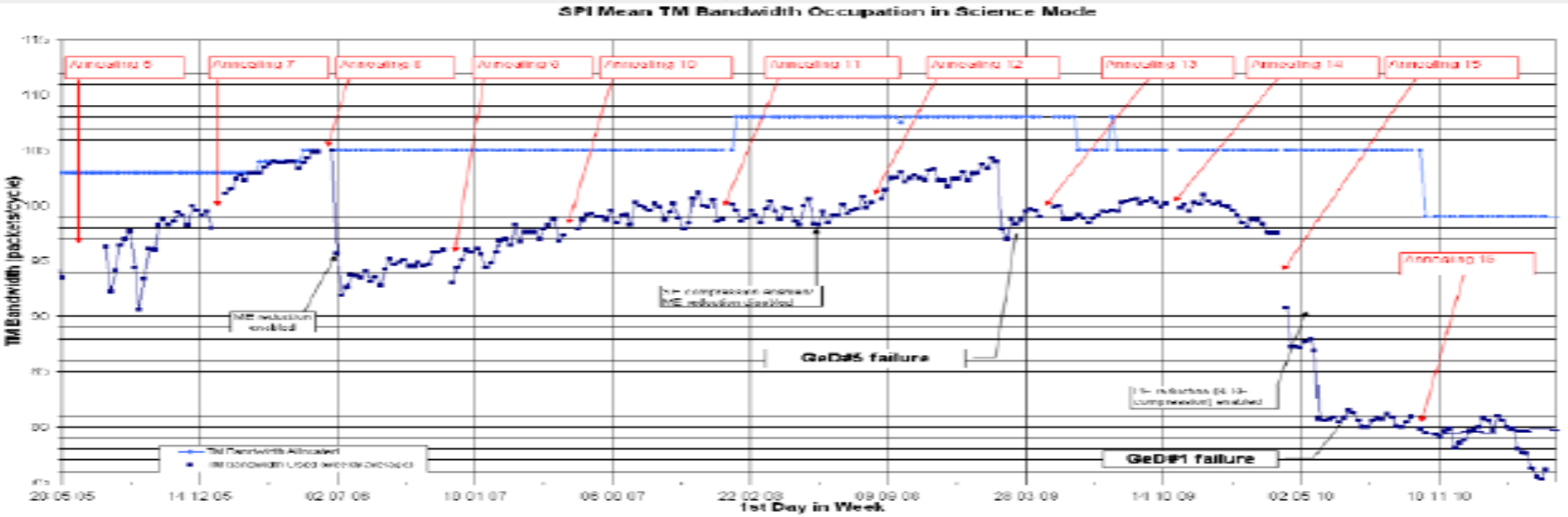
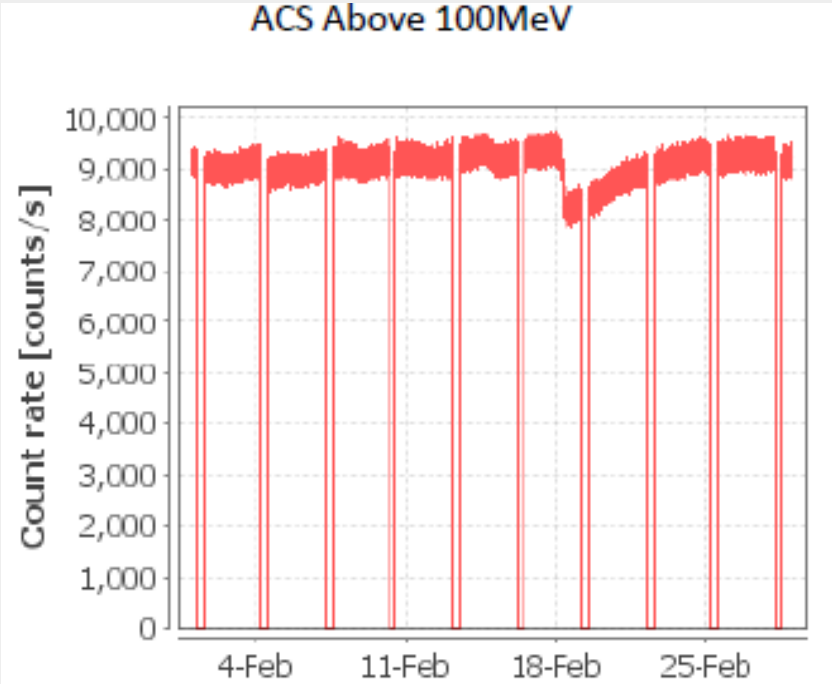
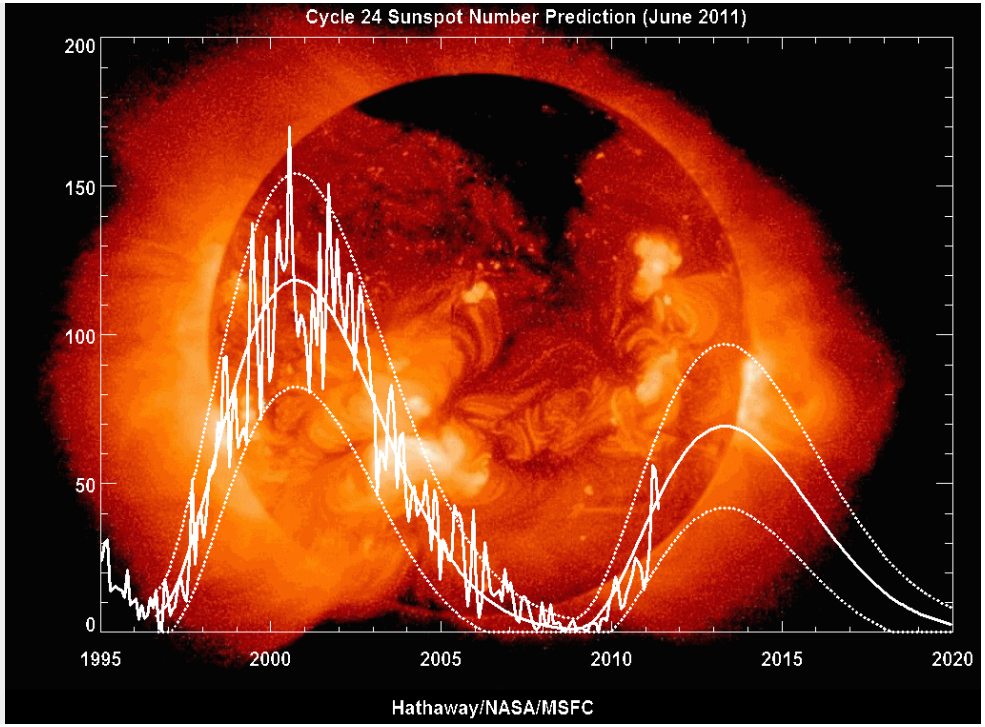
SPI STATUS


SPI Mean TM Bandwidth Occupation in Science Mode
TMBandwidth (packets/cycle)
Annealing 6
Annealing 7
Annealing 8
Annealing 9
Annealing 10
Annealing 11
Annealing 12
Annealing 13
Annealing 14
Annealing 15
Annealing 16
GeD#5 failure
GeD#1 failure
1st Day in Week


ACS Above 100MeV
Count rate [counts/s]
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
4-Feb
11-Feb
18-Feb
25-Feb


Cycle 24 Sunspot Number Prediction (June 2011)
200
150
100
50
0
1995
2000
2005
2010
2015
2020
Hathaway/NASA/MSFC

ANNEALING: 16th SUMMARY

- Start: October 10th
- 105C on October 12th
- 200 hours at 105C
- October 23th : CDE on
- October 27th Camera switch-on at 98k
- Smooth reactivation
- Nominal HV set to 3 kV
- Recovery not perfect but “good”

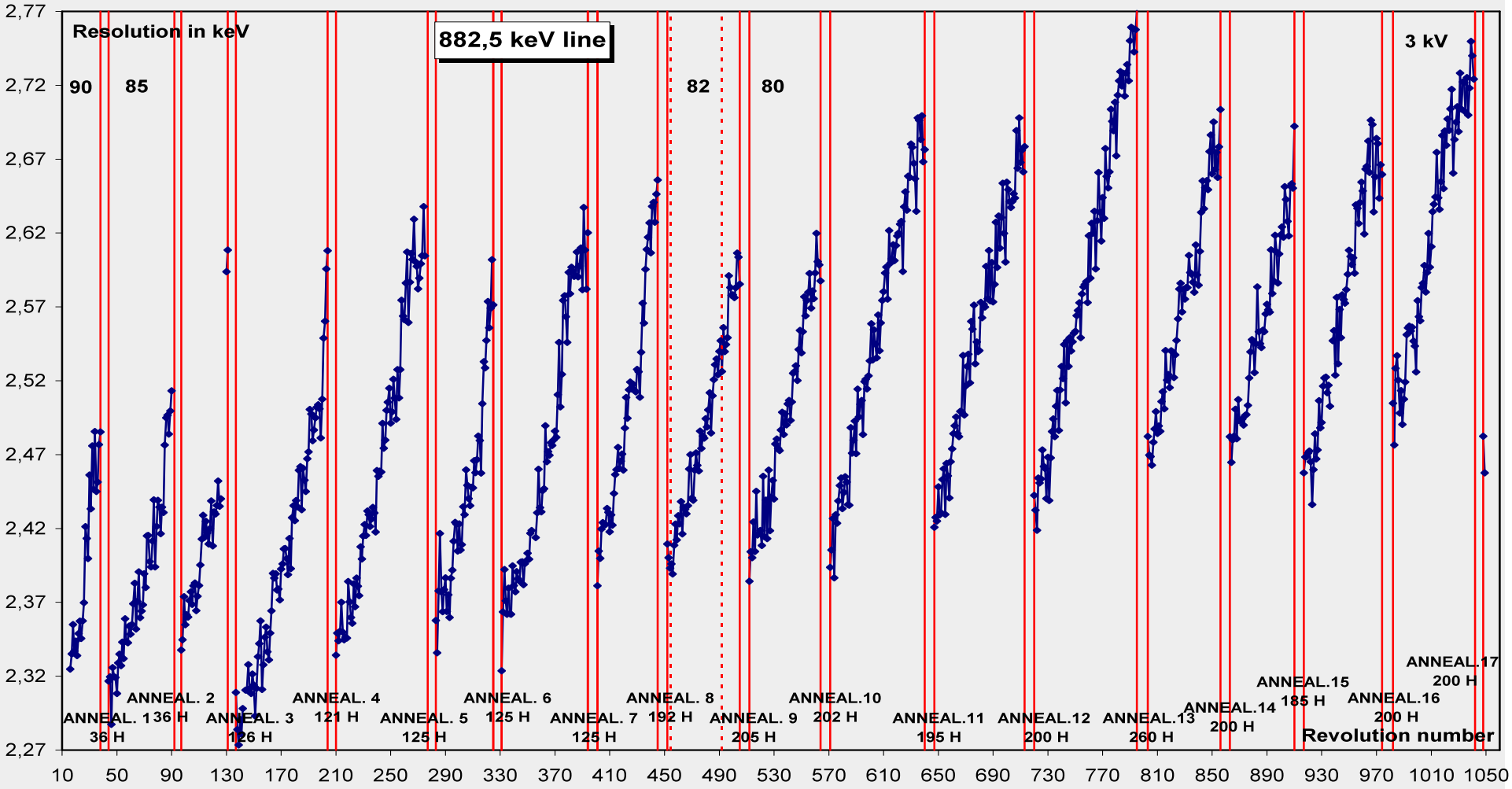
ANNEALING 17th

- Start: April 25th

- Camera switch on : May 12th
- Smooth reactivation
- Good recovery.
- HV set at 3KV
- Some “pollution” on GeD12
  - Cold box outgassing for the next annealing

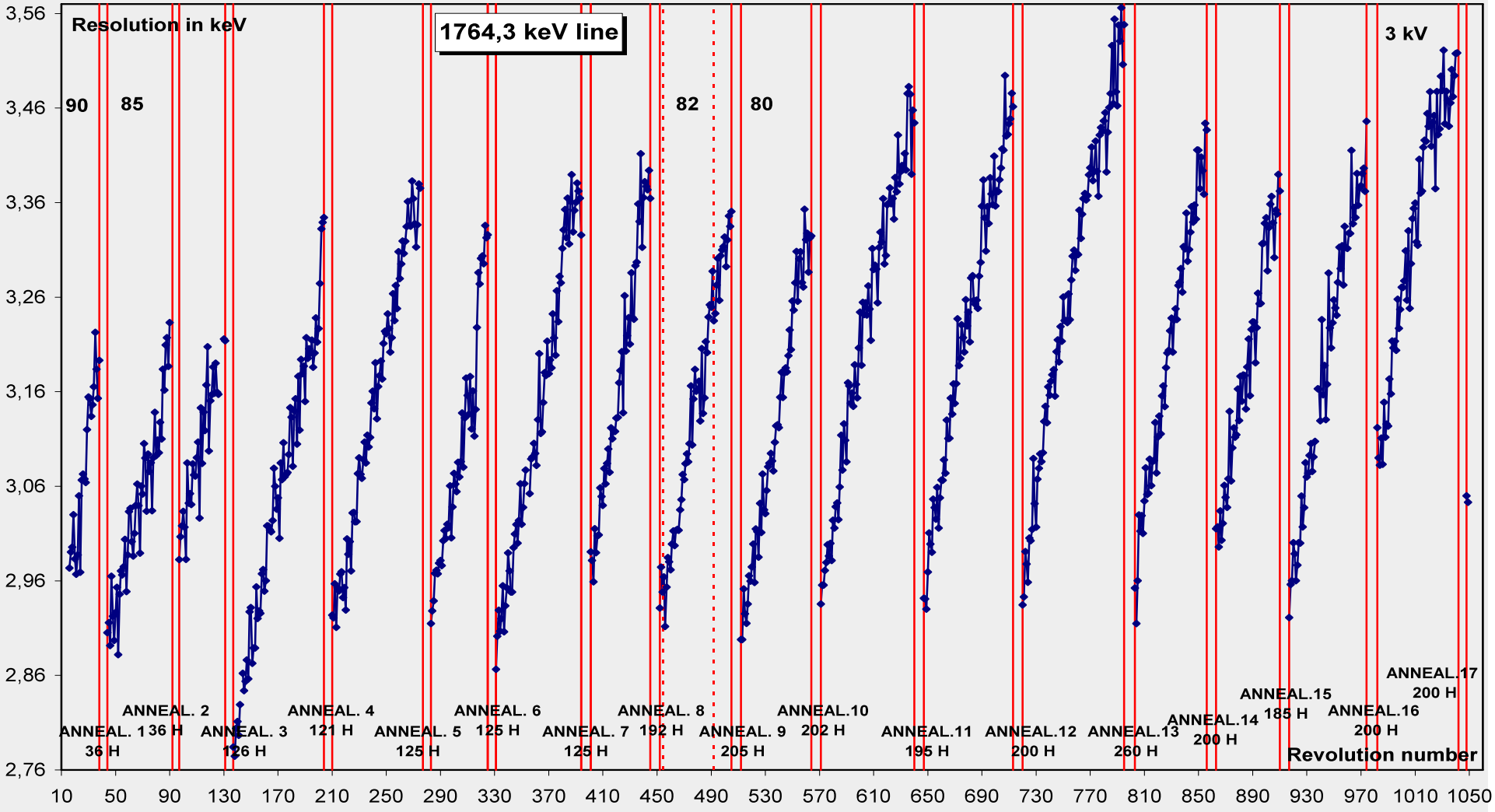
ENERGY RESOLUTION HISTORY: 882.5 keV

- Regular annealing (GeD at 105C) restore GeD energy resolution.



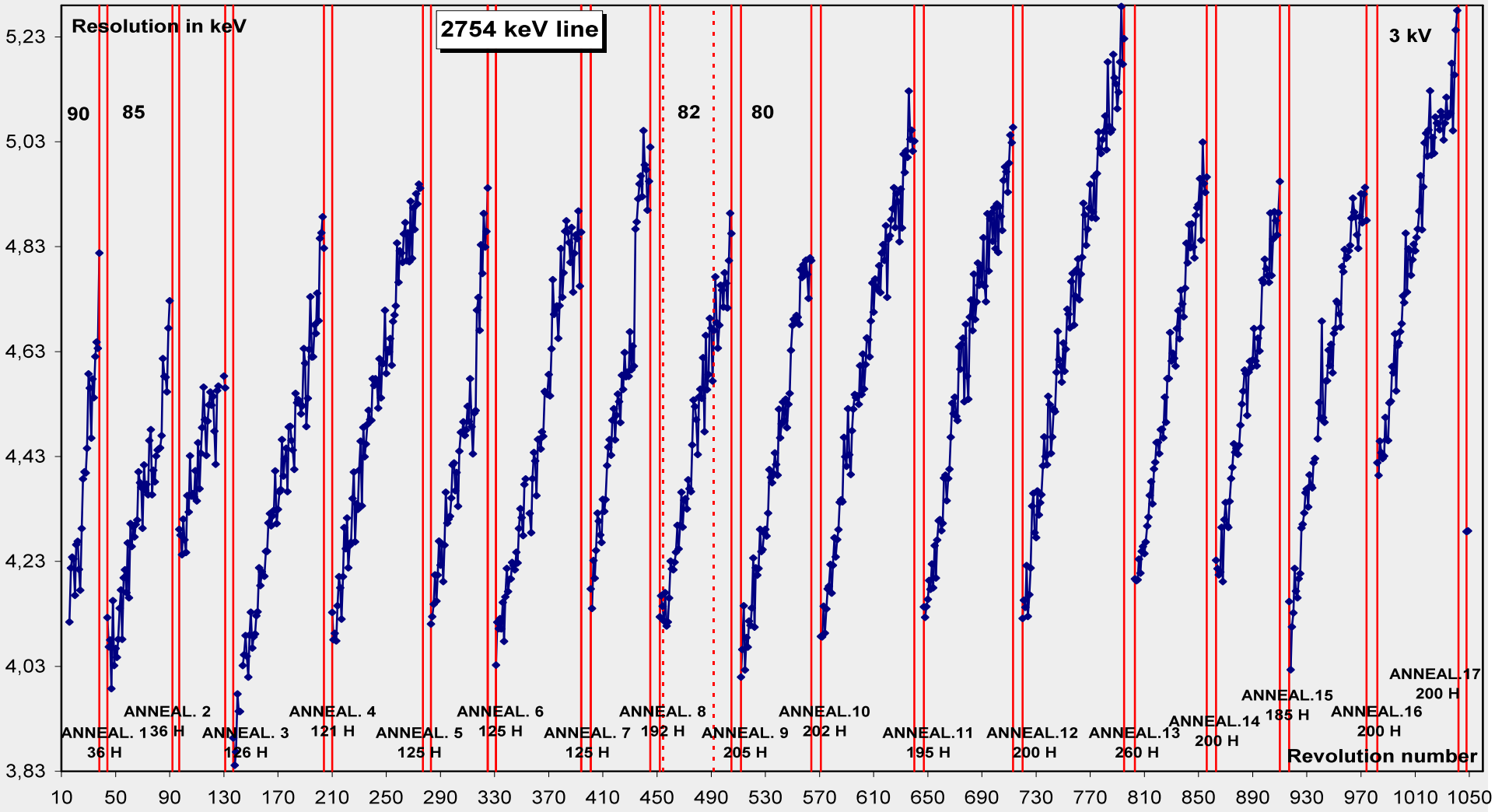
ENERGY RESOLUTION HISTORY: 1764.3 keV

- Regular annealing (GeD at 105C) restore GeD energy resolution.



ENERGY RESOLUTION HISTORY: 2754 keV

- Regular annealing (GeD at 105C) restore GeD energy resolution.



CRAB OBSERVATIONS

Calibration Part

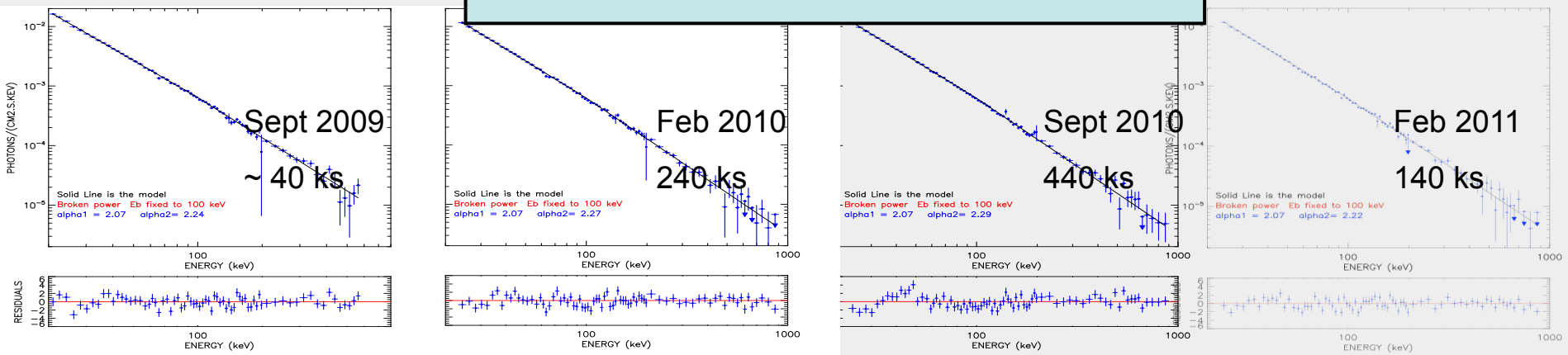
What new from the last time

- 4th Ged failure May 2010: Matrices correction by MC tool (GSFC)
- Crab Obs in Sept 2010
- New matrices validated for public usage (ISDC)

Nota: 19 → 15 crystals : 15/19 ~ 0.79 of the initial area

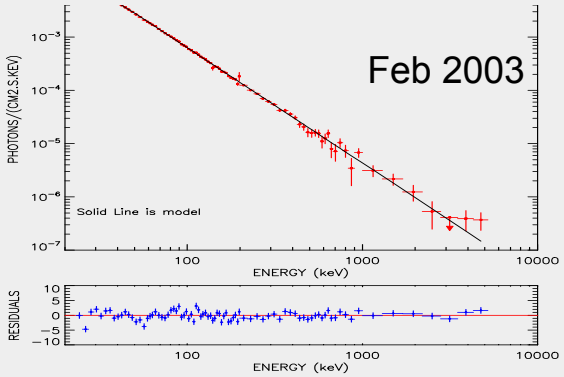
sqrt (0.79) ~ 0.89 of the initial sensitivity

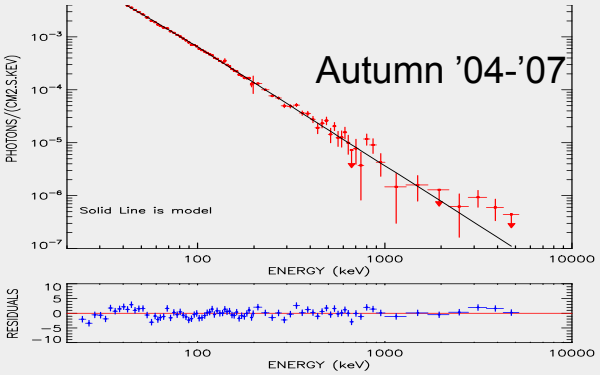
Then

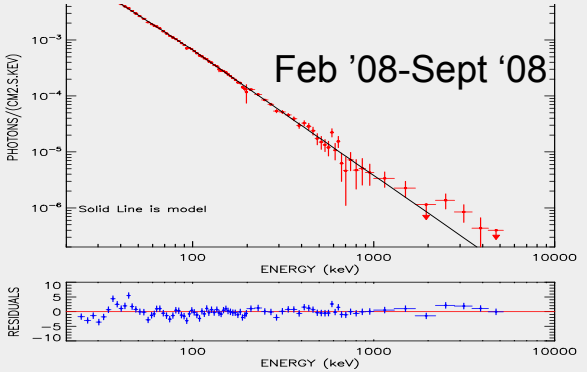


Rev #	Index 1	Ebreak	Index 2	Norme @ 100 keV
839	2.07	100 keV	2.24	6.45 10^{-4} ph/cm^2 s.keV
902-903	2.07	100 keV	2.27	6.25 10^{-4} ph/cm^2 s.keV
966-970	2.07	100 keV	2.29	6.3 10^{-4} ph/cm^2 s.keV
1019	2.07	100 keV	2.22	6.3 10^{-4} ph/cm^2 s.keV

The previous Crab spectra

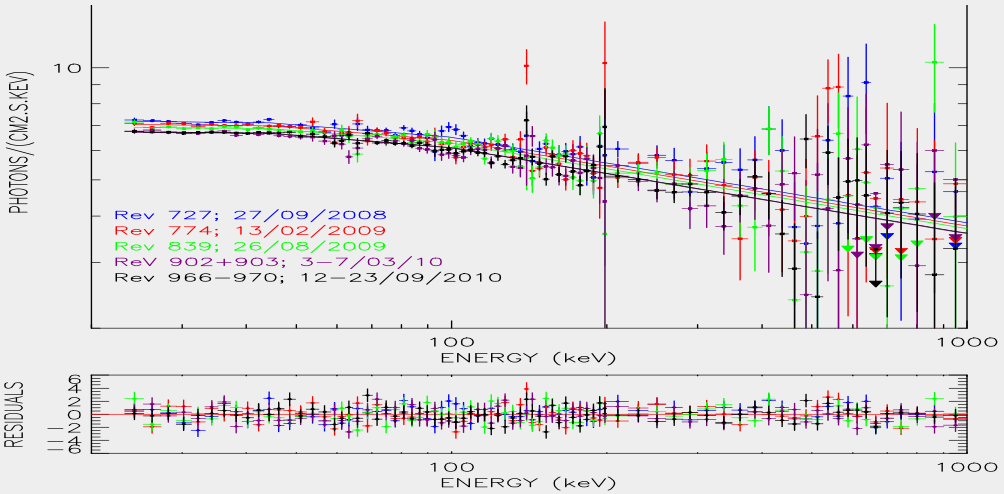






Rev #	Index 1	Ebreak	Index 2	Norme @ 100 keV
Sum 1	2.07	100 keV	2.24	6.6 10^{-4} ph/cm^2 s.keV
Sum 2	2.07	100 keV	2.25	6.55 10^{-4} ph/cm^2 s.keV
Sum 3	2.065	100 keV	2.25	6.7 10^{-4} ph/cm^2 s.keV

Comparison of the spectral shapes



Simultaneous fit ;

Same spectral shape

(3 PL)

Index1 = 2.01

Break1= 44.5 keV

Index2 = 2.11

Break2 == 100 keV

Index3 = 2.23

Some Science ?

The Astrophysical Journal Letters, 727:L40 (6pp), 2011 February 1 doi:10.1088/2041-8205/727/2/L40

WHEN A STANDARD CANDLE FLICKERS

Colleen A. Wilson-Hodge[1], Michael L. Cherry[2], Gary L. Case[2], Wayne H. Baumgartner[3], Elif Beklen[4,5], P. Narayana Bhat[6], Michael S. Briggs[6], Ascension Camero-Arranz[7], Vandiver Chaplin[6], Valerie Connaughton[6], Mark H. Finger[8], Neil Gehrels[9], Jochen Greiner[10], Keith Jahoda[9], Peter Jenke[1,17], R. Marc Kippen[11], Chryssa Kouveliotou[1], Hans A. Krimm[3,12], Erik Kuulkers[13], Niels Lund[14], Charles A. Meegan[8], Lorenzo Natalucci[15], William S. Paciesas[6], Robert Preece[6], James C. Rodi[2], Nikolai Shaposhnikov[3,16], Gerald K. Skinner[3,16], Doug Swartz[8], Andreas von Kienlin[10], Roland Diehl[10], and Xiao-Ling Zhang[10]

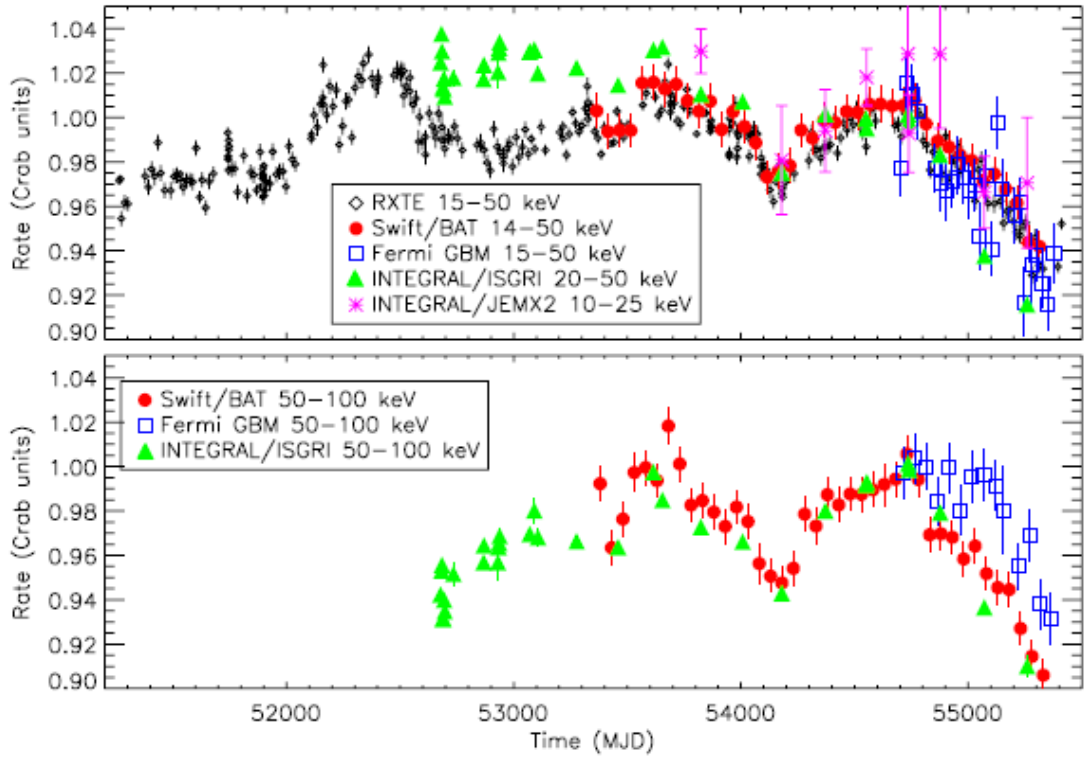
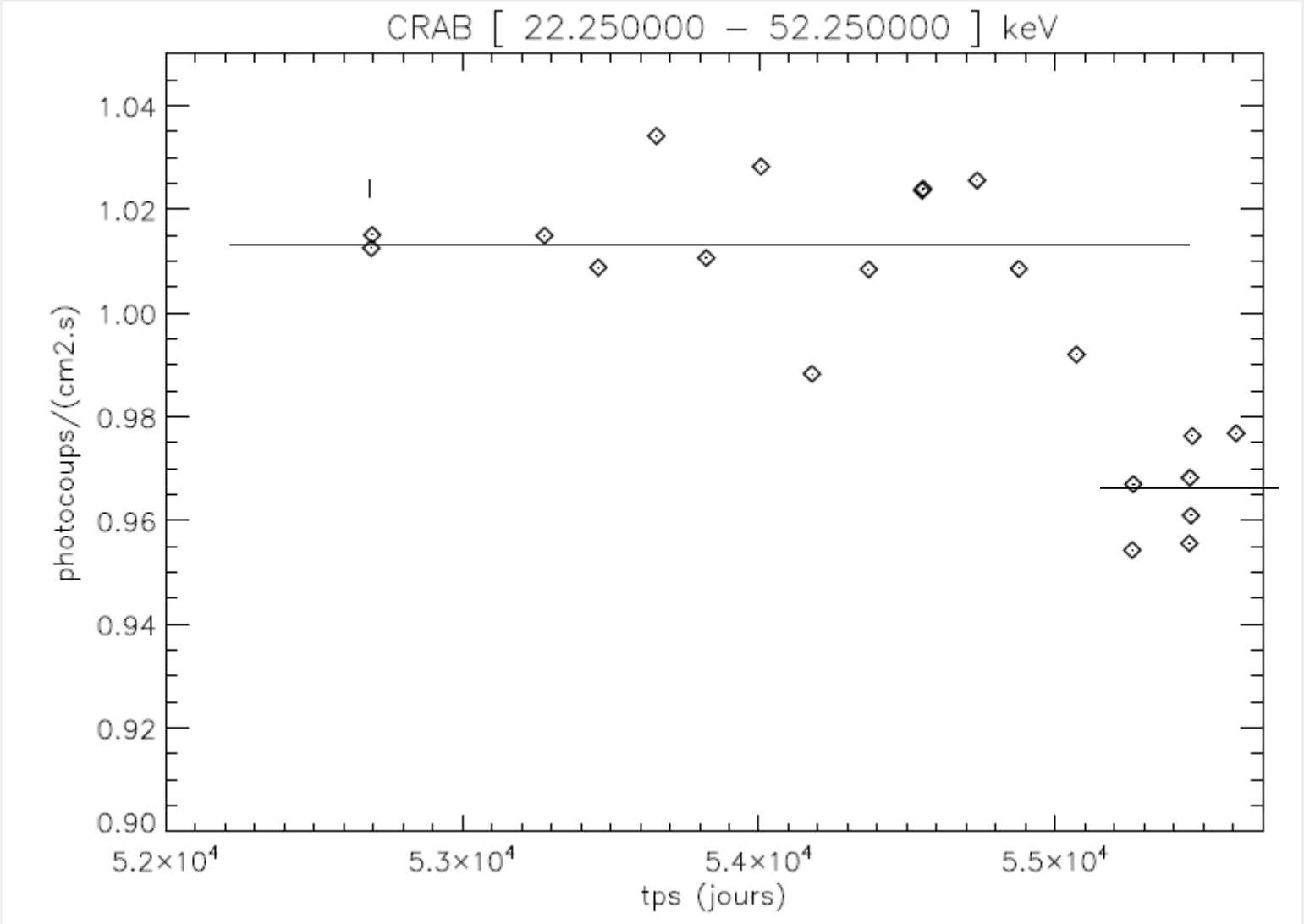
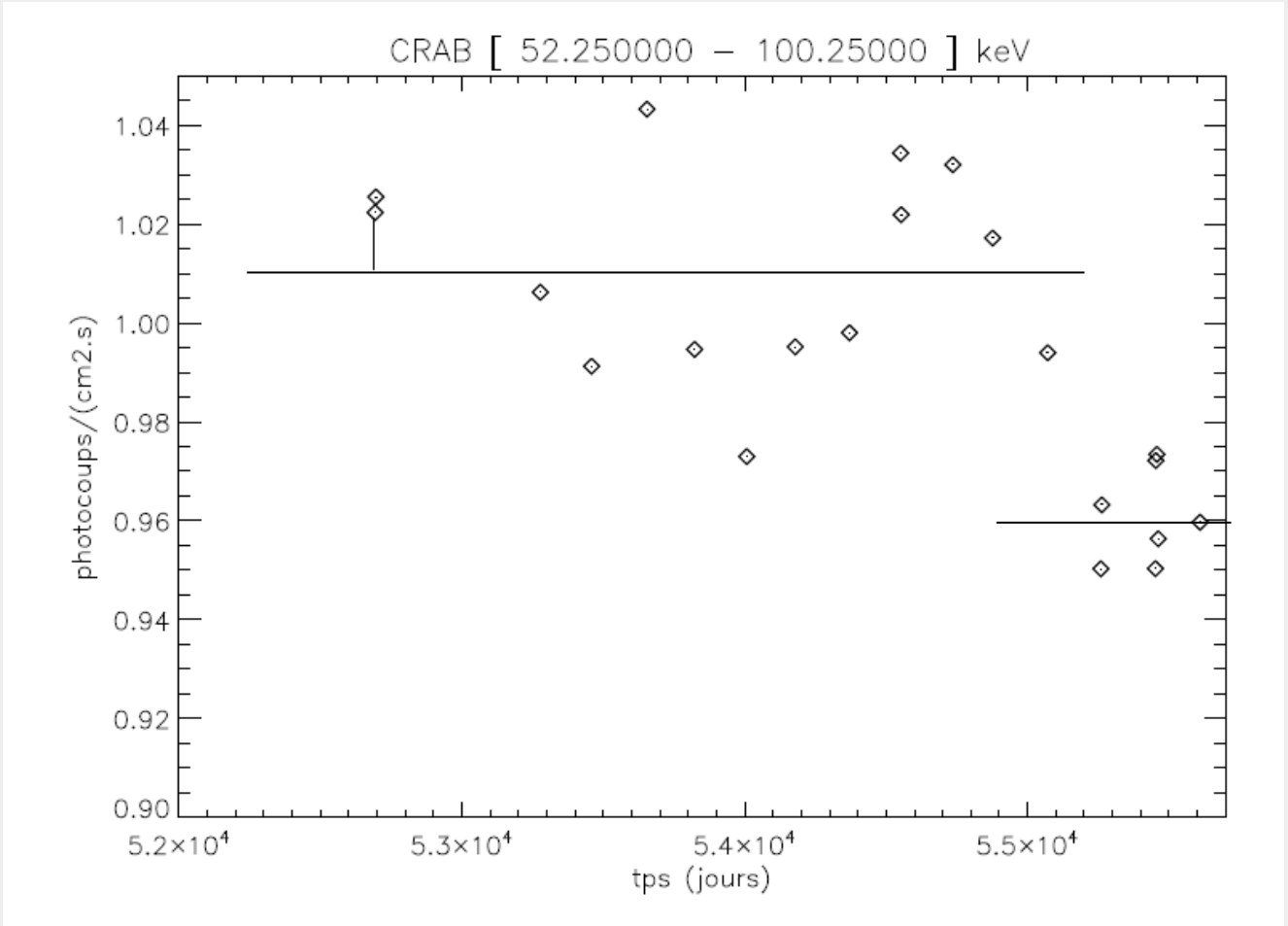
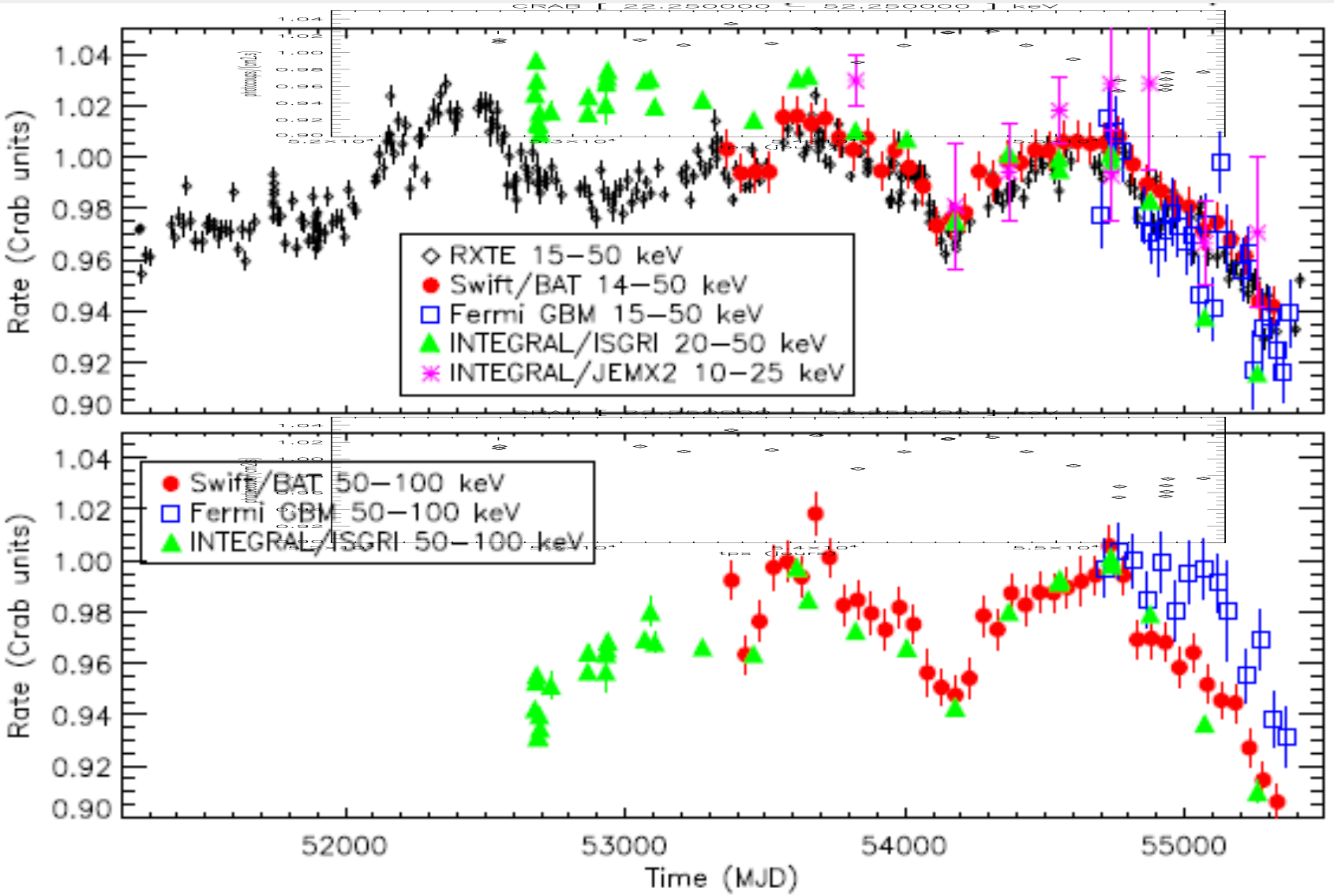
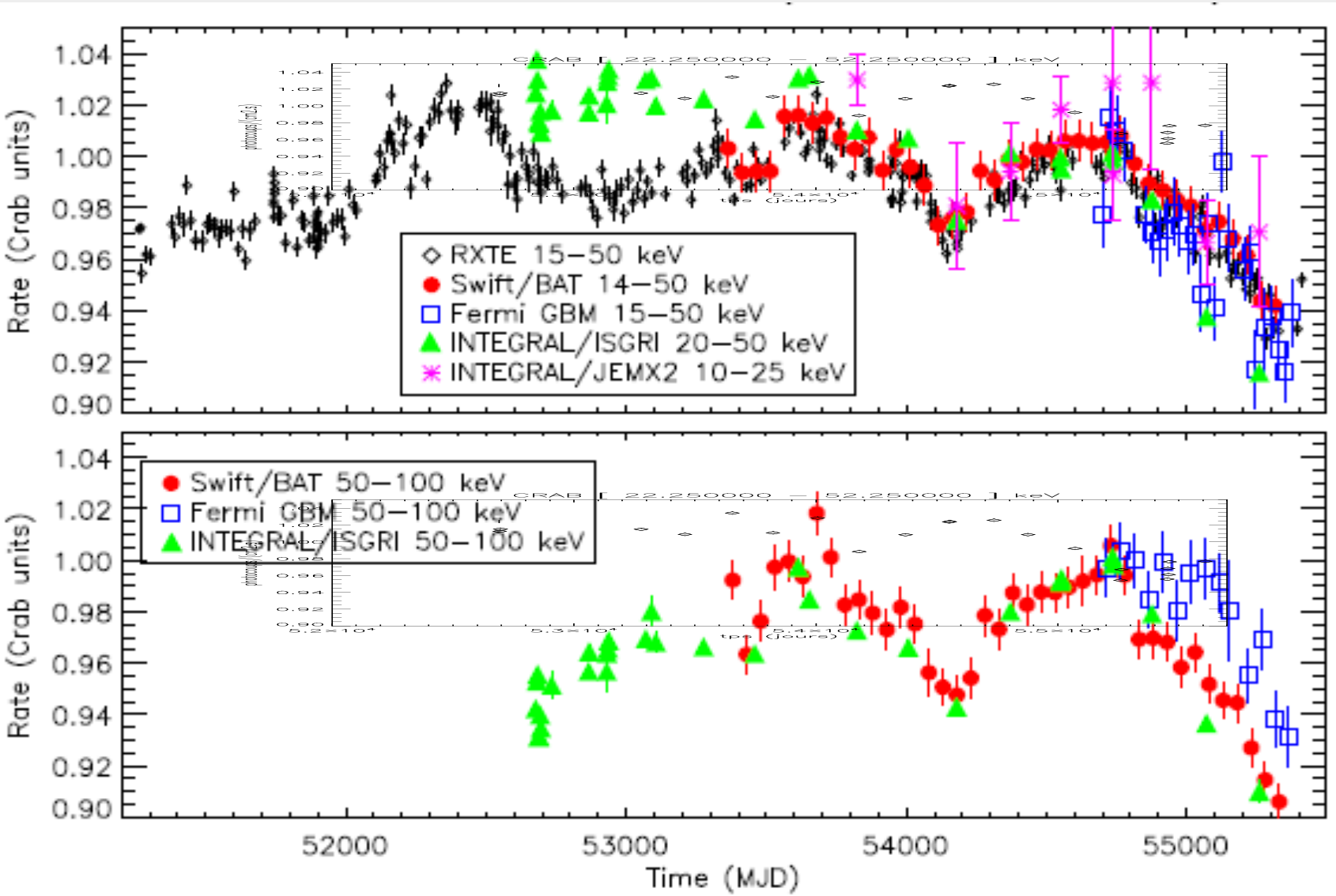


Figure 5. Composite Crab light curves for *RXTE*/PCA (15–50 keV: black diamonds), *Swift*/BAT (top: 14–50 keV, bottom: 50–100 keV: red filled circles), *Fermi*/GBM (top: 15–50 keV, bottom: 50–100 keV: open blue squares), *INTEGRAL*/ISGRI (top: 20–50 keV, Bottom: 50–100 keV: green triangles), and *INTEGRAL*/JEM-X2 (10–25 keV). Each data set has been normalized to its mean rate in the time interval MJD 54690–54790. All error bars include only statistical errors.


CRAB [22.250000 – 52.250000] keV
photocoups/(cm2.s)
1.04
1.02
1.00
0.98
0.96
0.94
0.92
0.90
5.2×10^4
5.3×10^4
5.4×10^4
5.5×10^4
tps (jours)


CRAB [52.250000 – 100.25000] keV
photocoups/(cm2.s)
1.04
1.02
1.00
0.98
0.96
0.94
0.92
0.90
5.2×10^4
5.3×10^4
5.4×10^4
5.5×10^4
tps (jours)


RXTE 15–50 keV
Swift/BAT 14–50 keV
Fermi GBM 15–50 keV
INTEGRAL/ISGRI 20–50 keV
INTEGRAL/JEMX2 10–25 keV
Swift/BAT 50–100 keV
Fermi GBM 50–100 keV
INTEGRAL/ISGRI 50–100 keV
Rate (Crab units)
Time (MJD)
52000
53000
54000
55000
0.90
0.92
0.94
0.96
0.98
1.00
1.02
1.04


Rate (Crab units)
1.04
1.02
1.00
0.98
0.96
0.94
0.92
0.90
RXTE 15–50 keV
Swift/BAT 14–50 keV
Fermi GBM 15–50 keV
INTEGRAL/ISGRI 20–50 keV
INTEGRAL/JEMX2 10–25 keV
Swift/BAT 50–100 keV
Fermi GBM 50–100 keV
INTEGRAL/ISGRI 50–100 keV
52000
53000
54000
55000
Time (MJD)

Conclusion

- Variations in the SPI Crab fluxes +- 2 % then - 5%
- Uncertainties on individual measurements estimated to ~ a few %

So 2 possible interpretations

- Crab stable and SPI efficiency decreases a little (8years in orbit)

Or / And

- Crab varies and SPI perfomance stable better than 1 %

In any case, don’t forget that we speak about a few %

Next Step:
Multiple events

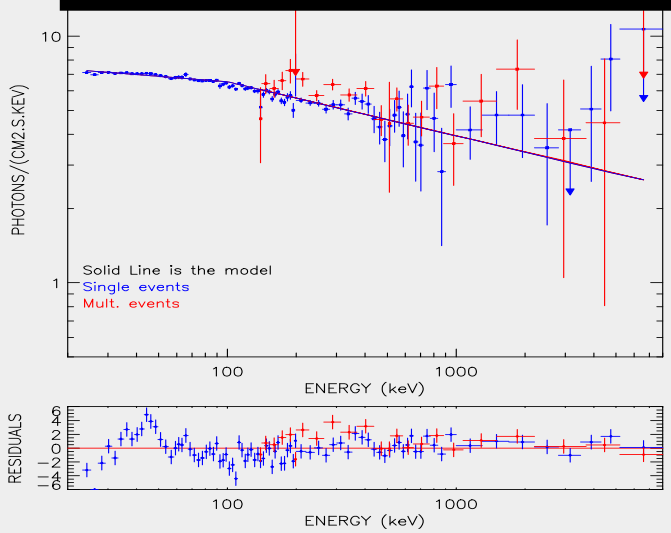
When the energy deposit concerns 2 or more detectors, we have to

- Reconstruct the total energy, attributed to a « pseudo-detector » (42 for double events)
- Use the corresponding responses

Interest:

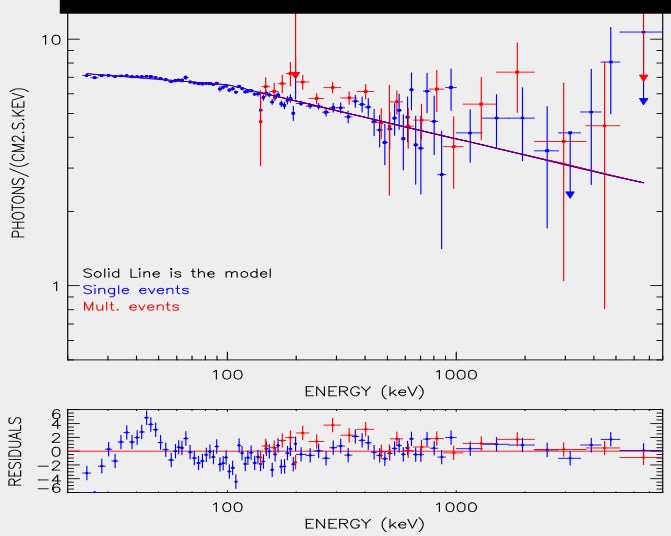
- very low background
- Increase the SPI sensitivity at high energy

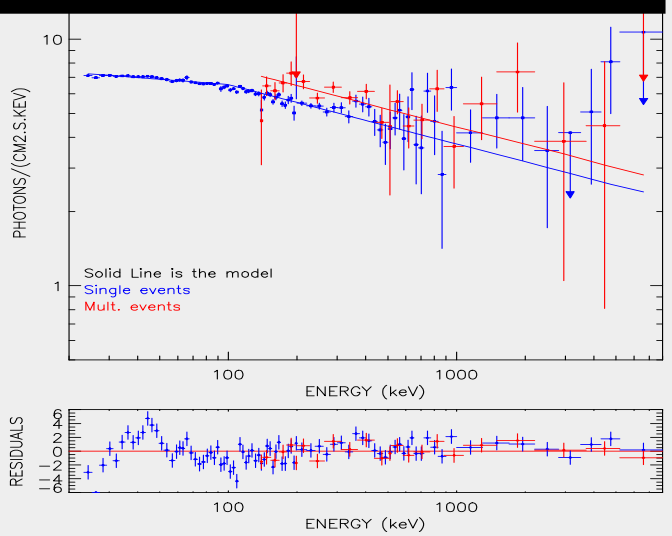
First tests



Sum 1	**2.07**	**100 keV**	**2.22**	**6.6 10^{-4} ph/cm^2 s.keV**

First tests


10
1
PHOTONS/(CM2.S.KEV)
Solid Line is the model
Single events
Mult. events
100
1000
ENERGY (keV)
RESIDUALS
-6
-4
-2
0
2
4
6
100
1000
ENERGY (keV)


10
1
PHOTONS/(CM2.S.KEV)
Solid Line is the model
Single events
Mult. events
100
1000
ENERGY (keV)
RESIDUALS
-6
-4
-2
0
2
4
6
100
1000
ENERGY (keV)

Multiples

- Next step in the high energy part will come from the use of the multiple events
- Check the coherence with the single event results during the mission
- Will improve high energy science results

FUTURE CALIBRATIONS

ONE PATTERN (50ks) PROVIDES « ENOUGH » STATISTICS UP TO ~ 200 keV

- Each annealing increases the central hole size: the high energy efficiency will necessarily decrease.

- 4 Revs allows a good control of SPI up to ~2 MeV

- AIM is to obtain

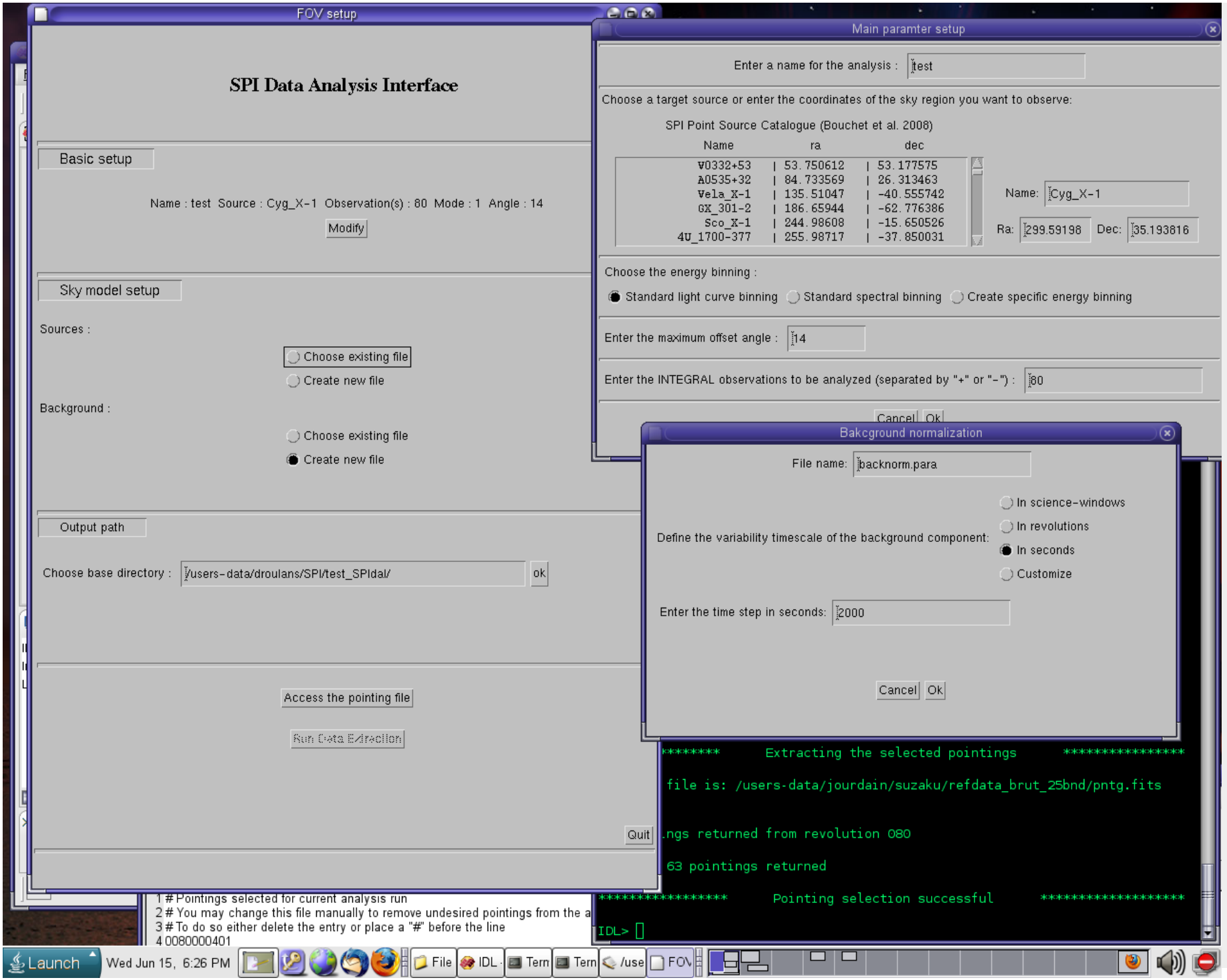
RELIABLE DATA UP TO A FEW MEV
IN THE STANDARD 5X5 PATTERN
AND
REFERENCE SPECTRA FOR CROSS-CALIBRATION

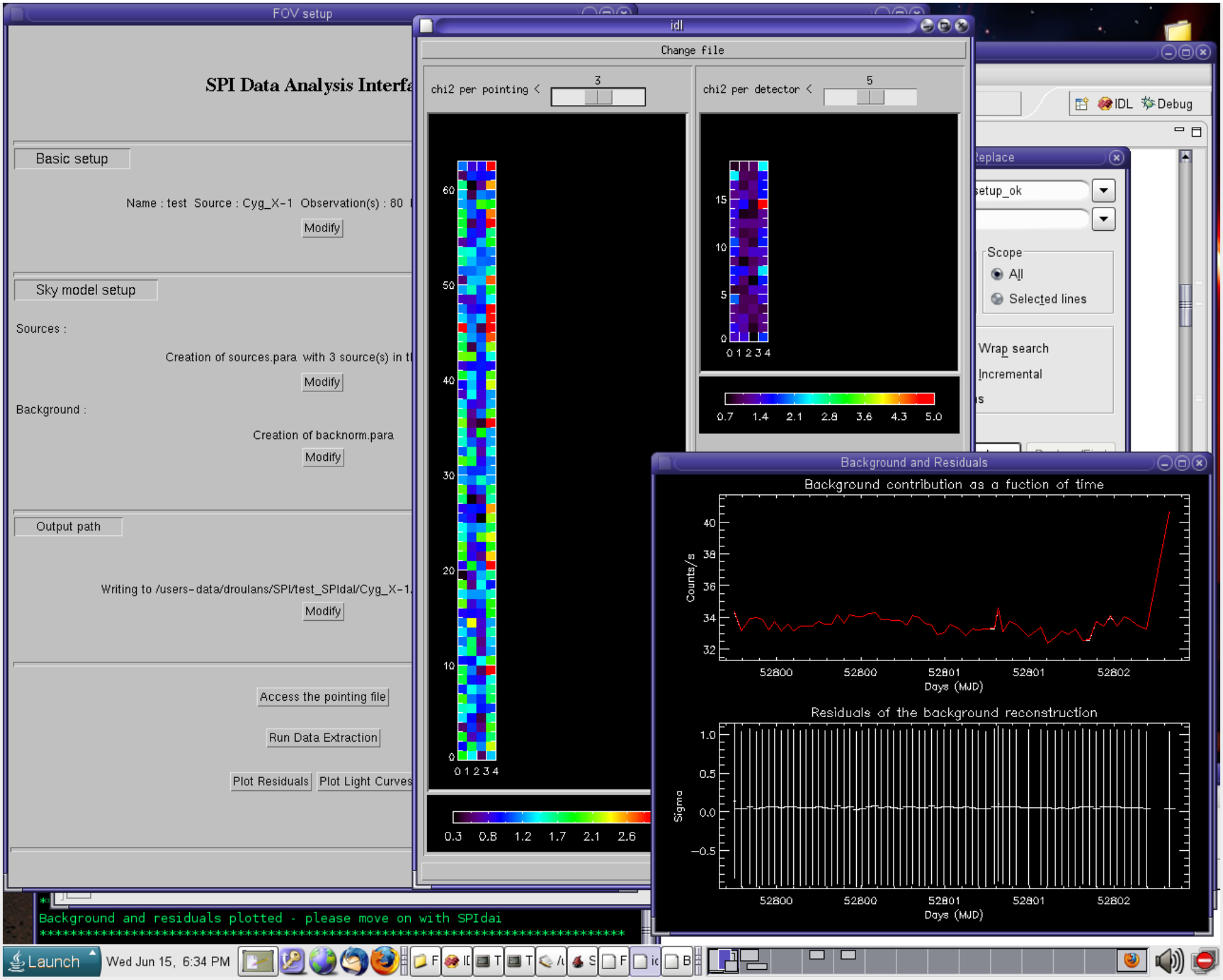
SPI WEB SITE at CESR

- New SPI web site at CESR
- Still improving !
- Data access:
- On request, access to the original consolidated TM data (image of MOC CDROM's)
- Standard scientific data products:
  - Production of "standard" fits products ready for use by SPIROS – SPIMODFIT….
  - Produced by CESR pipeline.
  - Contains flat_field data for SPIROS mode 3 usage.
  - No scw selection….

SPI WEB SITE at CESR: Next

- Propose science products for all public data
- Feedback needed
- Display of HK data will be available very soon.
- Data analysis tool has been designed and will be available:
  - Data selection
  - Energy bands selection
  - Sky model selection: point sources – variability
  - Fit quality indicators
  - Spectral extraction
  - Xspec-ready files production
  - Will be available through an account in CESR


FOV setup
SPI Data Analysis Interface
Basic setup
Name : test Source : Cyg_X-1 Observation(s) : 80 Mode : 1 Angle : 14
Modify
Sky model setup
Sources :
Choose existing file
Create new file
Background :
Choose existing file
Create new file
Output path
Choose base directory :
/users-data/droulans/SPI/test_SPIdal/
ok
Access the pointing file
Run Data Extraction
Quit
Main paramter setup
Enter a name for the analysis :
test
Choose a target source or enter the coordinates of the sky region you want to observe:
SPI Point Source Catalogue (Bouchet et al. 2008)
Name ra dec
W0332+53 | 53.750612 | 53.177575
A0535+32 | 84.733569 | 26.313463
Vela_X-1 | 135.51047 | -40.555742
GX_301-2 | 186.65944 | -62.776386
Sco_X-1 | 244.98608 | -15.650526
4U_1700-377 | 255.98717 | -37.850031
Name:
Cyg_X-1
Ra:
299.59198
Dec:
35.193816
Choose the energy binning :
Standard light curve binning
Standard spectral binning
Create specific energy binning
Enter the maximum offset angle :
14
Enter the INTEGRAL observations to be analyzed (separated by "+" or "-") :
80
Cancel
Ok
Bakcground normalization
File name:
backnorm.para
Define the variability timescale of the background component:
In science-windows
In revolutions
In seconds
Customize
Enter the time step in seconds:
2000
Cancel
Ok
******** Extracting the selected pointings ********
file is: /users-data/jourdain/suzaku/refdata_brut_25bnd/pntg.fits
.ngs returned from revolution 080
63 pointings returned
****************** Pointing selection successful ******************
IDL>
1 # Pointings selected for current analysis run
2 # You may change this file manually to remove undesired pointings from the a
3 # To do so either delete the entry or place a "#" before the line
4 0080000401
Launch
Wed Jun 15, 6:26 PM
File
IDL
Tern
Tern
/use
FOV


FOV setup
SPI Data Analysis Interfa
Basic setup
Name : test Source : Cyg_X-1 Observation(s) : 80
Modify
Sky model setup
Sources :
Creation of sources.para with 3 source(s) in t
Modify
Background :
Creation of backnorm.para
Modify
Output path
Writing to /users-data/droulans/SPI/test_SPIdal/Cyg_X-1
Modify
Access the pointing file
Run Data Extraction
Plot Residuals
Plot Light Curves
idl
Change file
chi2 per pointing < 3
chi2 per detector < 5
0.3 0.8 1.2 1.7 2.1 2.6
0.7 1.4 2.1 2.8 3.6 4.3 5.0
Background and Residuals
Background contribution as a fuction of time
Counts/s
Days (MJD)
Residuals of the background reconstruction
Sigma
Days (MJD)
IDL
Debug
Replace
setup_ok
Scope
All
Selected lines
Wrap search
Incremental
Background and residuals plotted - please move on with SPIdai
Launch
Wed Jun 15, 6:34 PM