

XRT update

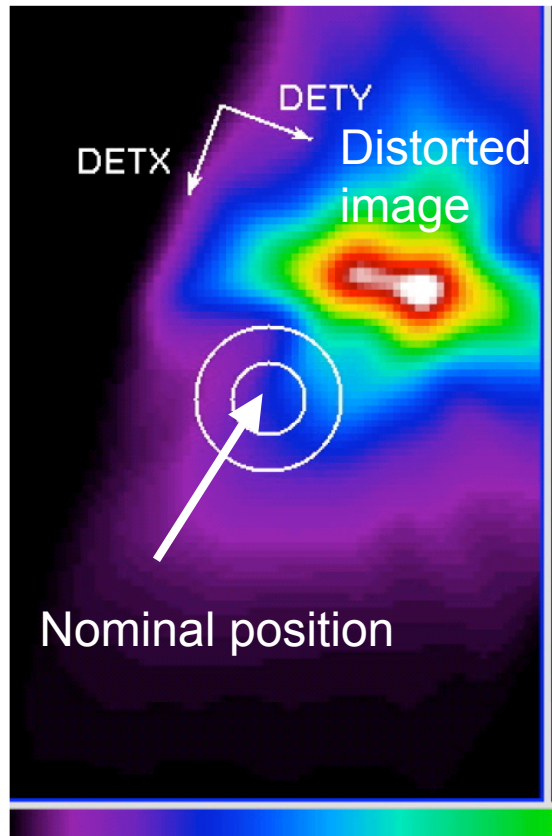
Yoshitomo Maeda (ISAS/JAXA),
Kai-Wing Chan (GSFC/NASA)
and the XRT team

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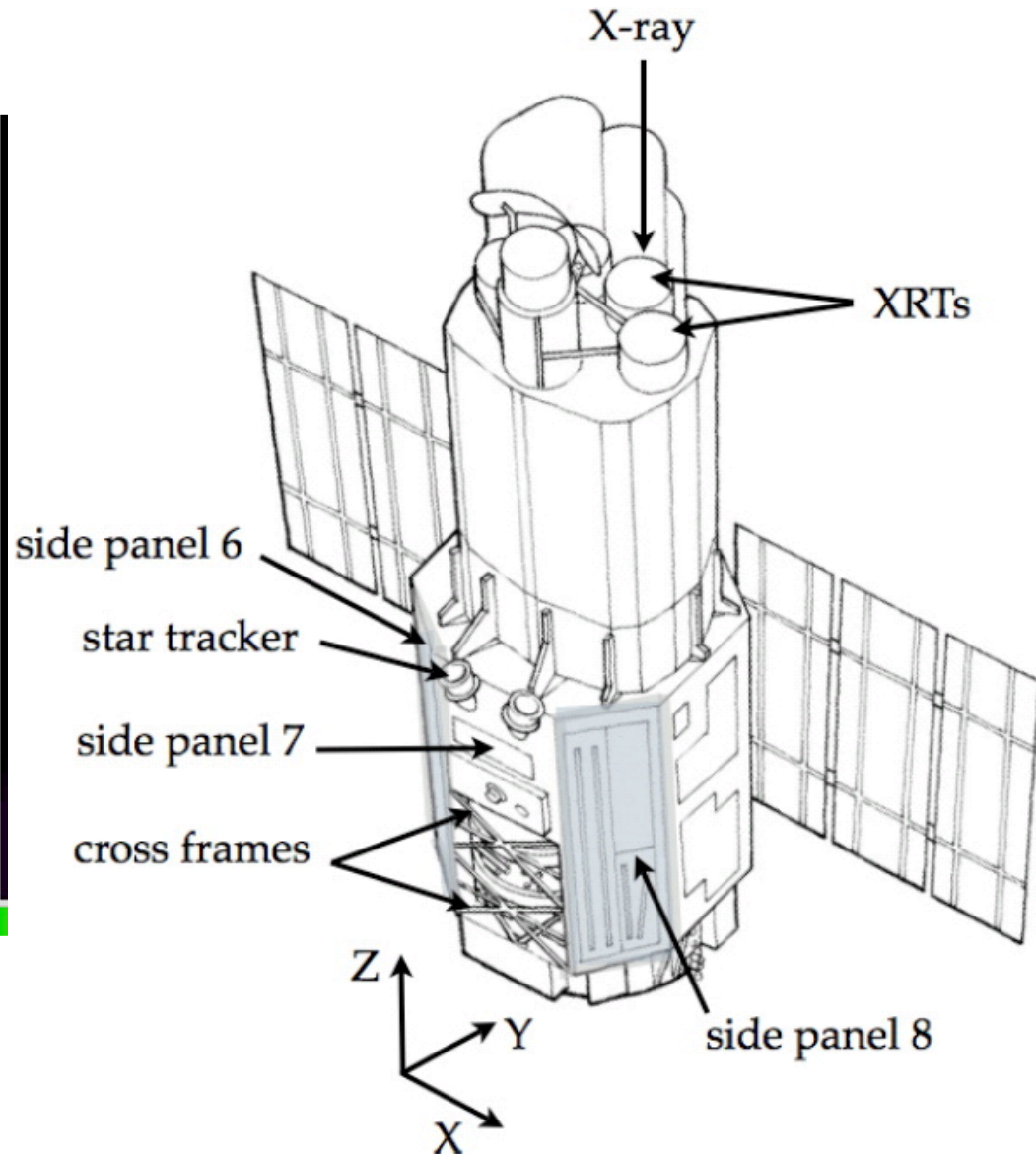
- Current XRT Performance
 - No significant time evolution/degradation from the launch
- Updates on software/CALDB/calibration status
 - New tools: Attitude correction ftools “aeattcor”
 - The cross calibration of XIS/PIN
 - Speed-up and general improvement on the ray-tracing code
 - A bug fix on large angle stray lights ($> 5\text{deg}$,)
- Plan of their future updates
 - Provide a faster arf generator
 - More fine ray-tracing tuning

Attitude correction : aeattcor

V1.2



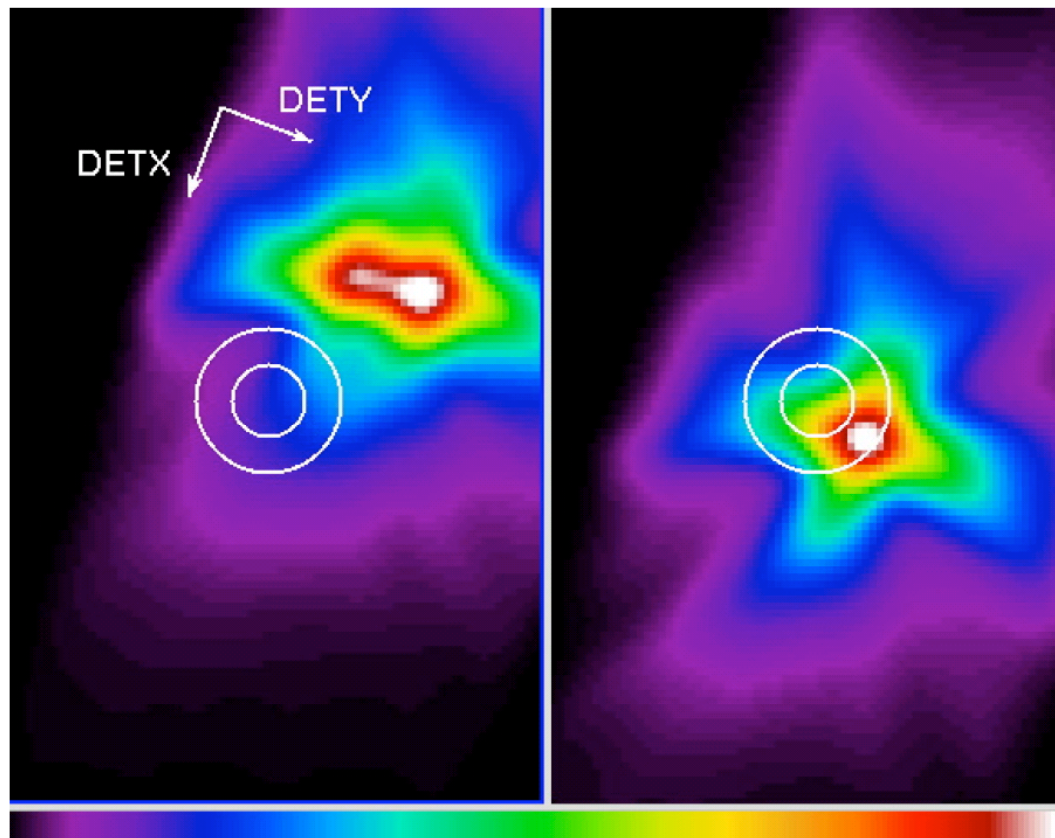
96 min modulation \sim 1 orbit
Amplitude \sim 50 arcsec



Attitude correction : aeattcor

V1.2

V2.0

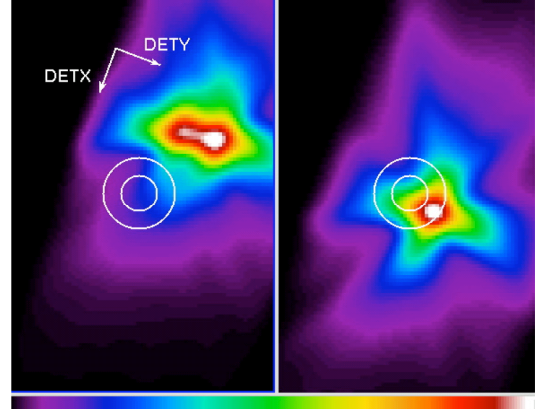
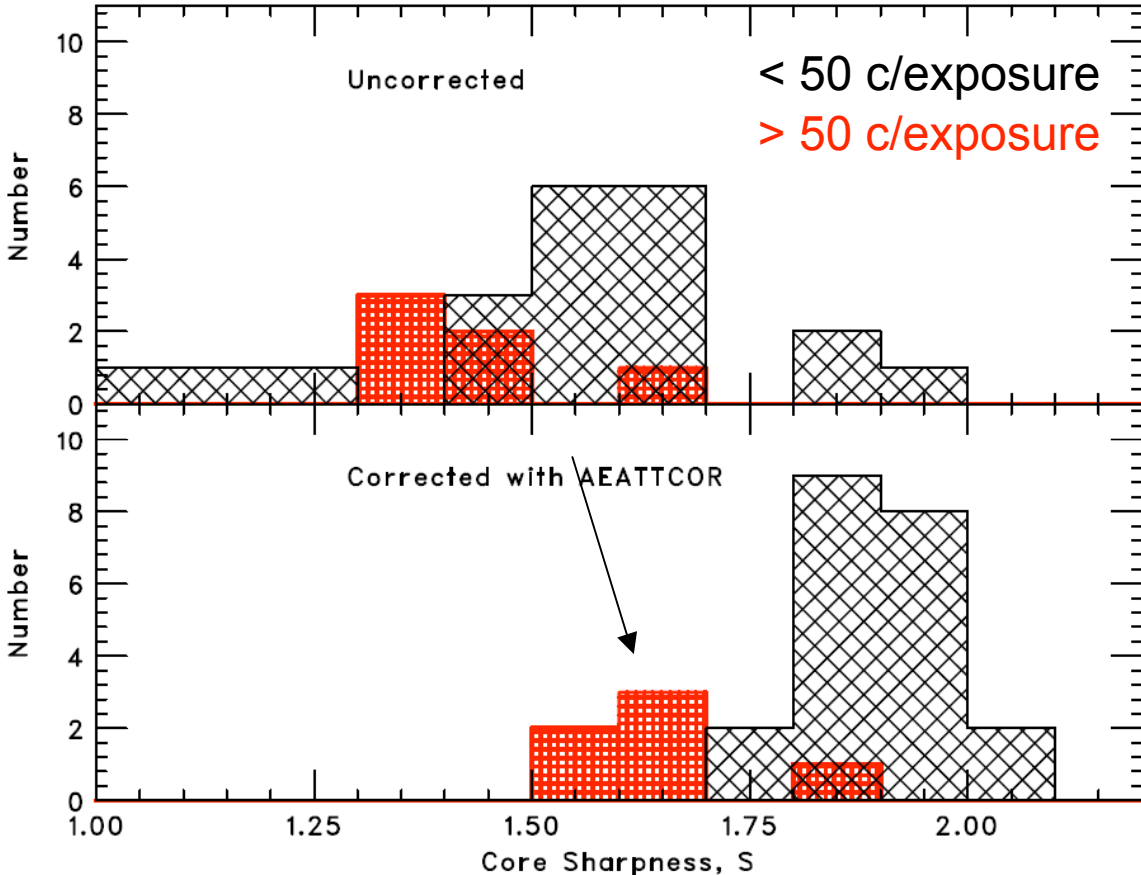


Suzaku has no alignment monitor onboard.

- modeling the empirical correction using the very limited HK or orbit data.
- The solution is included in a ftools “aeattcor”

↔
Aeattcor was applied

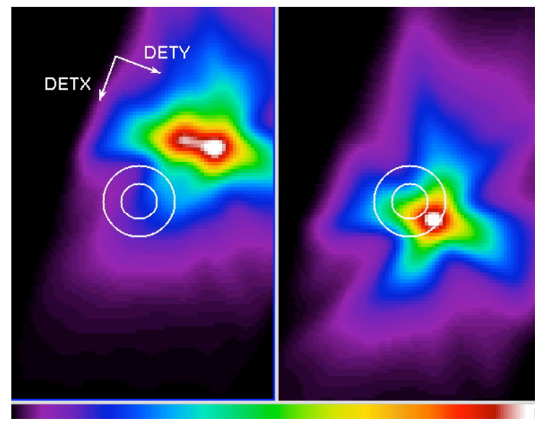
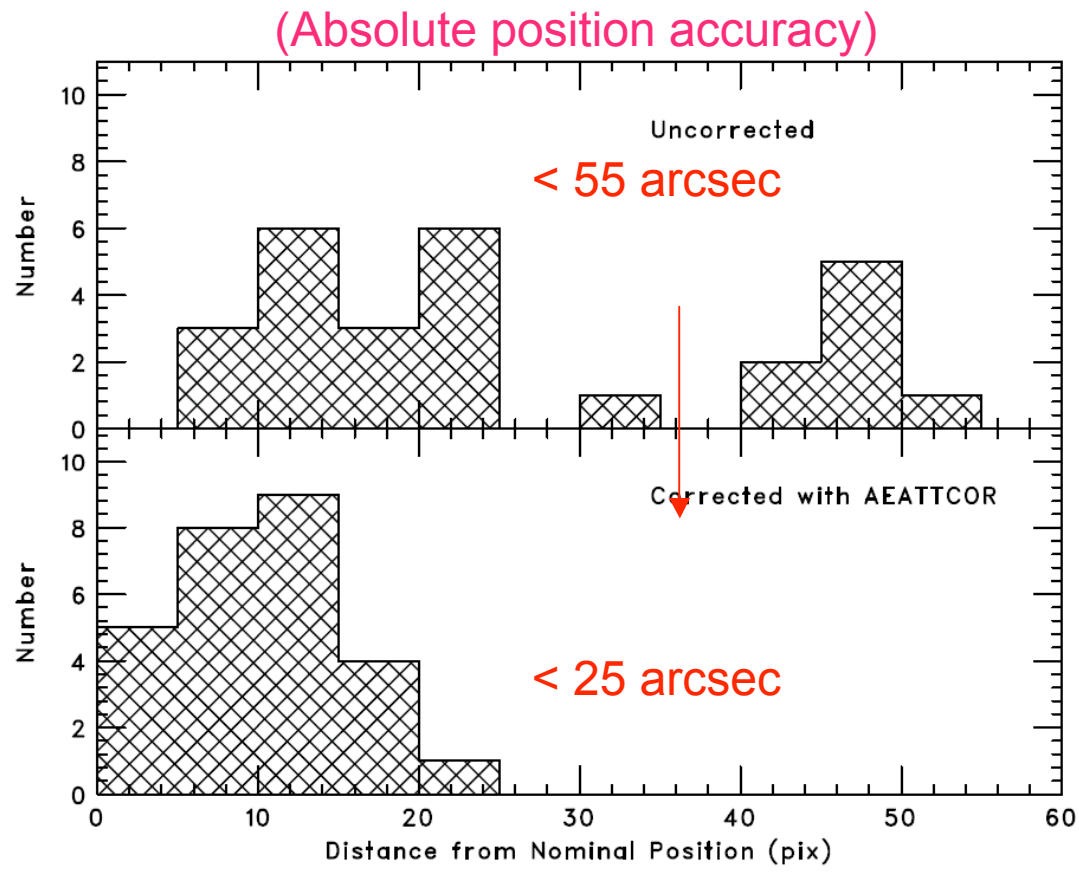
Attitude correction : aeattcor



Core sharpness

$$\frac{\text{Counts (< 20arcsec)}}{\text{Counts (< 10arcsec)}}$$

Attitude correction : aeattcor



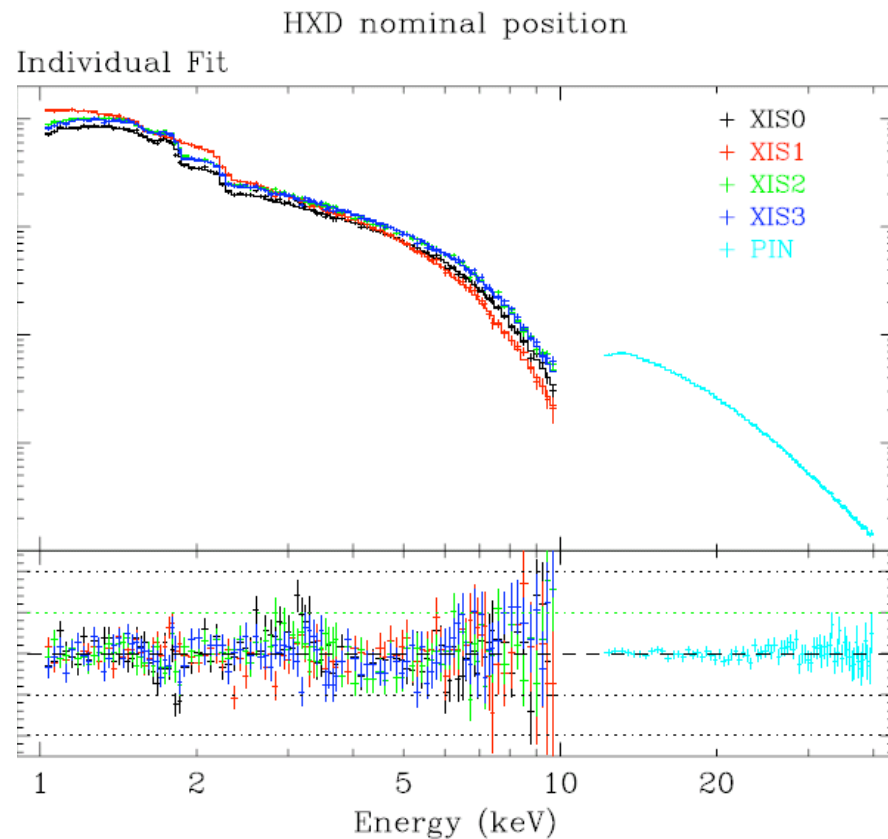
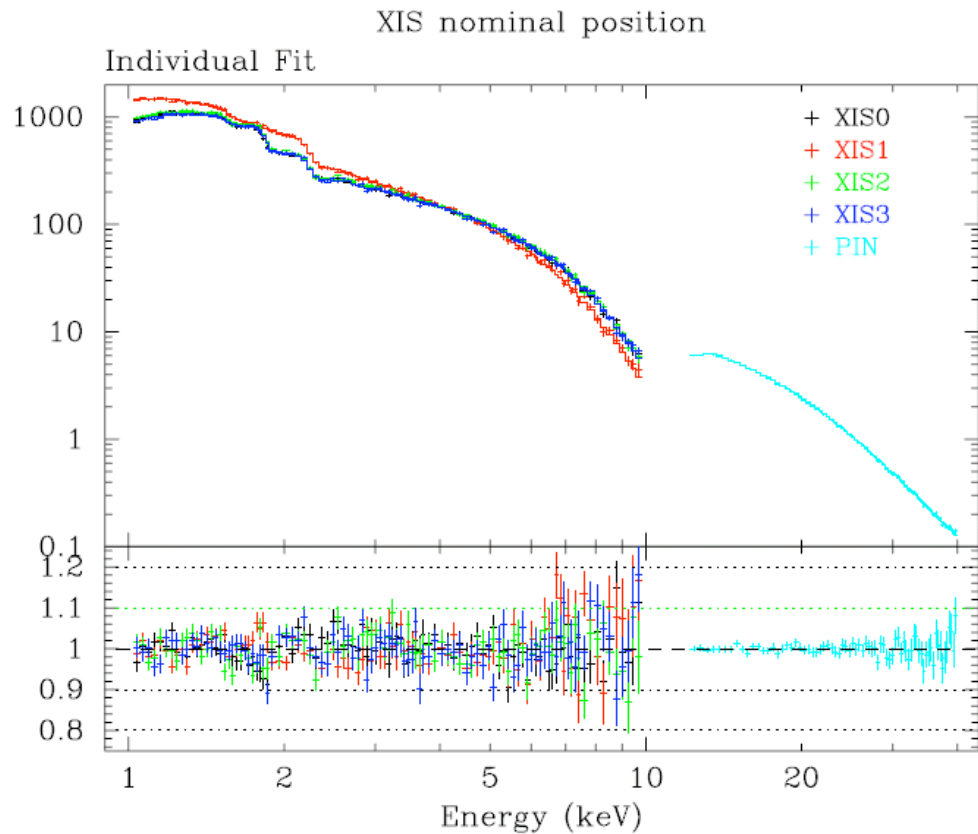
Distance from the nominal position

E.A.: Cross norm. (XIS/HXD)

Crab power-law fit

XIS nominal

HXD nominal (3.5 arcmin off)



E.A.: Cross norm. (XIS/HXD)

Spectral parameters from each detector ... Photon-index of the XIS is in the range 2.05–2.08 and 2.03–2.09 at the XIS and HXD nominal positions (table 1 and table 4), respectively. That of the PIN is 2.09–2.10. Note that the photon index of XIS0 is significantly changed from the revision 1.2[1].

This is because the thickness of the depletion layer is updated for XIS0. Only change in XIS-0 from v1.2

Detector	N_{H} [10^{22}cm^{-2}]	Γ	Norm ^a	Flux ^b	χ_{ν}^2 (dof)
hline					
XIS0	0.288 ± 0.014	2.050 ± 0.016	9.51 ± 0.21	2.207	1.42 (100)
XIS1	0.287 ± 0.013	2.075 ± 0.016	10.09 ± 0.21	2.256	1.77 (100)
XIS2	0.277 ± 0.014	2.065 ± 0.015	9.69 ± 0.21	2.202	1.66 (100)
XIS3	0.295 ± 0.014	2.046 ± 0.016	9.31 ± 0.20	2.173	1.61 (100)
PIN	0.3 (fix)	2.101 ± 0.008	11.41 ± 0.26	2.464	0.74 (72)

XIS
nominal

Detector	N_{H} [10^{22}cm^{-2}]	Γ	Norm ^a	Flux ^b	χ_{ν}^2 (dof)
hline					
XIS0	0.279 ± 0.016	2.046 ± 0.019	8.89 ± 0.23	2.078	1.81 (100)
XIS1	0.294 ± 0.015	2.093 ± 0.019	10.05 ± 0.25	2.186	0.99 (100)
XIS2	0.265 ± 0.015	2.057 ± 0.017	9.33 ± 0.22	2.150	1.40 (100)
XIS3	0.265 ± 0.015	2.031 ± 0.017	9.31 ± 0.22	2.226	1.63 (100)
PIN	0.3 (fix)	2.090 ± 0.009	10.93 ± 0.27	2.400	0.82 (72)

HXD
nominal

E.A.: Cross norm. (XIS/HXD)

We are providing the Crab index, normalization ratio to the users through the web page as a Suzaku memo.



Users, who needs accurate systematic error on the effective area, incorporates the Crab normalization ratio in their spectral fit

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HXD
nominal

A current status of a fine tuning of the XRT response (Non-released test version)

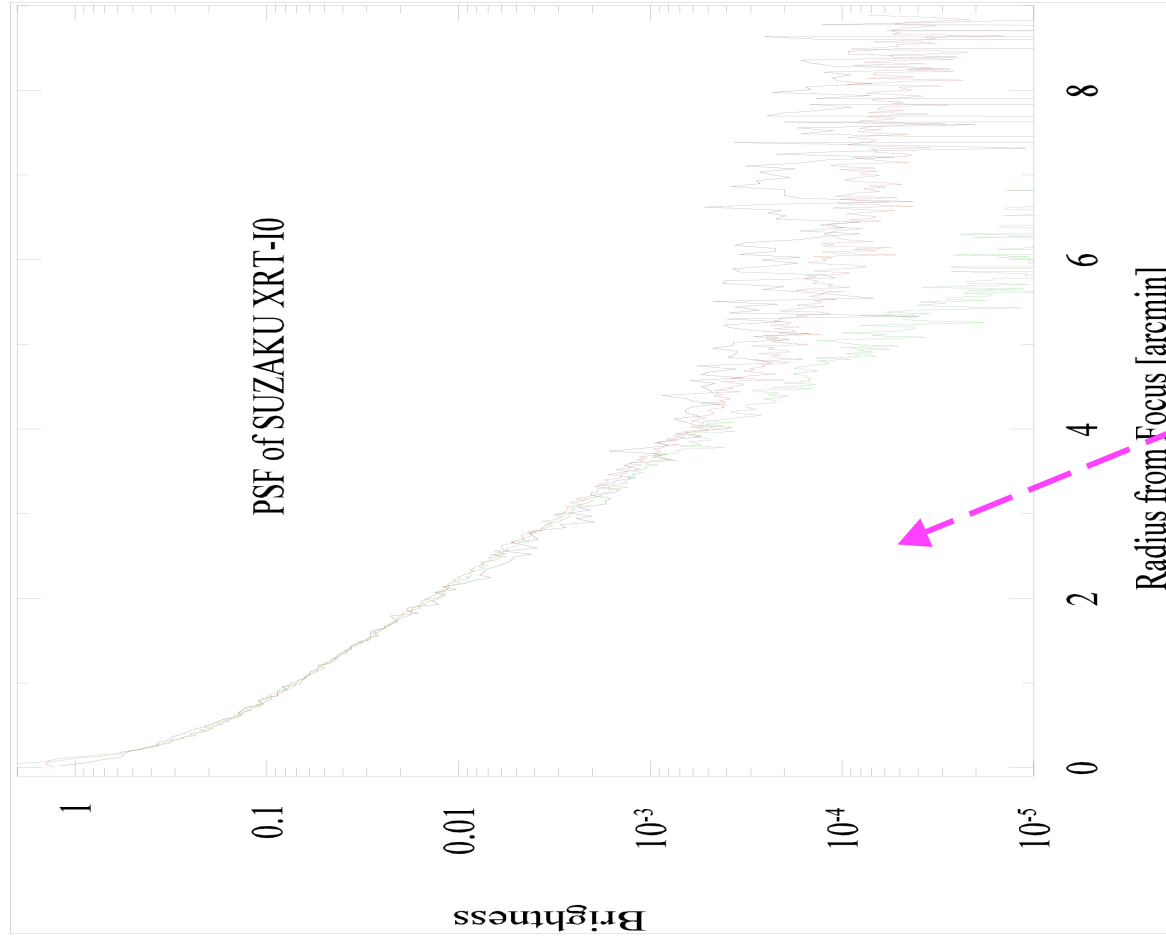
Purpose: To provide more accurate arf generator and simulator

→ (Hopefully) make users free from systematic uncertainties of the XRT response

- Image (PSF/EEF)
- Vignetting
- EA

PSF XIS-0

- SS Cyg at XISnom
- Xissim 20070716
- Test version



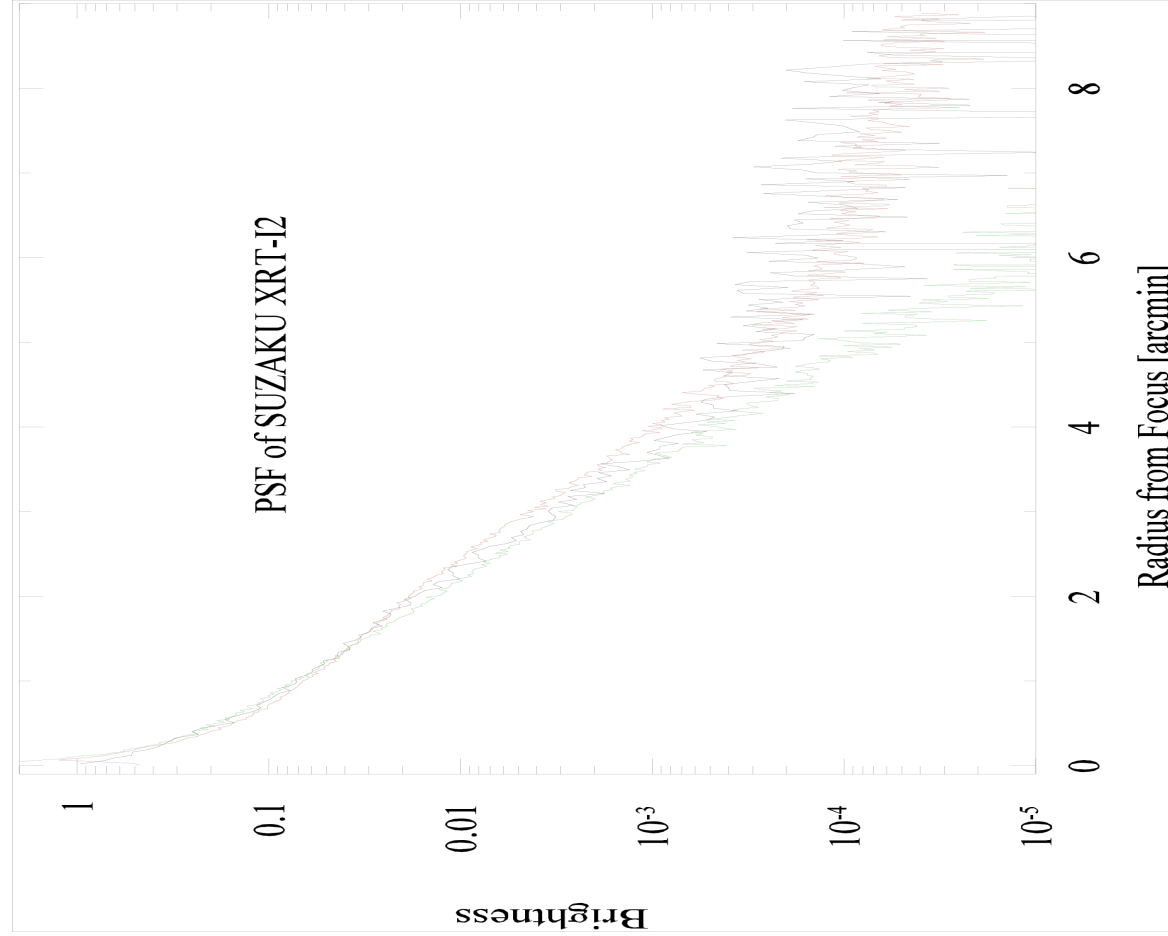
PSF XIS-1

— SS Cyg at XISnom
— Xissim 20070716
— Test version



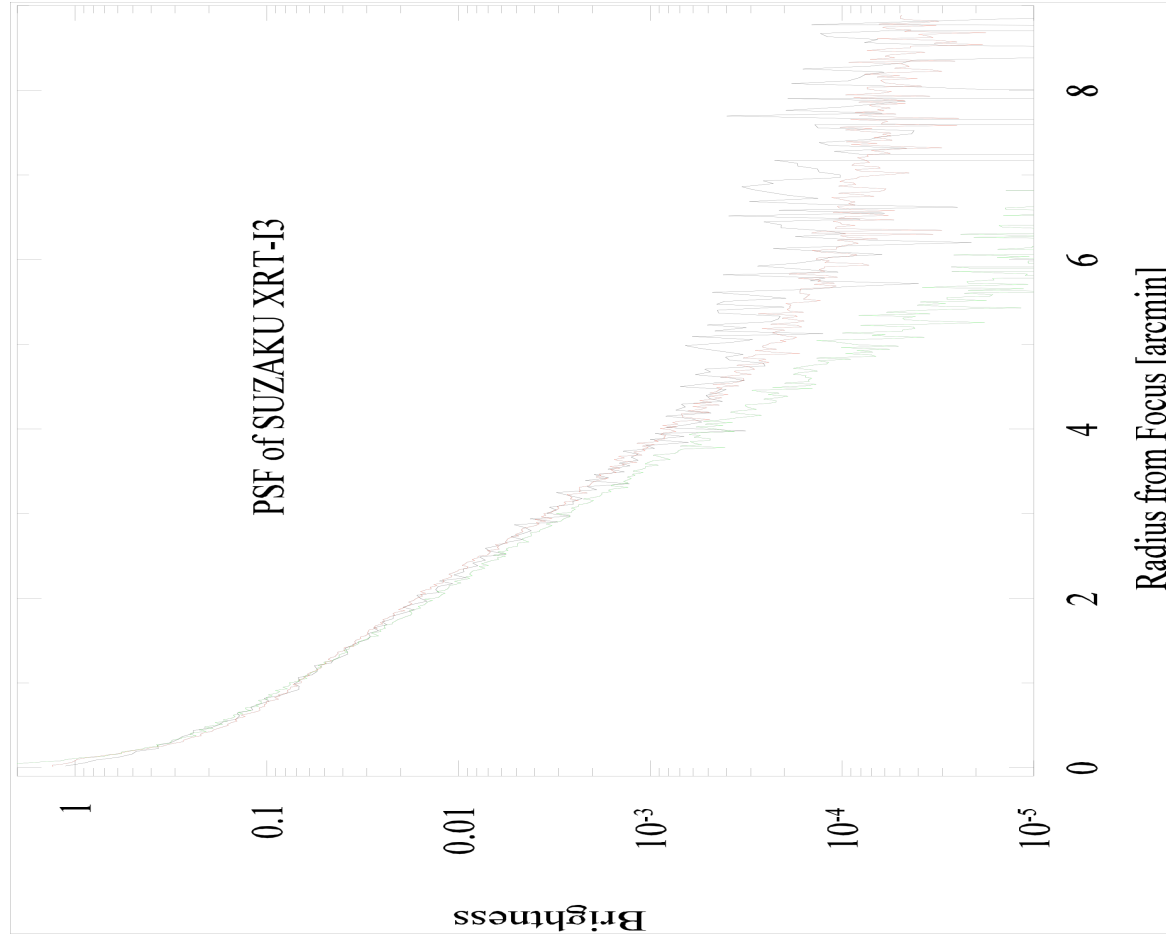
PSF XIS-2

- SS Cyg at XISnom
- Xissim 20070716
- Test version



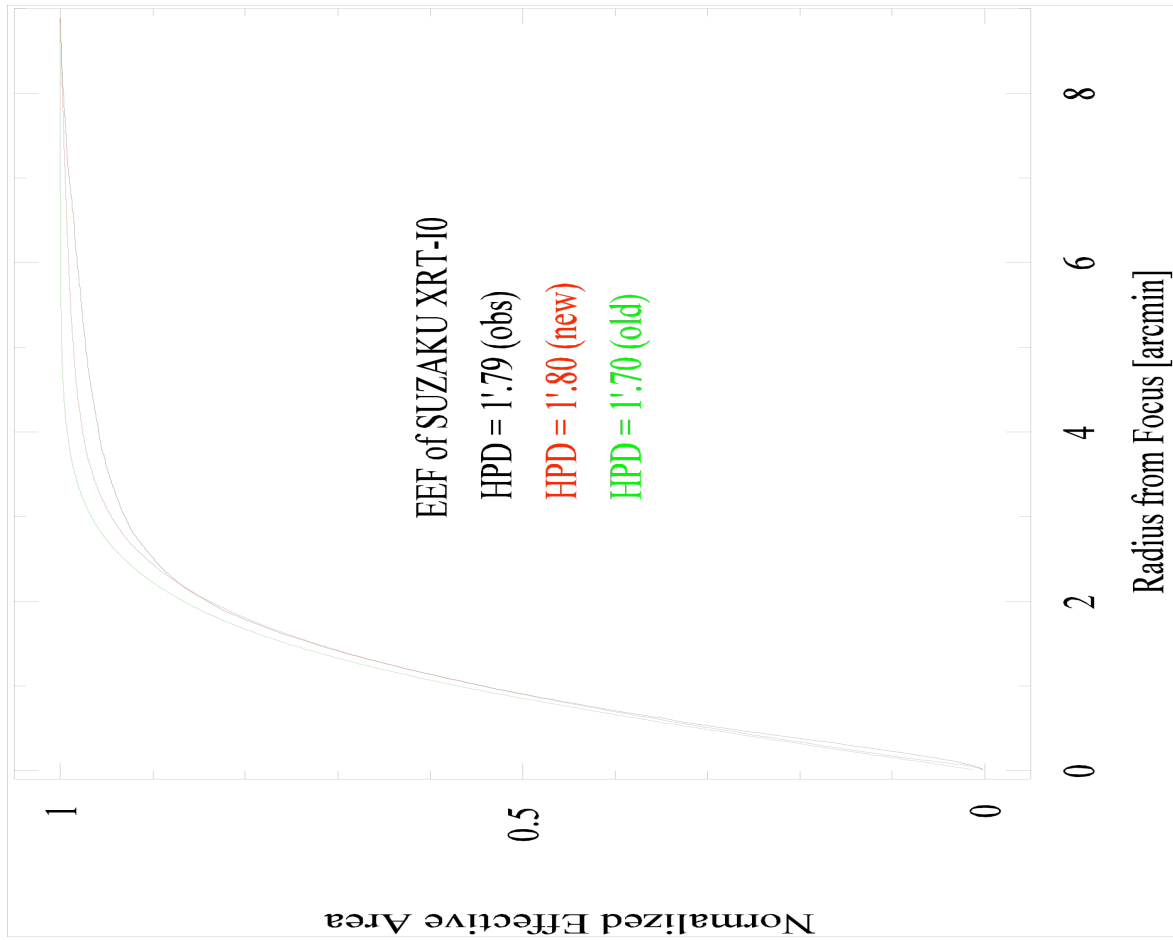
PSF XIS-3

- SS Cyg at XISnom
- Xissim 20070716
- Test version



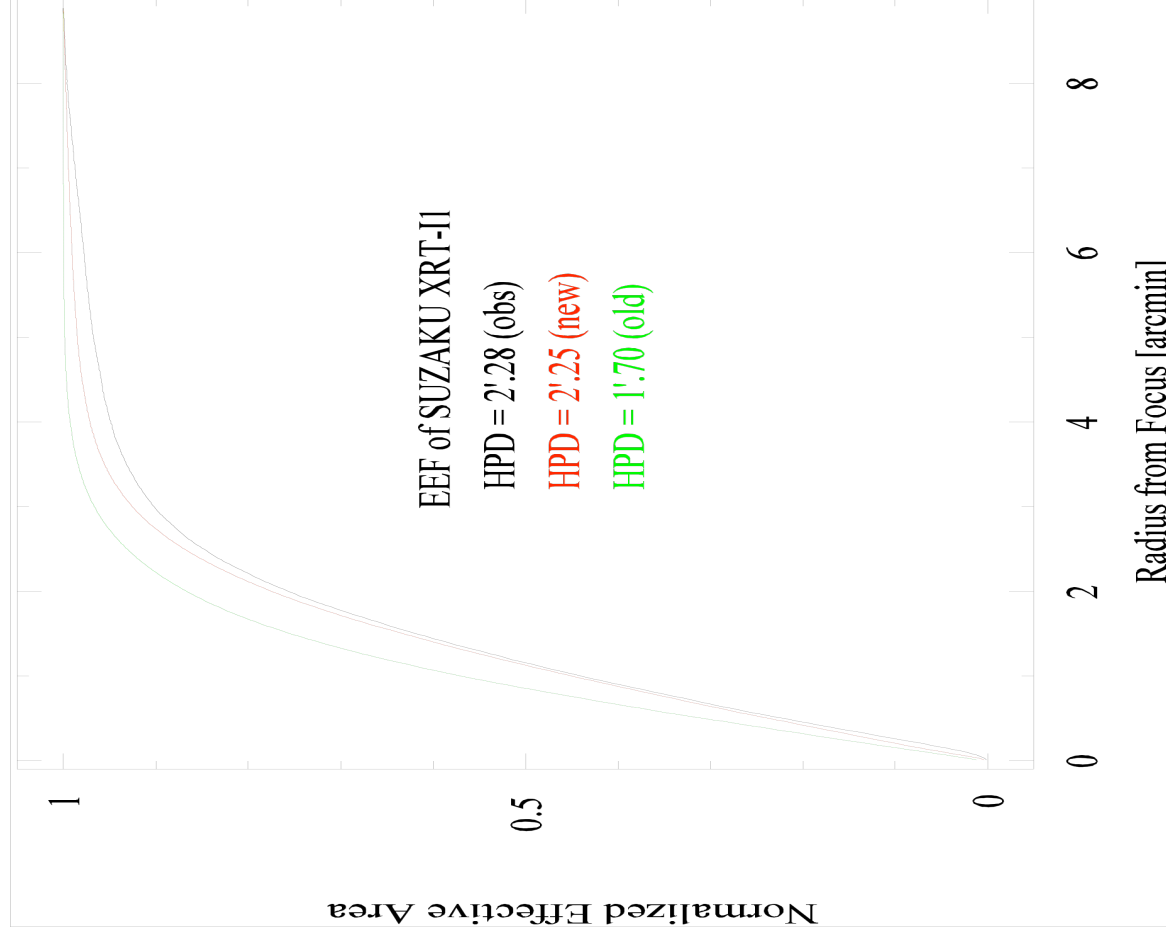
EEF XIS-0

- SS Cyg at XISnom
- Xissim 20070716
- Test version



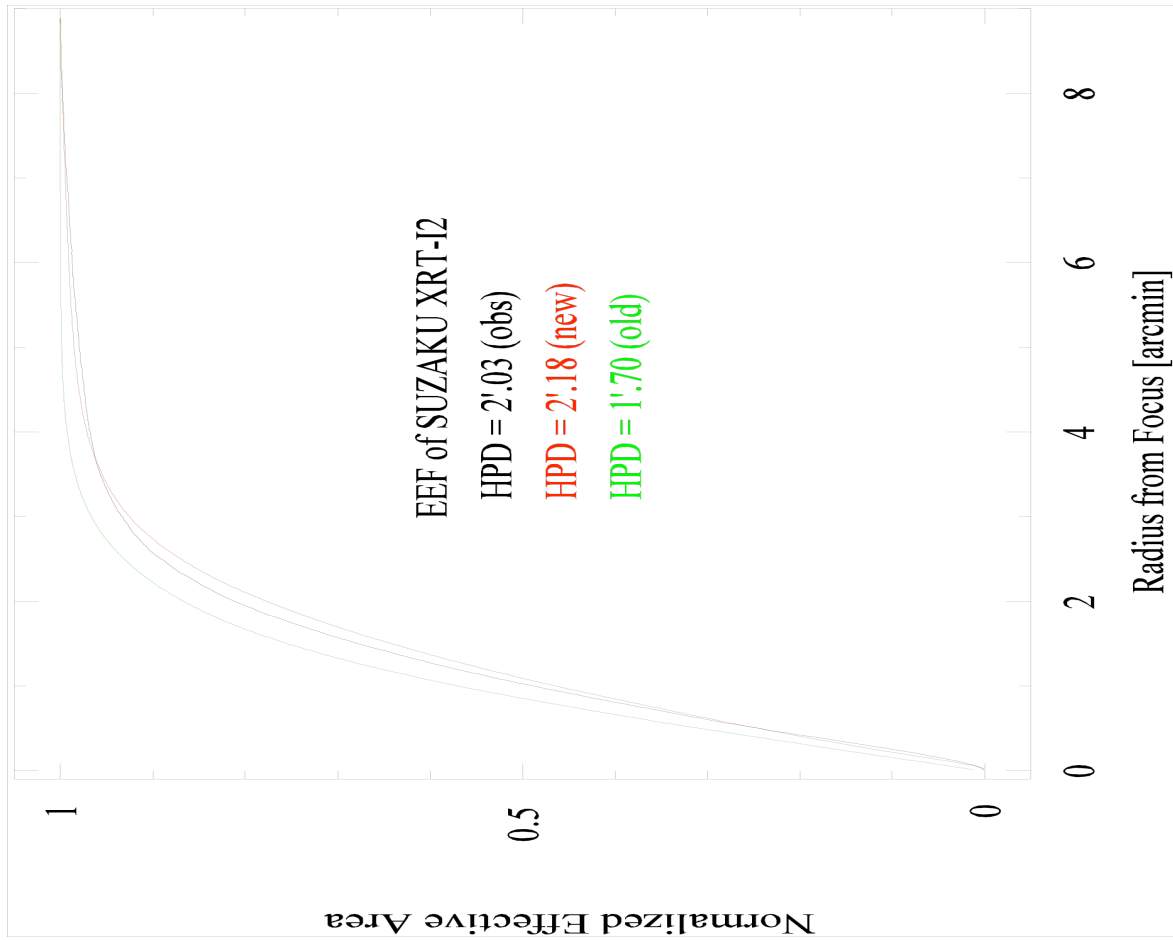
EEF XIS-1

- SS Cyg at XISnom
- Xissim 20070716
- Test version



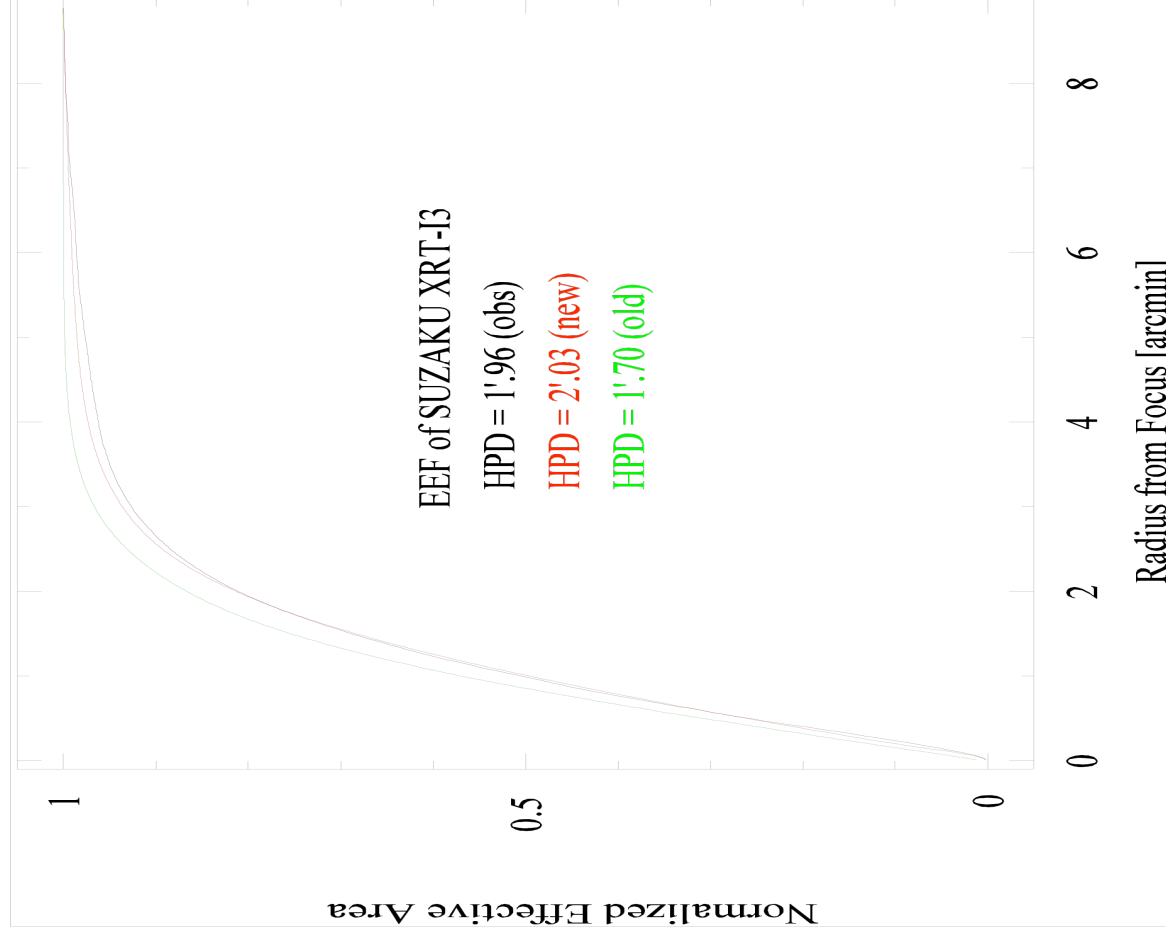
EEF XIS-2

- SS Cyg at XISnom
- Xissim 20070716
- Test version



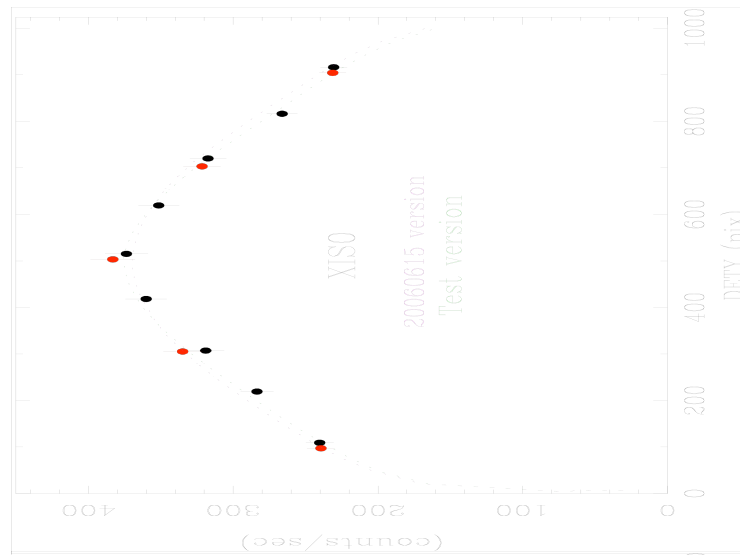
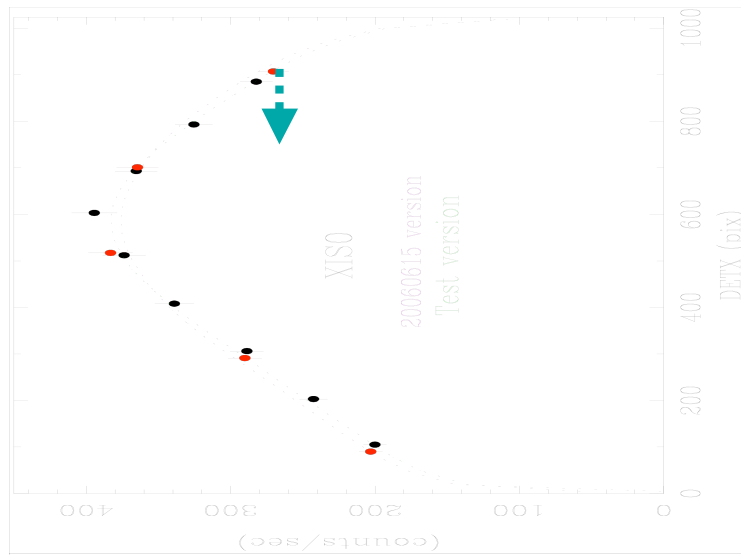
EEF XIS-3

- SS Cyg at XISnom
- Xissim 20070716
- Test version

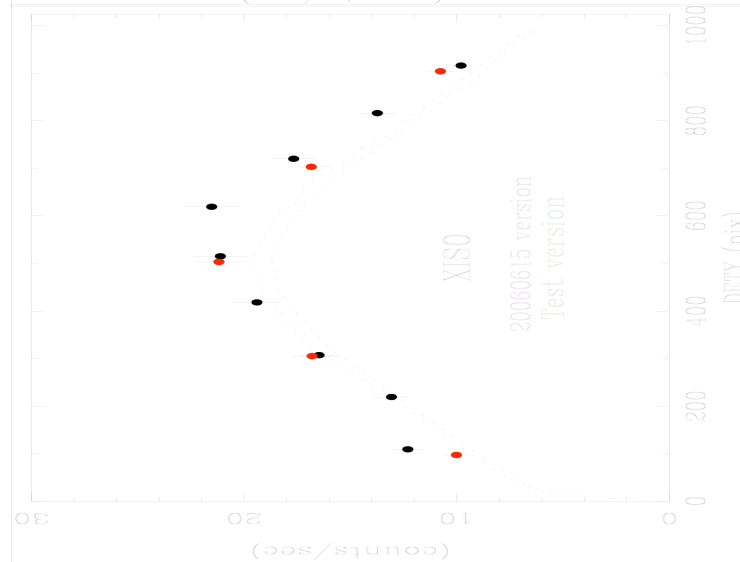
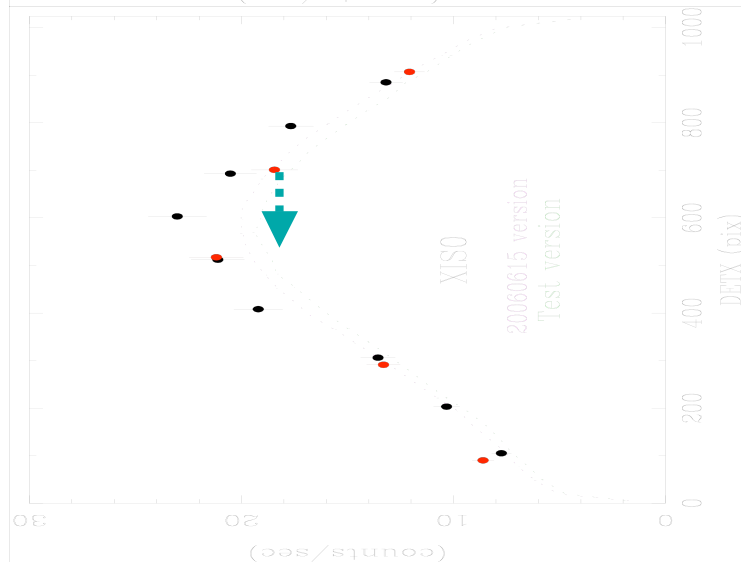


Vignetting: XIS-0

..... Xissim 20070716
..... Test version



4.5 keV

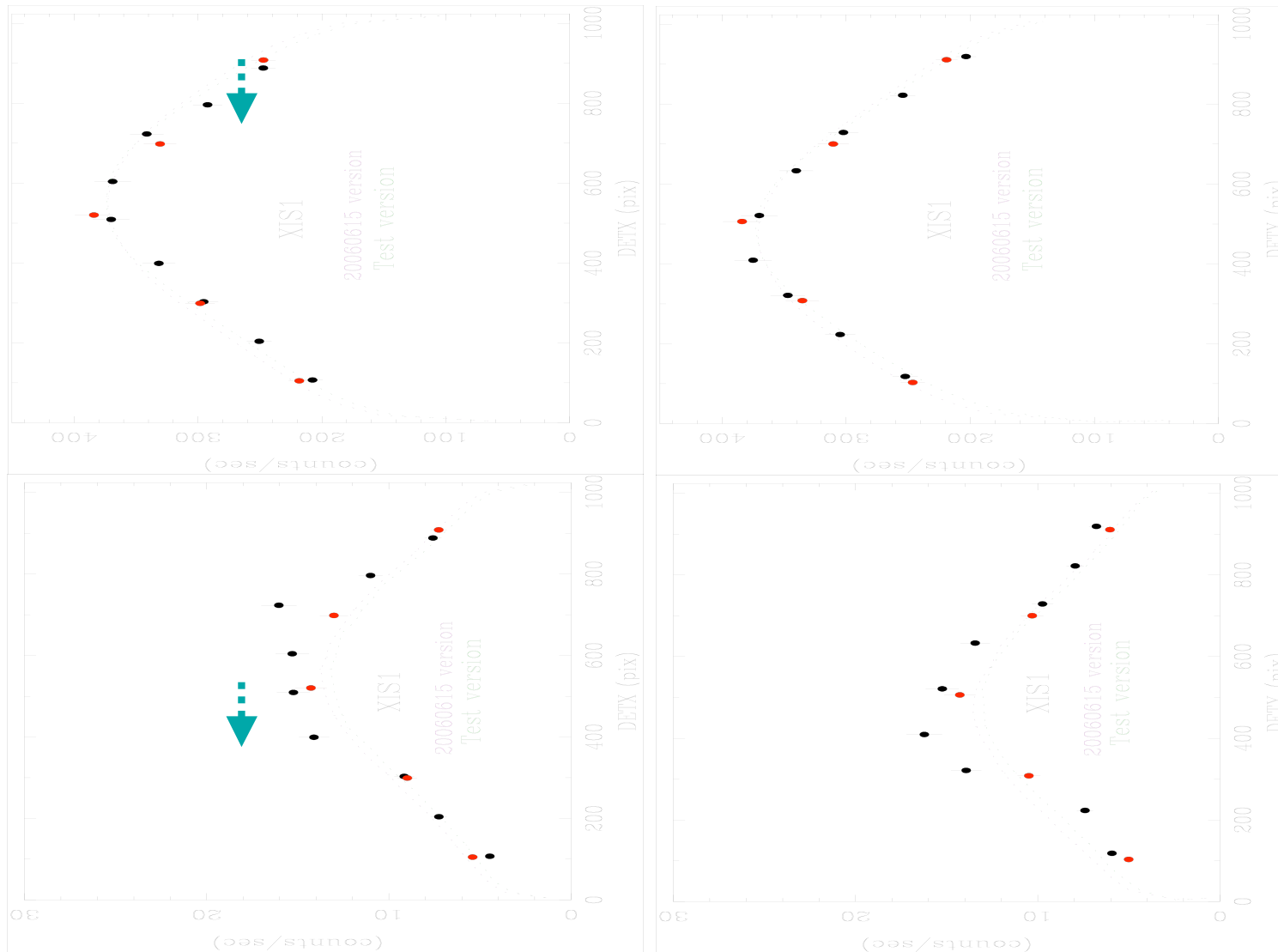


8.0 keV

- Crab 2005 Fall
- Crab 2006 Fall

Vignetting: XIS-1

..... Xissim 20070716
..... Test version



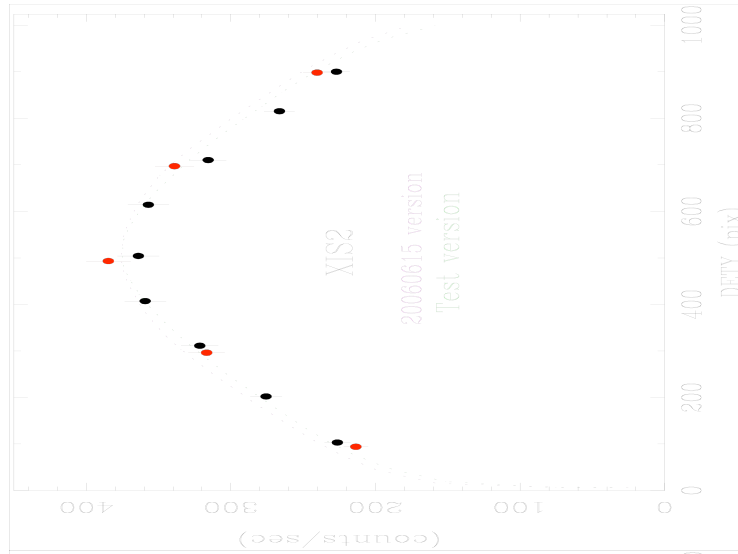
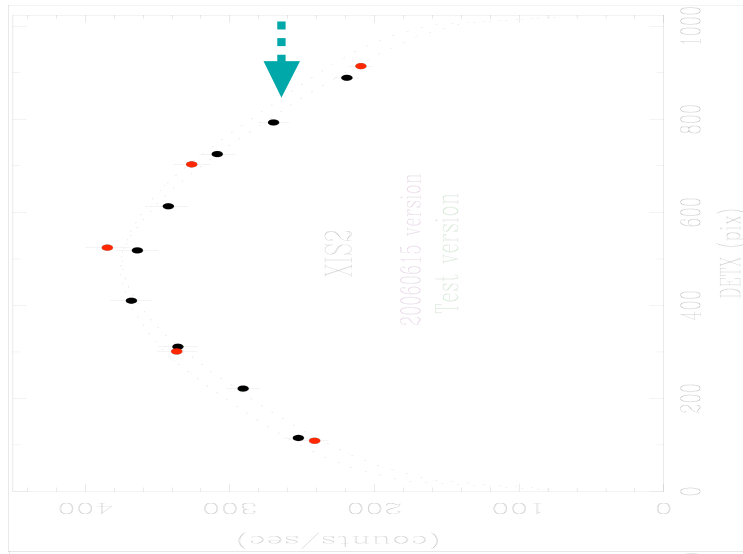
4.5 keV

8.0 keV

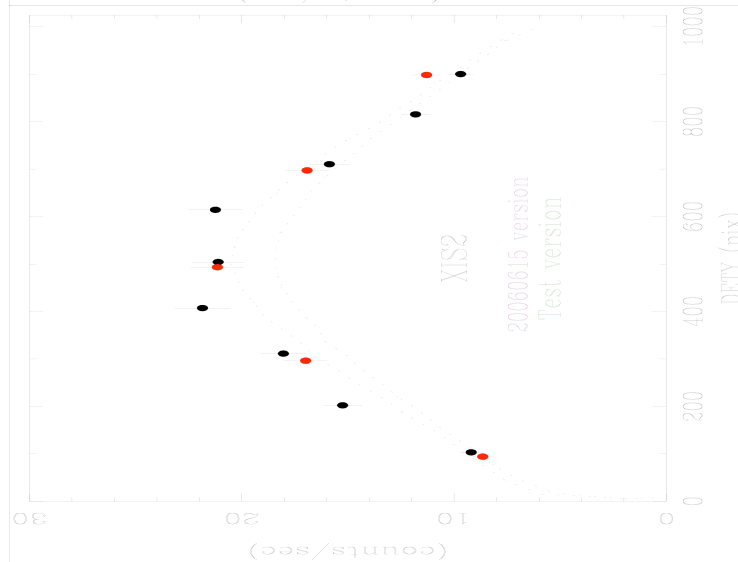
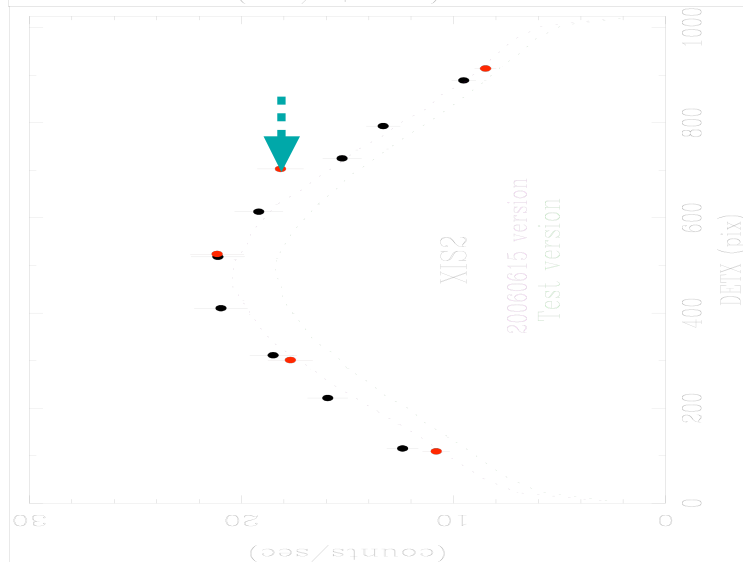
- Crab 2005 Fall
- Crab 2006 Fall

Vignetting: XIS-2

..... Xissim 20070716
..... Test version



4.5 keV

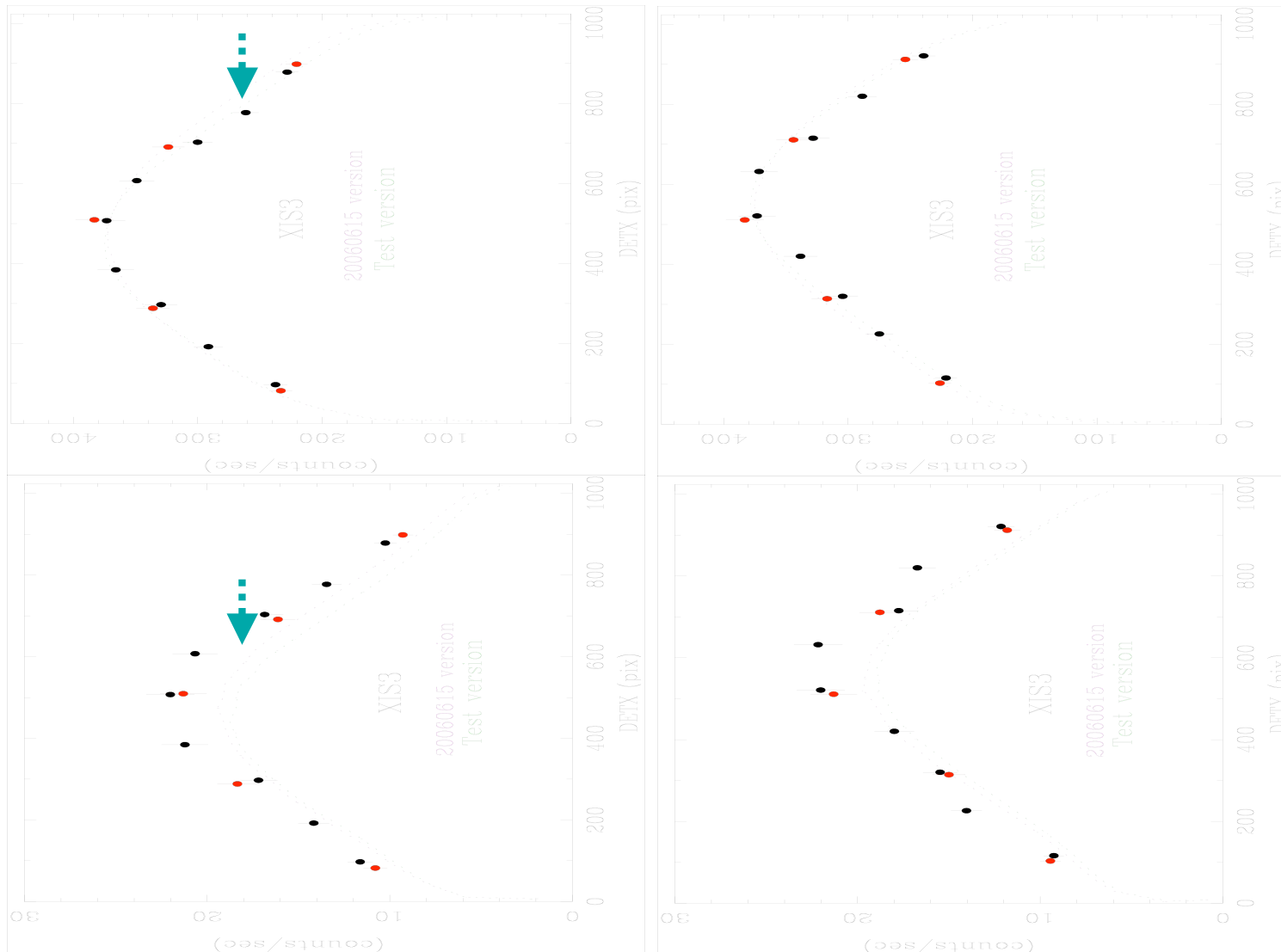


8.0 keV

- Crab 2005 Fall
- Crab 2006 Fall

Vignetting: XIS-3

..... Xissim 20070716
..... Test version



4.5 keV

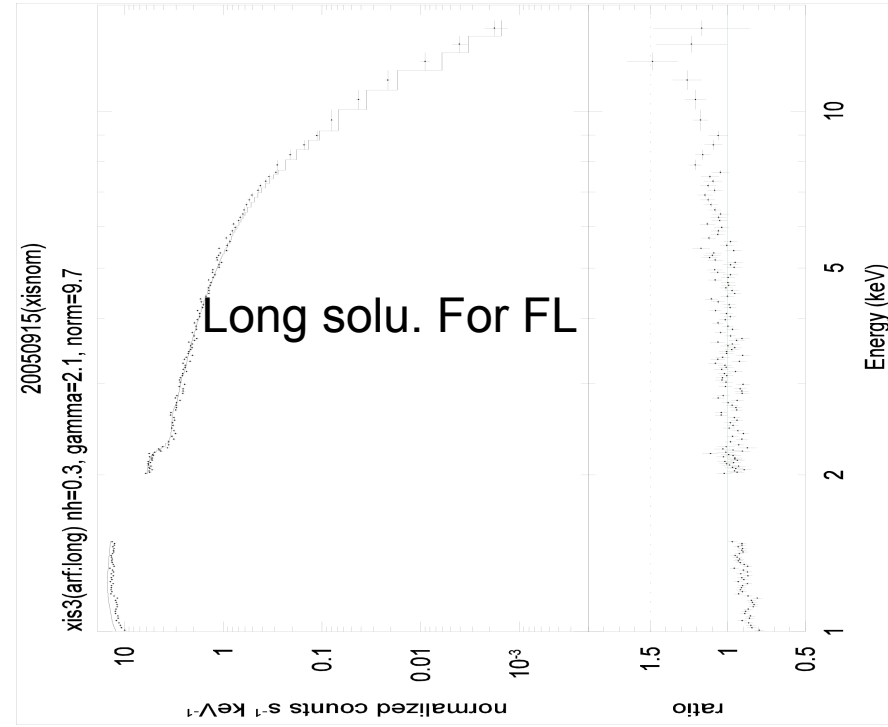
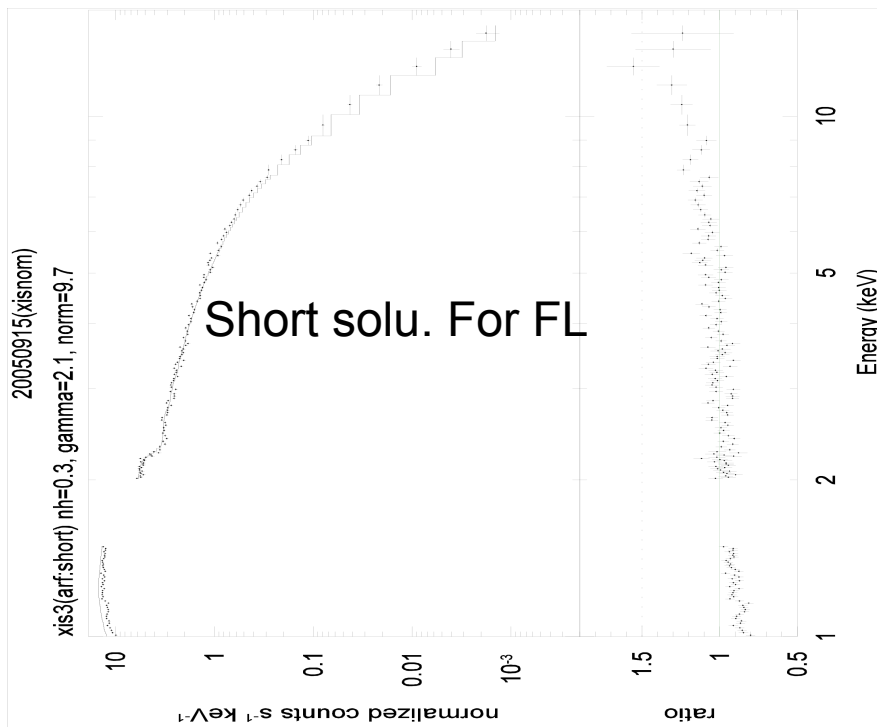
8.0 keV

- Crab 2005 Fall
- Crab 2006 Fall

On-Going

Effective Area

Data: Crab
Response: Test version
Model: $\Gamma=2.1$



Problem: Crab' slope becomes flatter (~ 2.0)

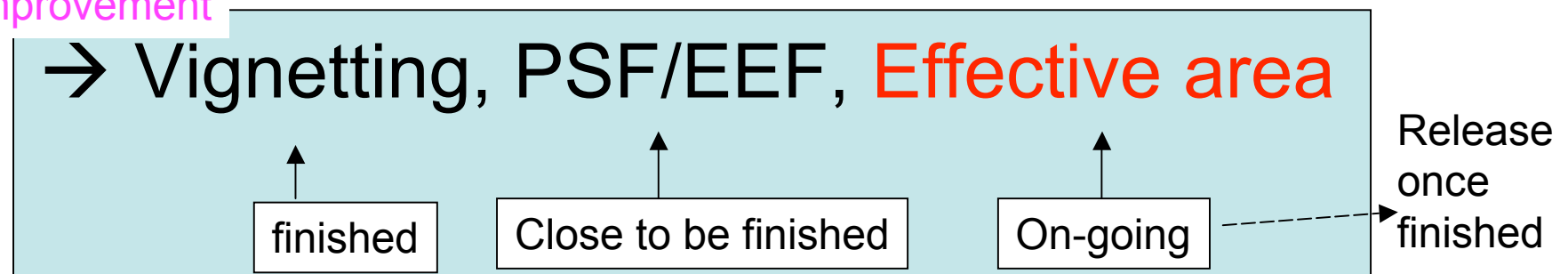


Once solved, update responses to GO/SWG.

A current status of a fine tuning of the XRT response (test version)

- Future updated components
 - teldef
 - Optical Axis
 - Ray-tracing library/reference files
 - Foils geometry at every QT
 - Focal length, Optical Axis
 - Scattering (Au surface)

Improvement



Summary

- Continue to update XISSIM/XISSIMARFGEN beyond version 20070716
- Current Status
 - Update version of xissim, xissimarfggen: all 2007-07-16 versions
 - Attitude correction tool “aeattcor” was released and was incorporated in the v 2.0 processing.
- Future plan
 - Release a faster version of the xissimarfggen: xisarfggen
 - Improve the calibration accuracy
 - Current Test Version nearly completed for
 - Vignetting
 - Work in progress
 - Angular Resolution (PSF/EEF)
 - Effective area