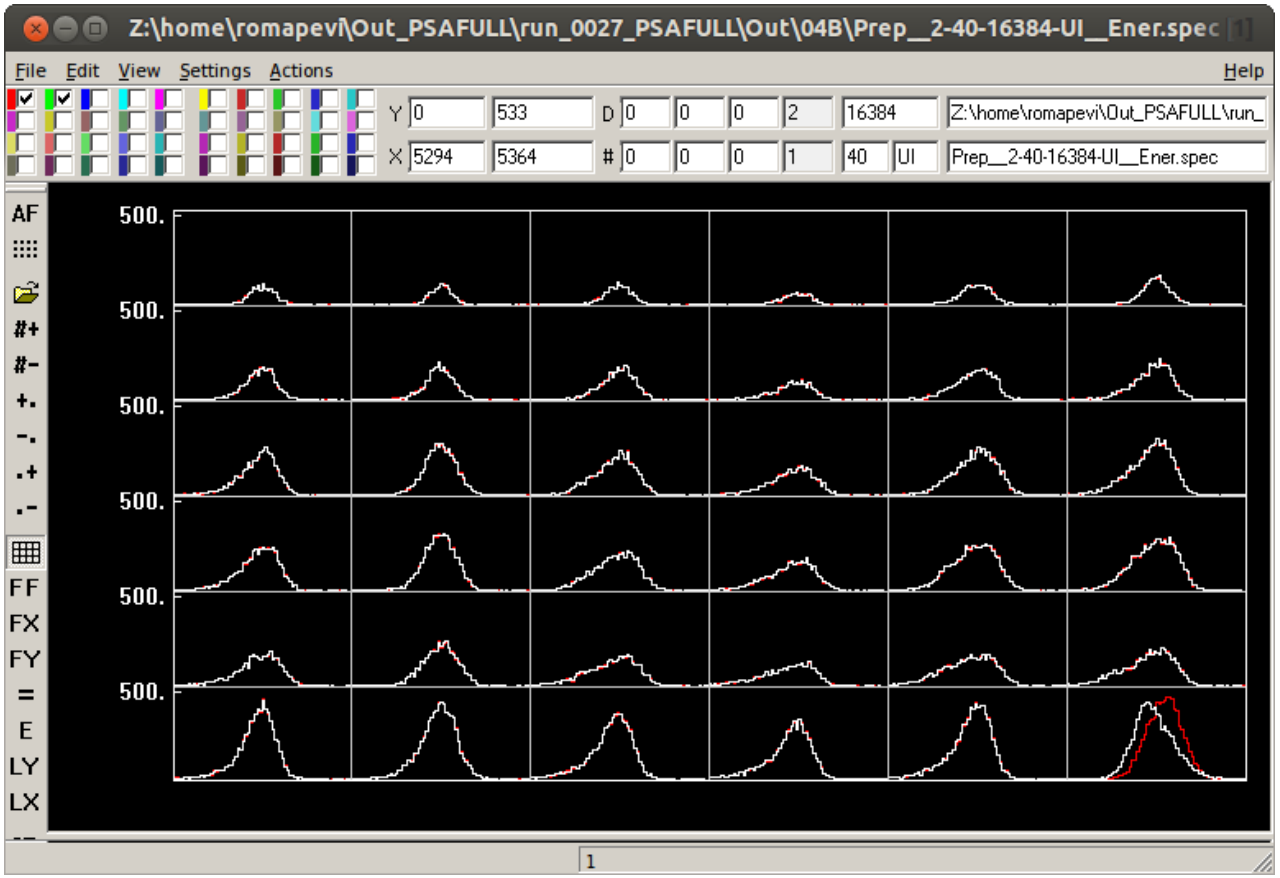
Local Level

Replay to generate event_energy.bdat files

Unstable Segment Correction

Crystal B001 ATC1 position **04B**

- 00B **seg 30** Prep__2-40-16384__Ener.spec [0][30] (red) & [1][30] (white)



Replay:
- add new cross talk files
- add in the gen_conf.py **'04B' : "UnstableSegment 7 0.9495"**
- keep de old coeff of calibration for seg 30 (different from 0) in the PreprocessingFilterPsa.conf

Local Level

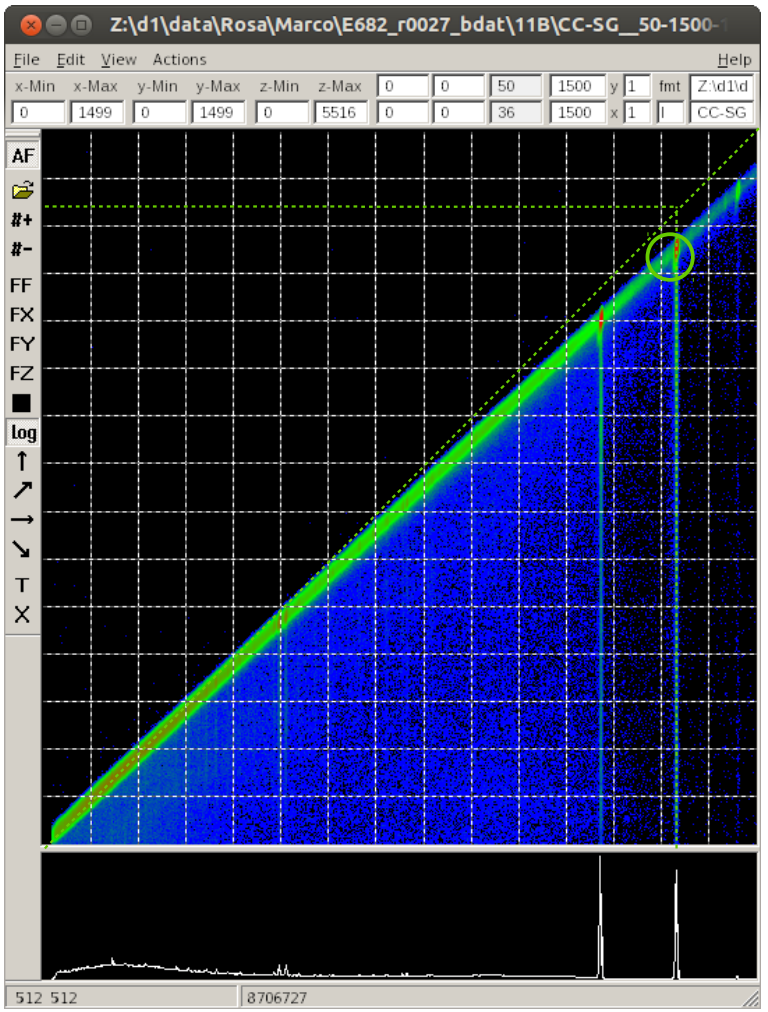
Replay to generate event_energy.bdat files

Dead Segment Correction

Crystal B013 ATC7 position **11B.**

- **11B** CC-SG__50-1500-1500-US__ma.matr [36]

ecalF1.cal file seg 30 coeff 0.00000 to treat seg 30 as a lost segment in the correction



[x,y] = **[1332.36,1253.16]**

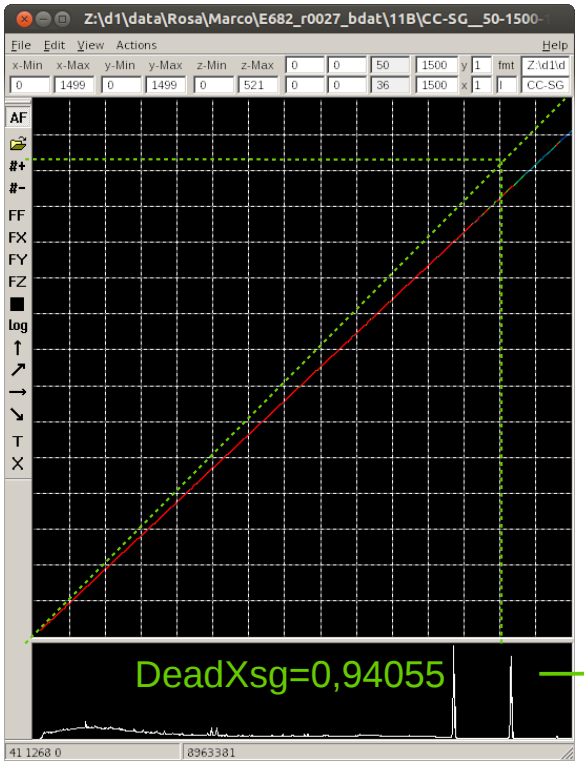
Slope of main diagonal ==> **DeadXsg=y/x=0,94055**

No core loss ==> **DeadXcc=0**

Local Level

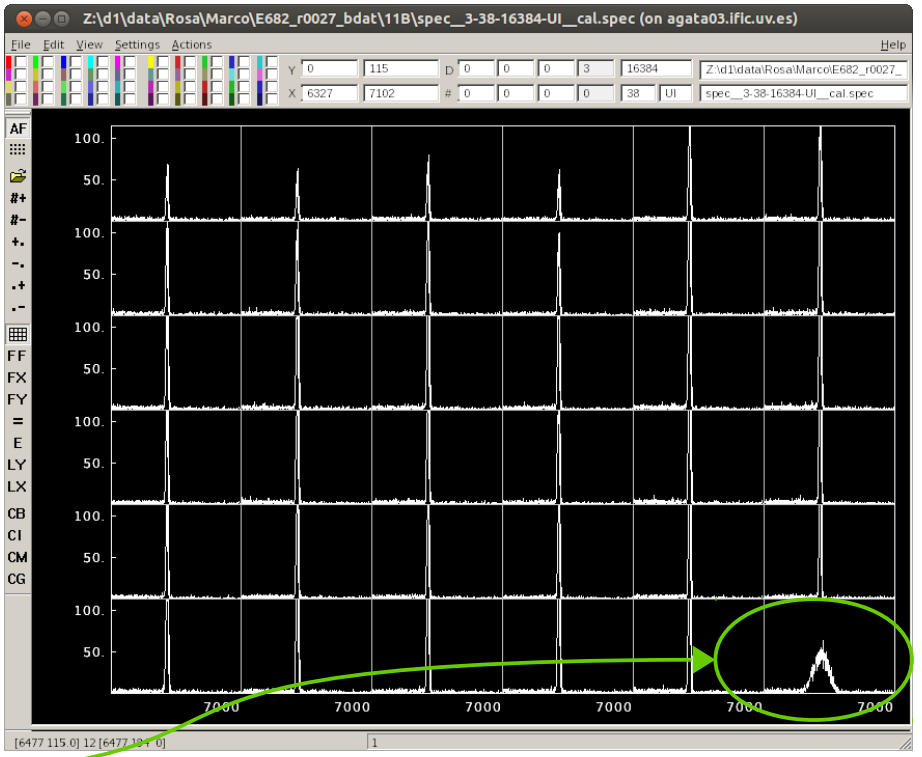
Dead Segment Correction

Crystal B013 ATC7 position **11B.**

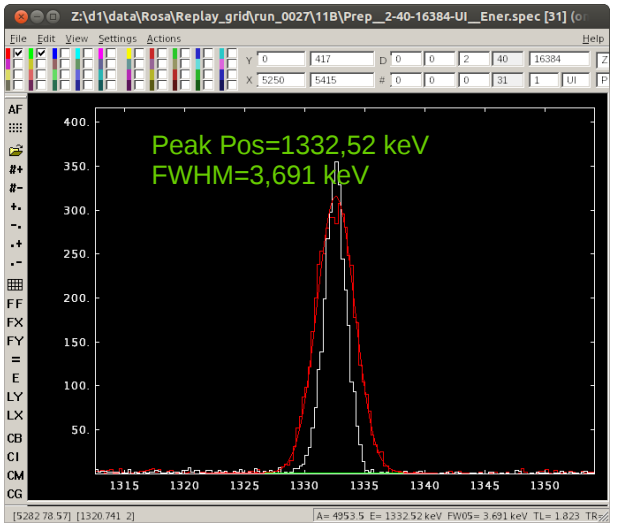


- **11B** CC-SG__50-1500-1500-US__ma.matr [36]

- 11B **seg 30** spec__3-38-16384-UI__cal.spec [0][all]



- 11B **seg 30** Prep__2-40-16384__Ener.spec [0][30] (red) & [0][31] (white)



Replay:
- add new cross talk files
- add in the gen_conf.py Prep: **'11B' : ("DeadSegment 30 0.94055 0"),** because “UnstableSegment 30 0.94055” is not working when setting coeff of seg 30 to 0
- add in the gen_conf.py PSA: **'11B' : ("DeadSegment 30 "),**
- set coeff seg 30 to 0 in the PreprocessingFilterPsa.conf

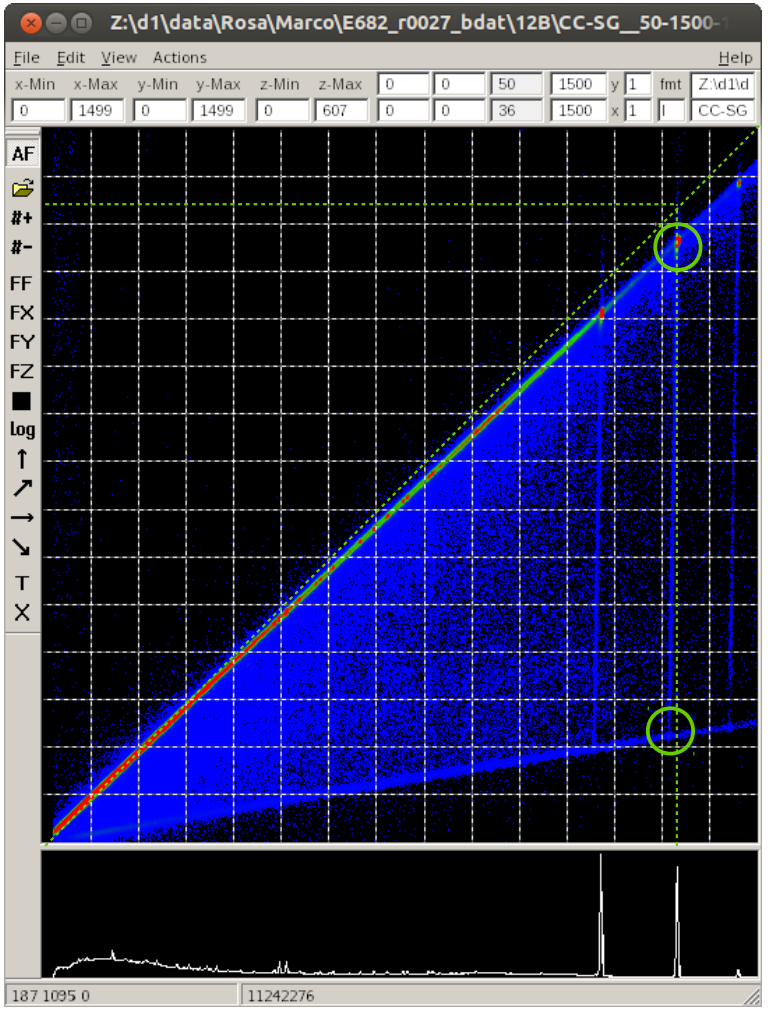
Local Level

Replay to generate event_energy.bdat files

Dead Segment correction

Crystal B010 ATC3 position **12B.**

- 12B CC-SG__50-1500-1500-US__ma.matr [36] ecalF1.cal file seg 5 coeff 0.00000 to treat seg 5 as a broken segment in the correction



$[x_1,y_1]$ = [1332.47,1263.62]

$[x_2,y_2]$ = [1315.6,223.10]

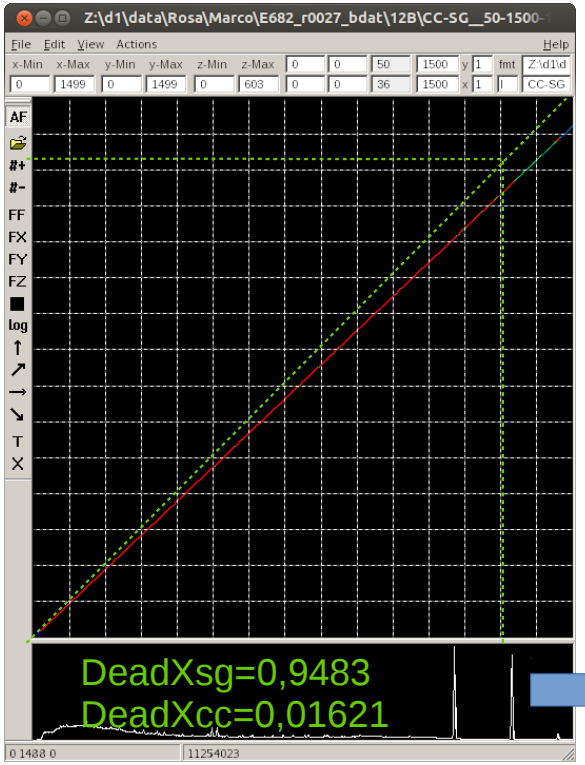
Slope of main diagonal ==> **DeadXsg=y_1/x_1=0,9483**

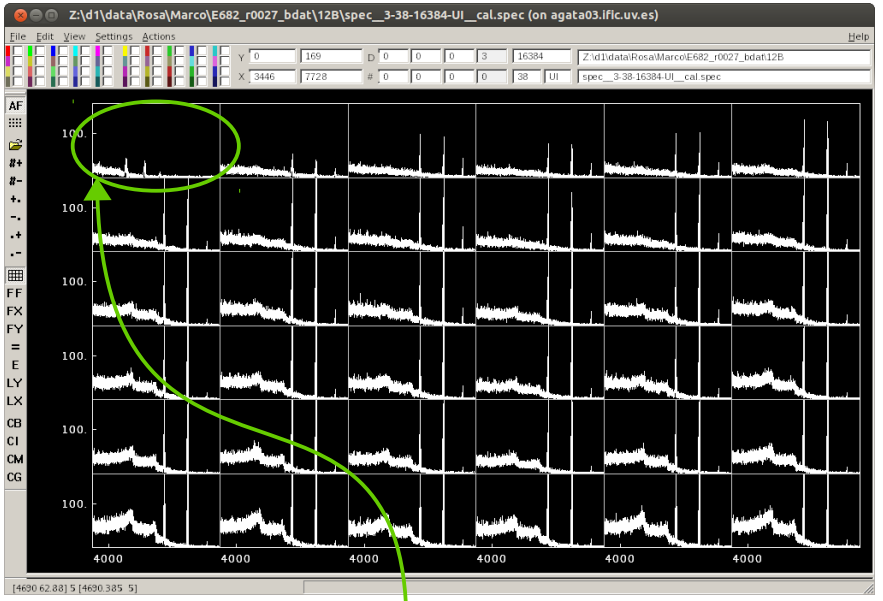
1/slope of core loss ==> **DeadXcc=$(x_1-x_2)/(y_1-y_2)$=0,01621**

Local Level

Dead Segment correction

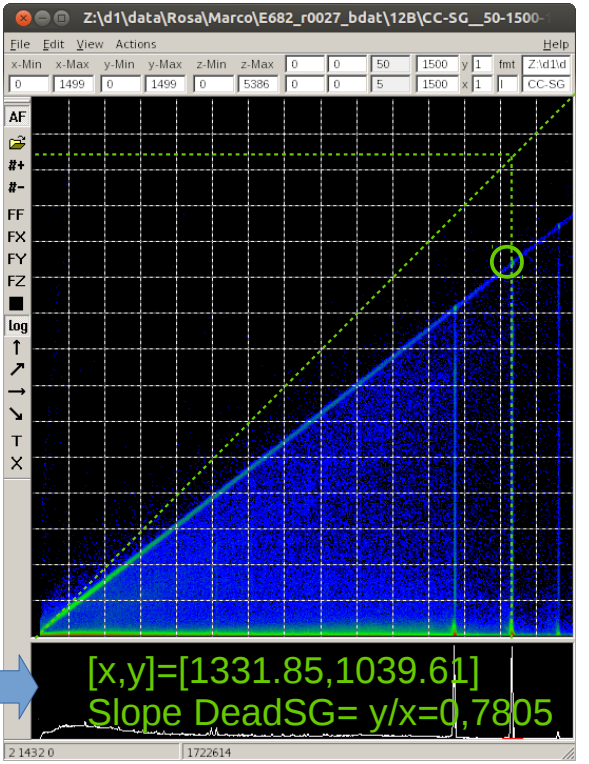
- 12B **seg 5** spec__3-38-16384-UI__cal.spec [0][all]





The energy is very small due to part of it is still in the neighbours. For the cross talk correction we need the slope of the broken segment after the correction

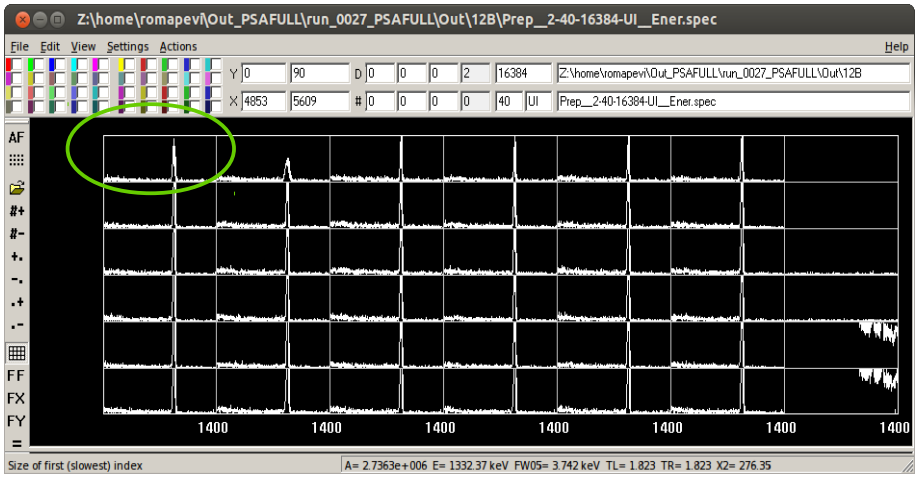
- **12B** CC-SG__50-1500-1500-US__ma.matr [5]



- **12B** CC-SG__50-1500-1500-US__ma.matr [36]

Replay:
- add new cross talk files
- add in the gen_conf.py Prep: **'12B' : ("DeadSegment 5 0.9483 0.1621"),**
- add in the gen_conf.py PSA: **'12B' : ("DeadSegment 5 "),**
- set coeff seg 5 to 0 in the PreprocessingFilterPsa.conf

- 12B **seg 5** Prep__2-40-16384__Ener.spec [0][*]

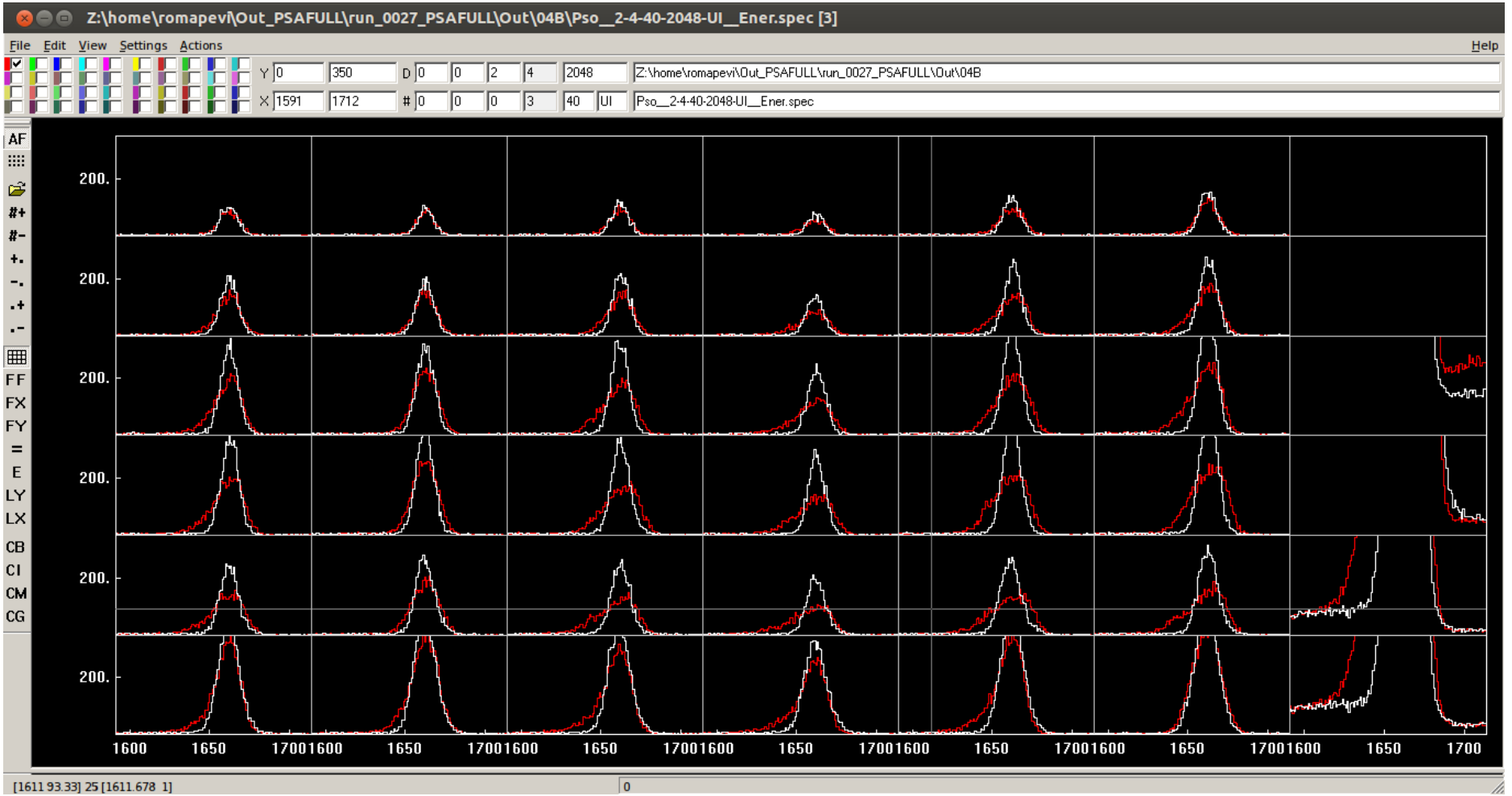


Local Level

Neutron Damage Correction

Crystal B001 ATC1 position **04B**

- 04B Pso__2-4-40-2048-UI__Ener.spec [0][1] before (red) and [0][3] after (white) the neutron correction

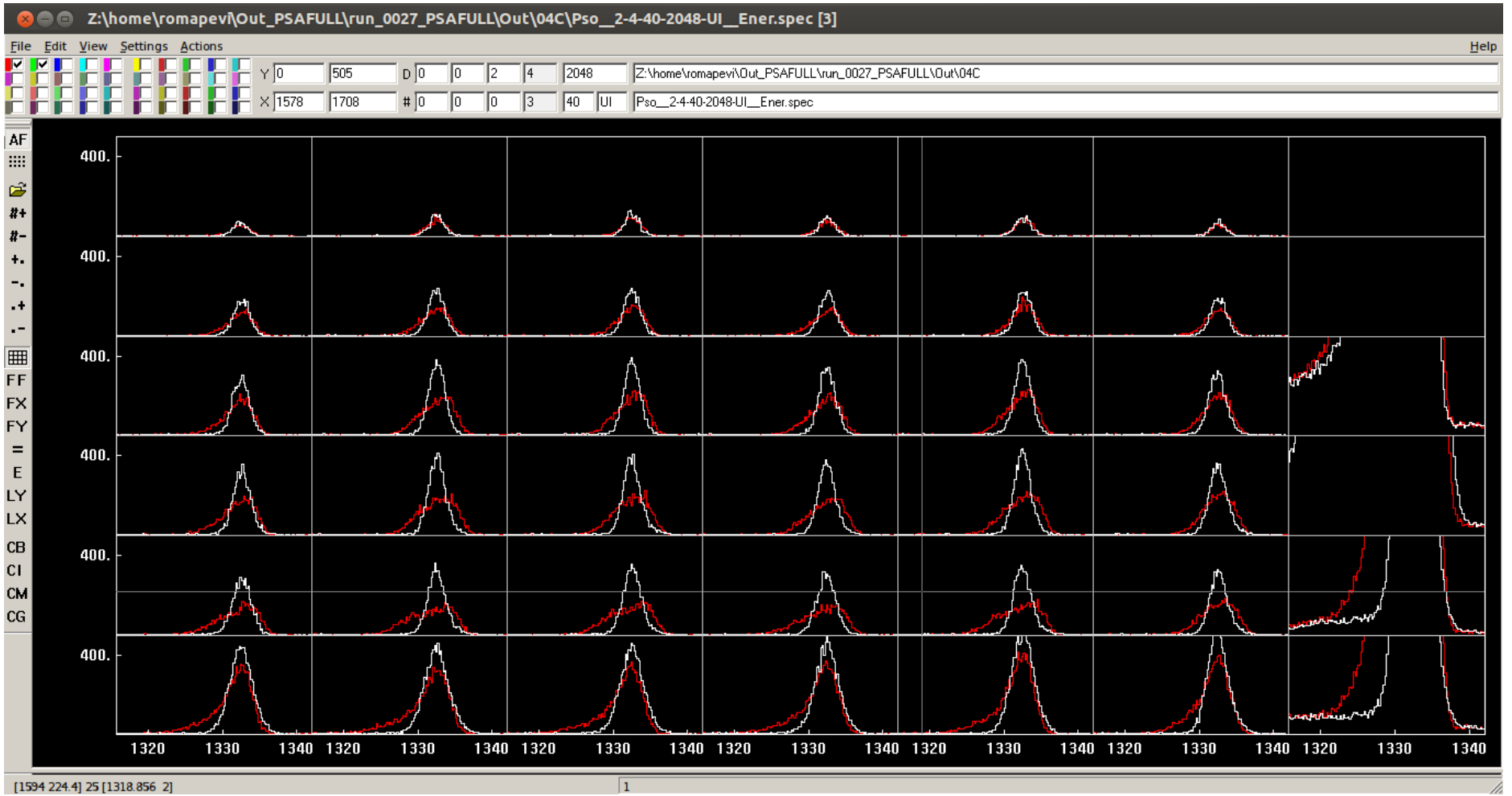


Local Level

Neutron Damage Correction

Crystal C003 ATC1 position **04C**

- 04C Pso__2-4-40-2048-UI__Ener.spec [0][1] before (red) and [0][3] after (white) the neutron correction

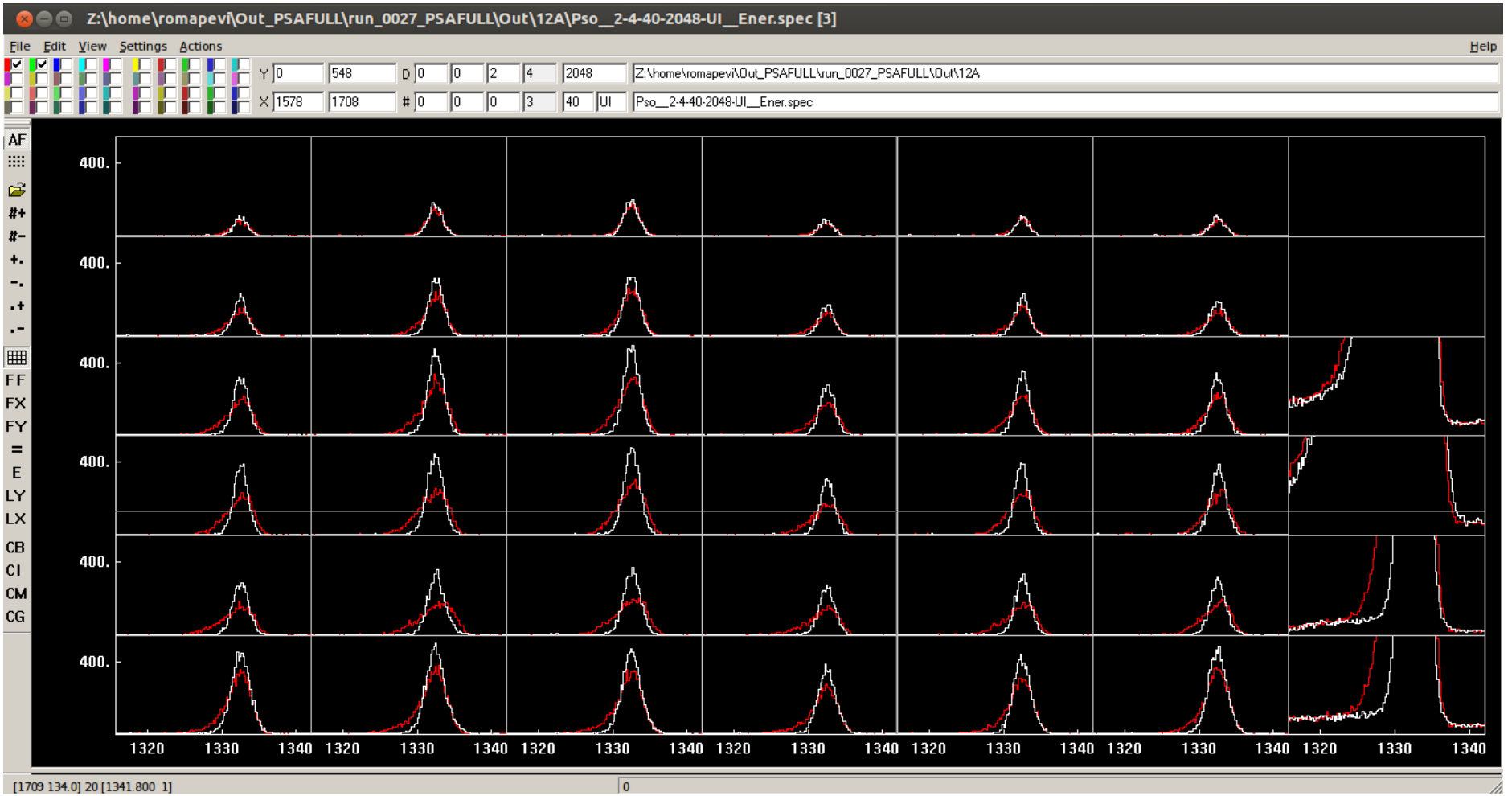


Local Level

Neutron Damage Correction

Crystal A002 ATC3 position **12A**

- 12C Pso__2-4-40-2048-UI__Ener.spec [0][1] before (red) and [0][3] after (white) the neutron correction

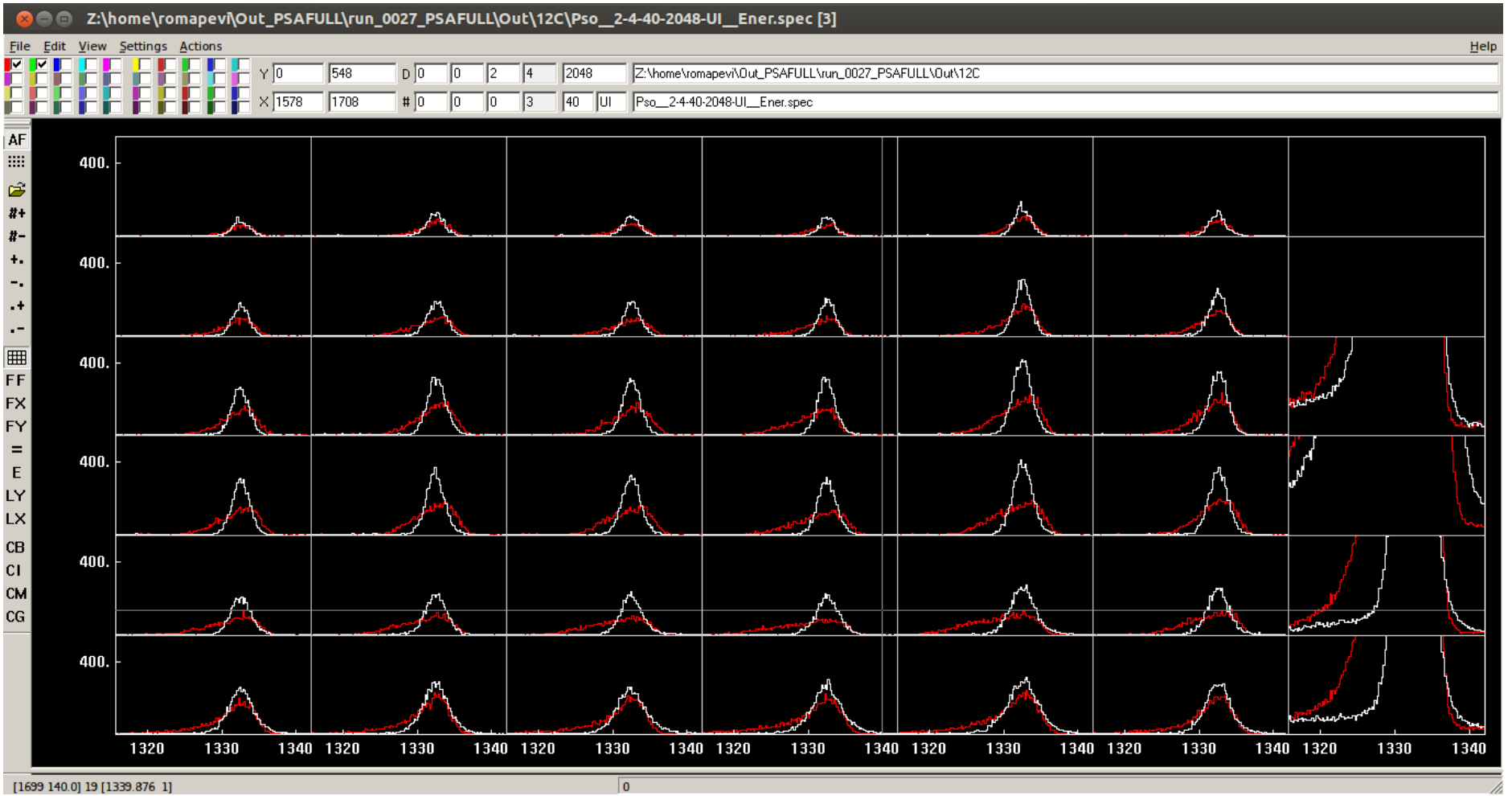


Local Level

Neutron Damage Correction

Crystal C001 ATC3 position **12C**

- 12C Pso__2-4-40-2048-UI__Ener.spec [0][1] before (red) and [0][3] after (white) the neutron correction



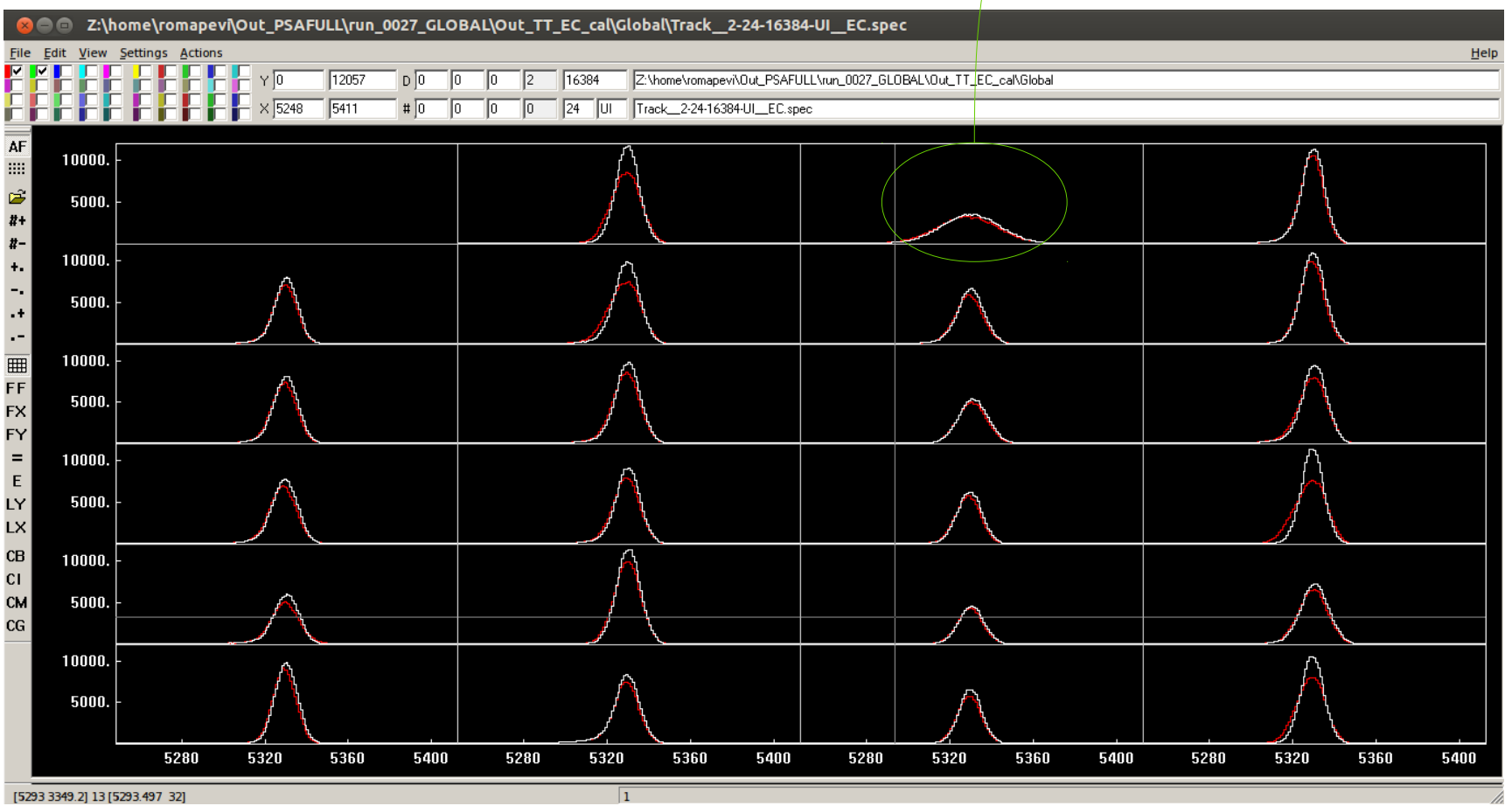
Global Level

Energy after NC and recalibration

Cores

- Track__2-24-16384-UI__EC.spec[0][*] **Cores** before (red) and after (white) neutron damage correction (Replay on GRID run 27)

11C very bad resolution



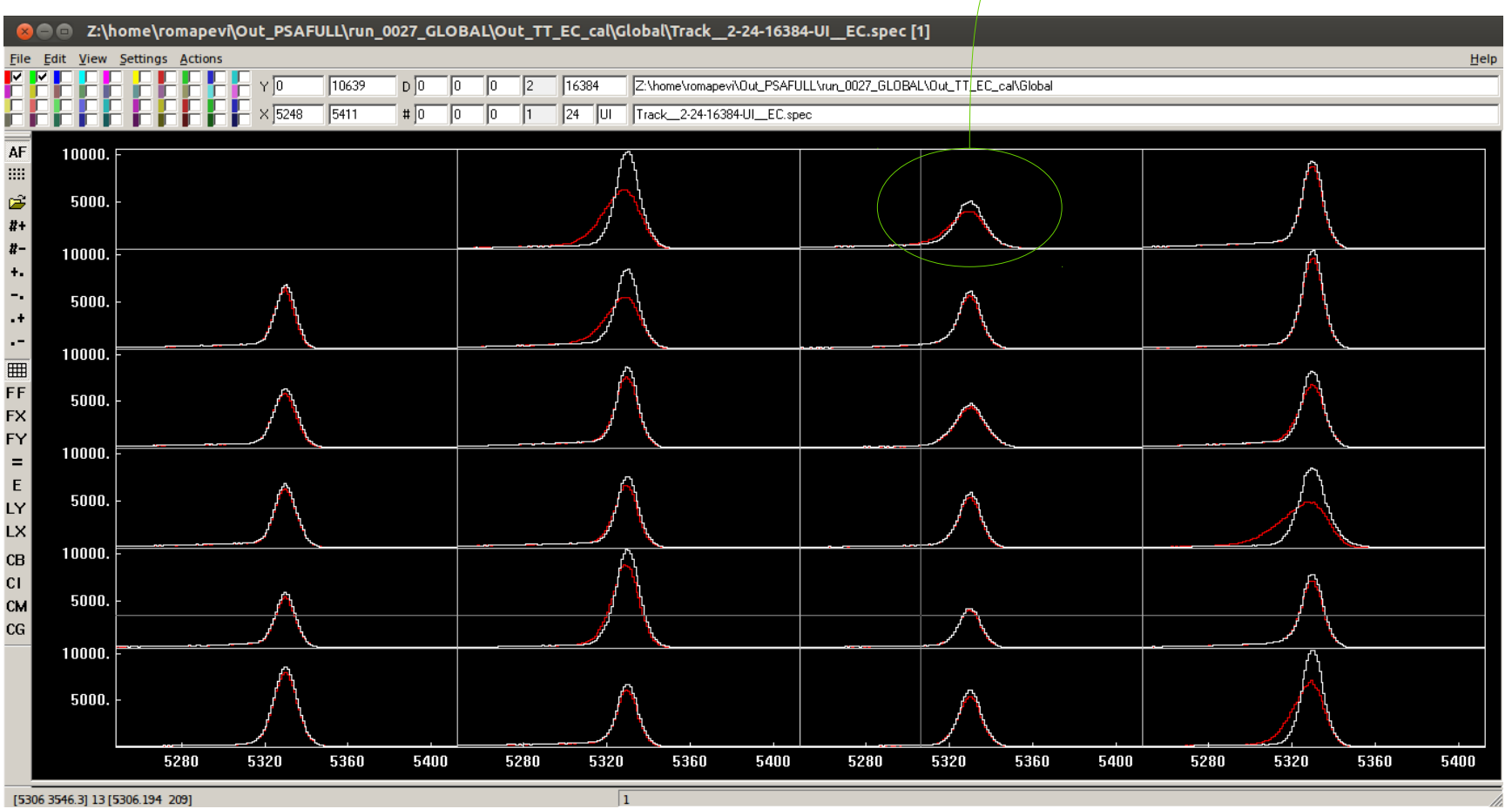
Global Level

Energy after NC and recalibration

Sum of Segments

- Track__2-24-16384-UI__EC.spec[1][*] **SumSeg** before (red) and after (white) neutron damage correction (Replay on GRID run 27)

11B Better resolution for Sum Seg



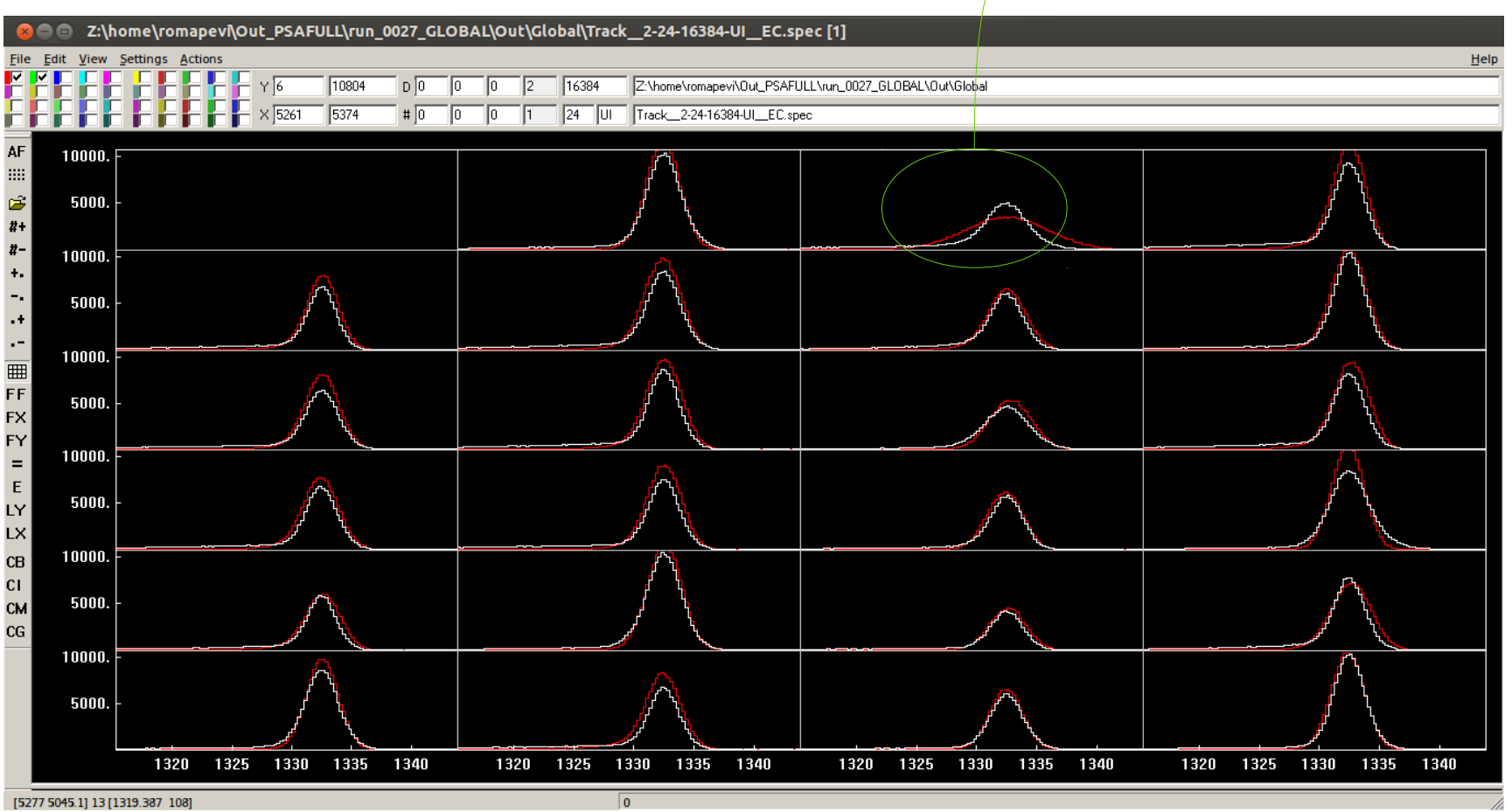
Global Level

Energy after NC and recalibration

Comparison Cores & SumSeg

- Track__2-24-16384-UI__EC.spec **Cores [0][*](red) SumSeg [0][*] (white)** after neutron damage correction (Replay on GRID run 27)

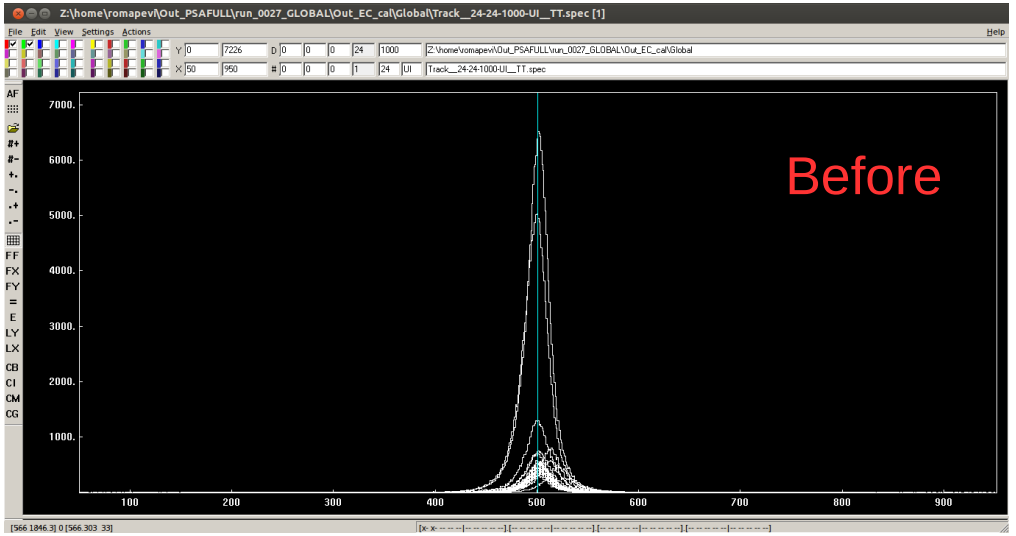
11C very bad core resolution

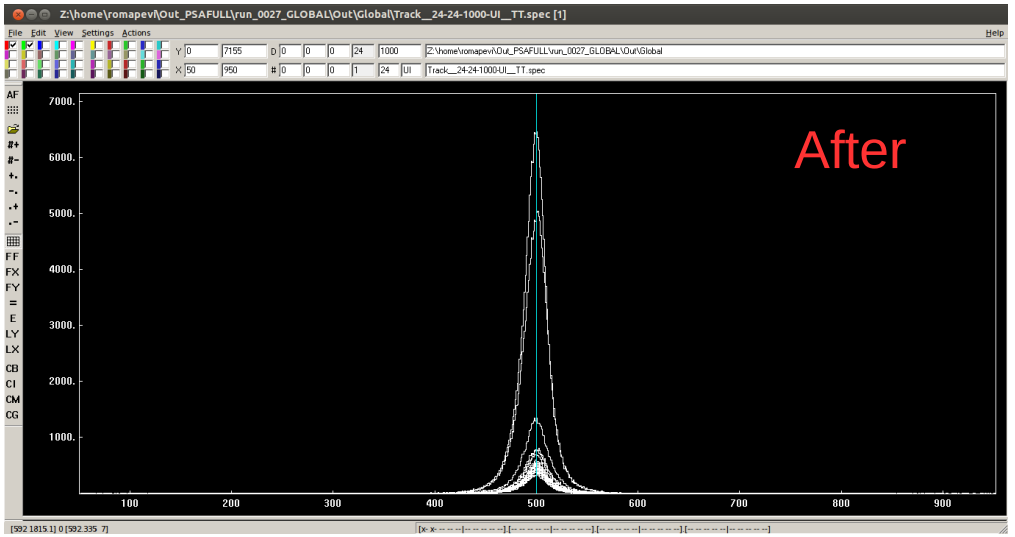


Global Level

Global Time Alignment

- Track__24-24-1000-UI__TT.spec example detector 00B [0][*]

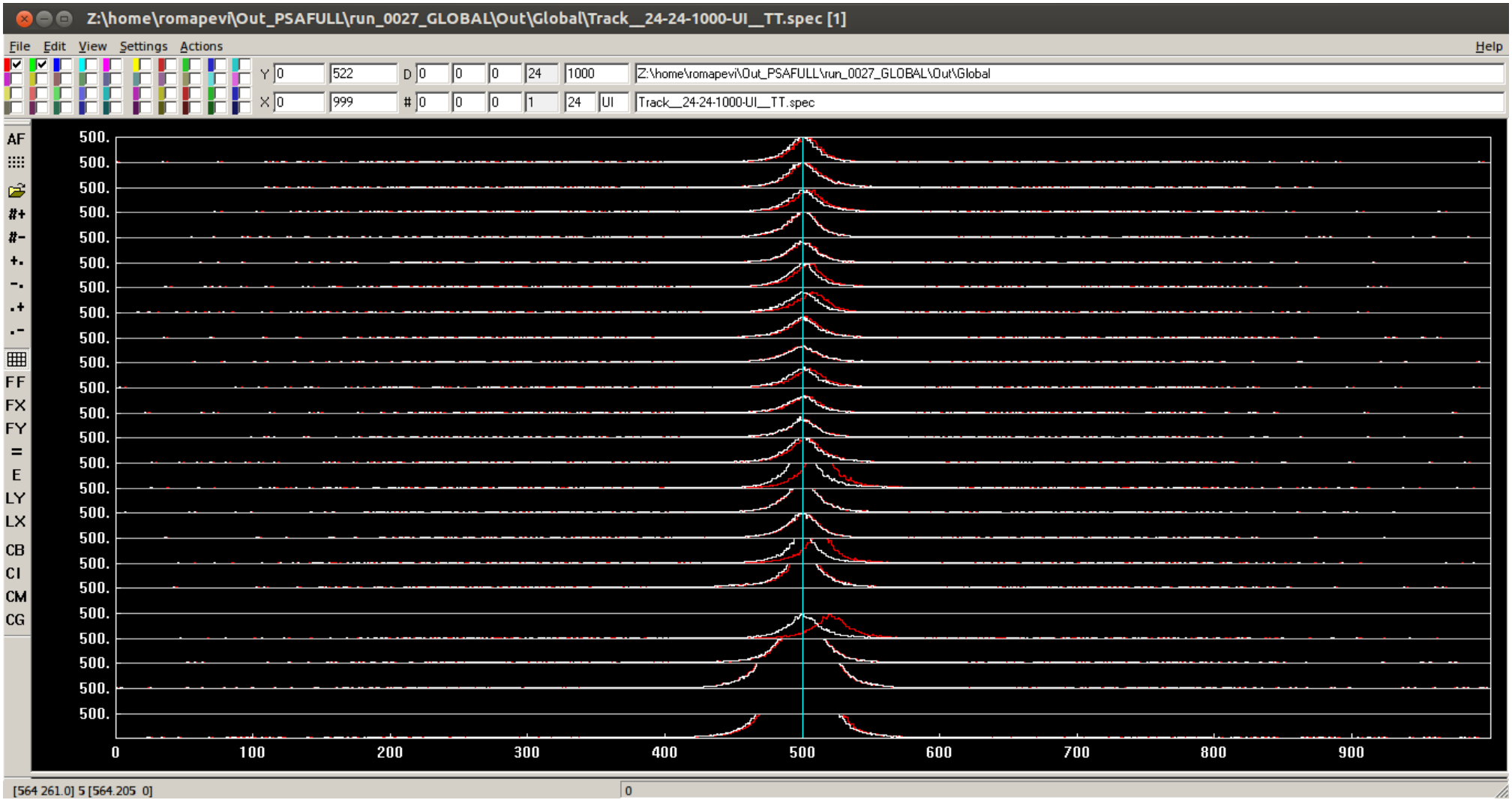




Global Level

Global Time Alignment

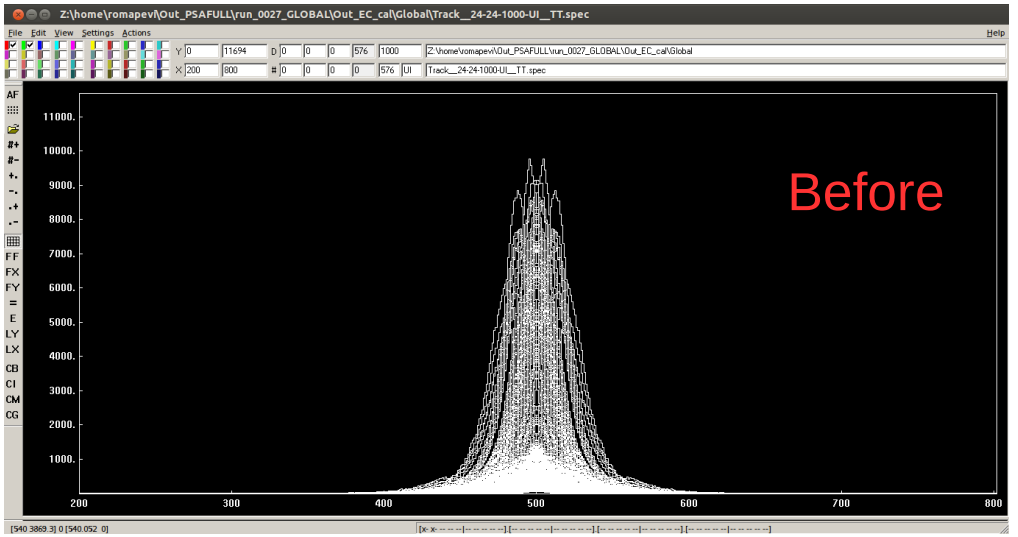
- Track__24-24-1000-UI__TT.spec example detector 00B [0][*]
  red before, white after time aligment

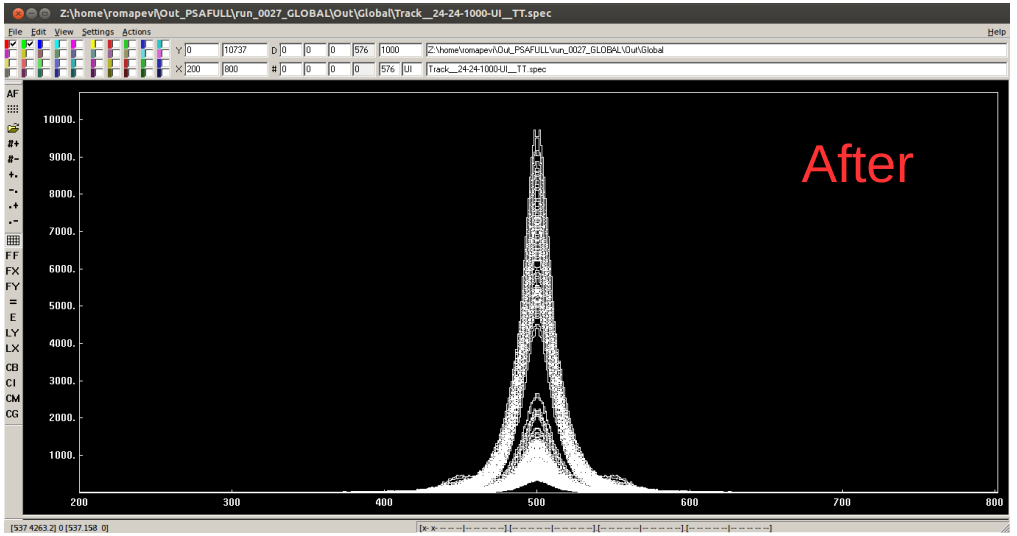


Global Level

Global Time Alignment

- Track__24-24-1000-UI__TT.spec all [*][*]





Global Level

Global Time Alignment

- Track__24-24-1000-UI__TT.spec all [*][*] red before, white after time aligment