

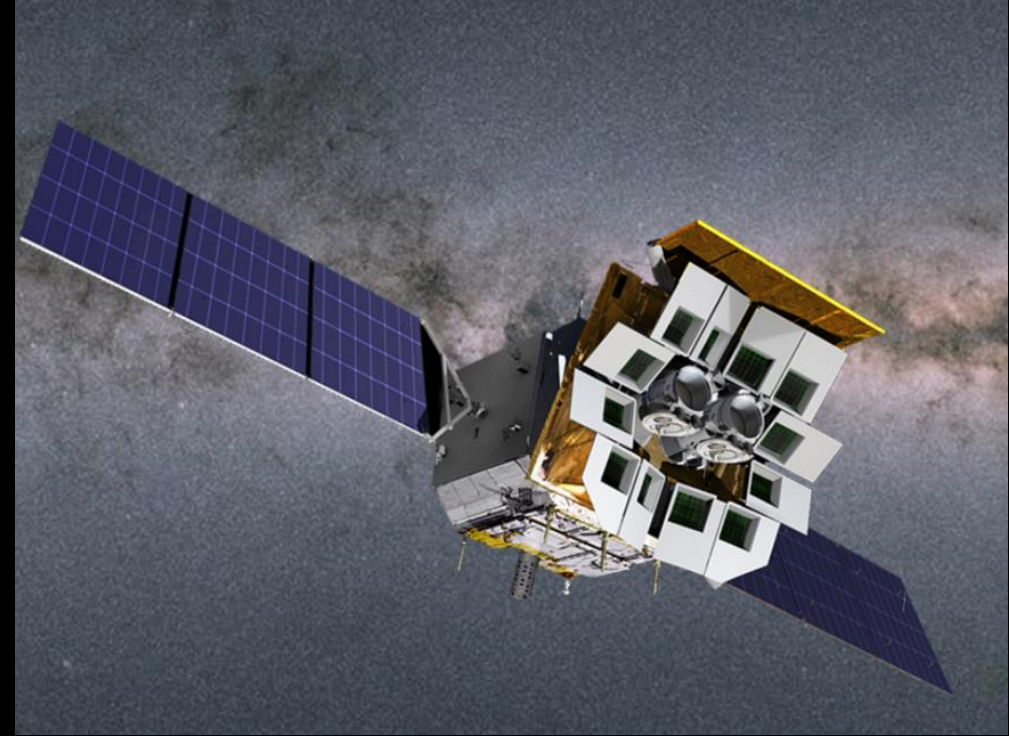


The in-orbit background of EP/FXT

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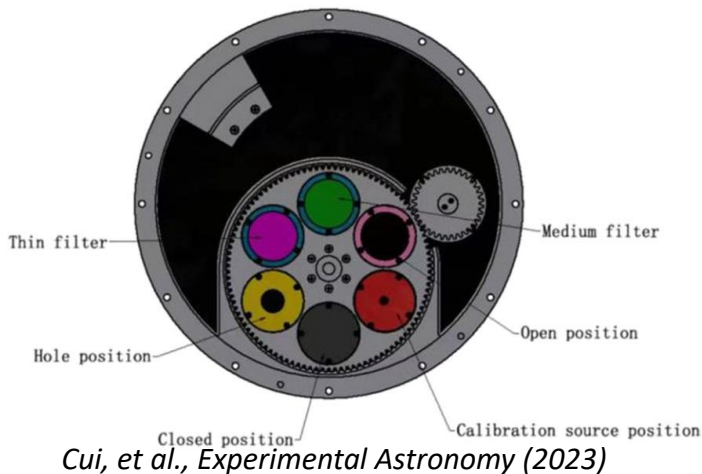
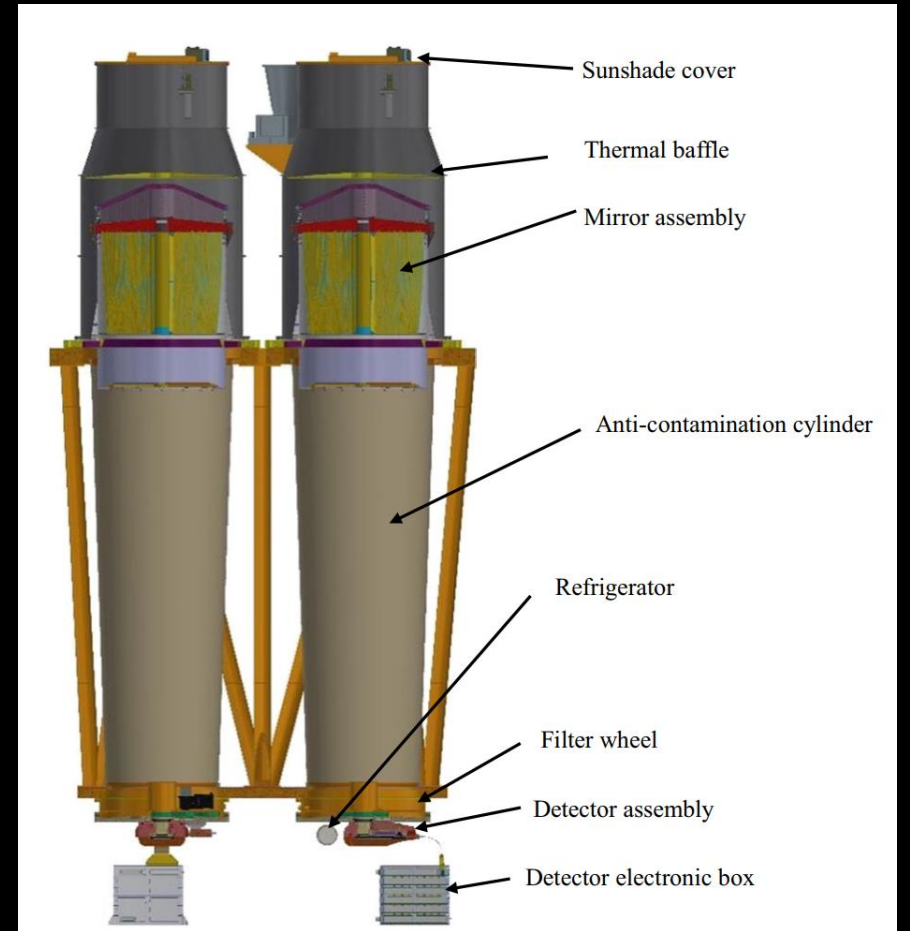
Outline

- EP/FXT
- Background simulation VS observation
- Preliminary results of in-orbit background characteristics



EP-FXT telescope

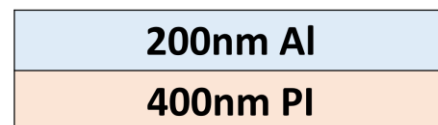
- Two identical modules, FXTA & FXTB
- Wolter-I mirror + pn-CCD + filter
- two pn-CCDs orthogonally positioned
 - Full Frame (FF), Partial Window (PW), Timing (TM)
- Filter wheel: 6 positions



closed



medium filter



thin filter



hole filter

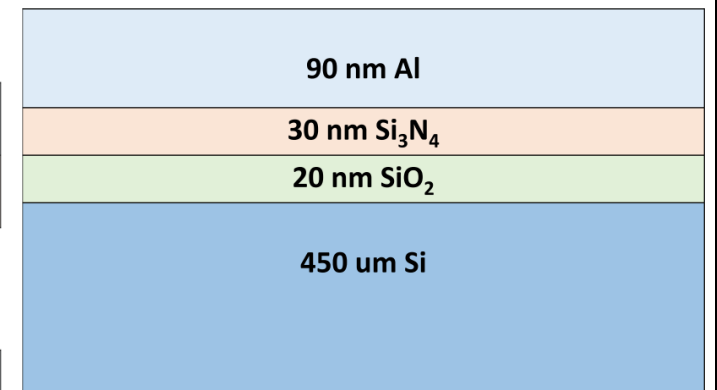
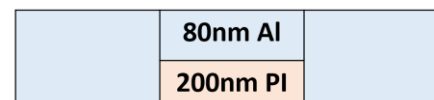


Fig. 2. On-chip filters above the pn-CCD.

EP-FXT orbit

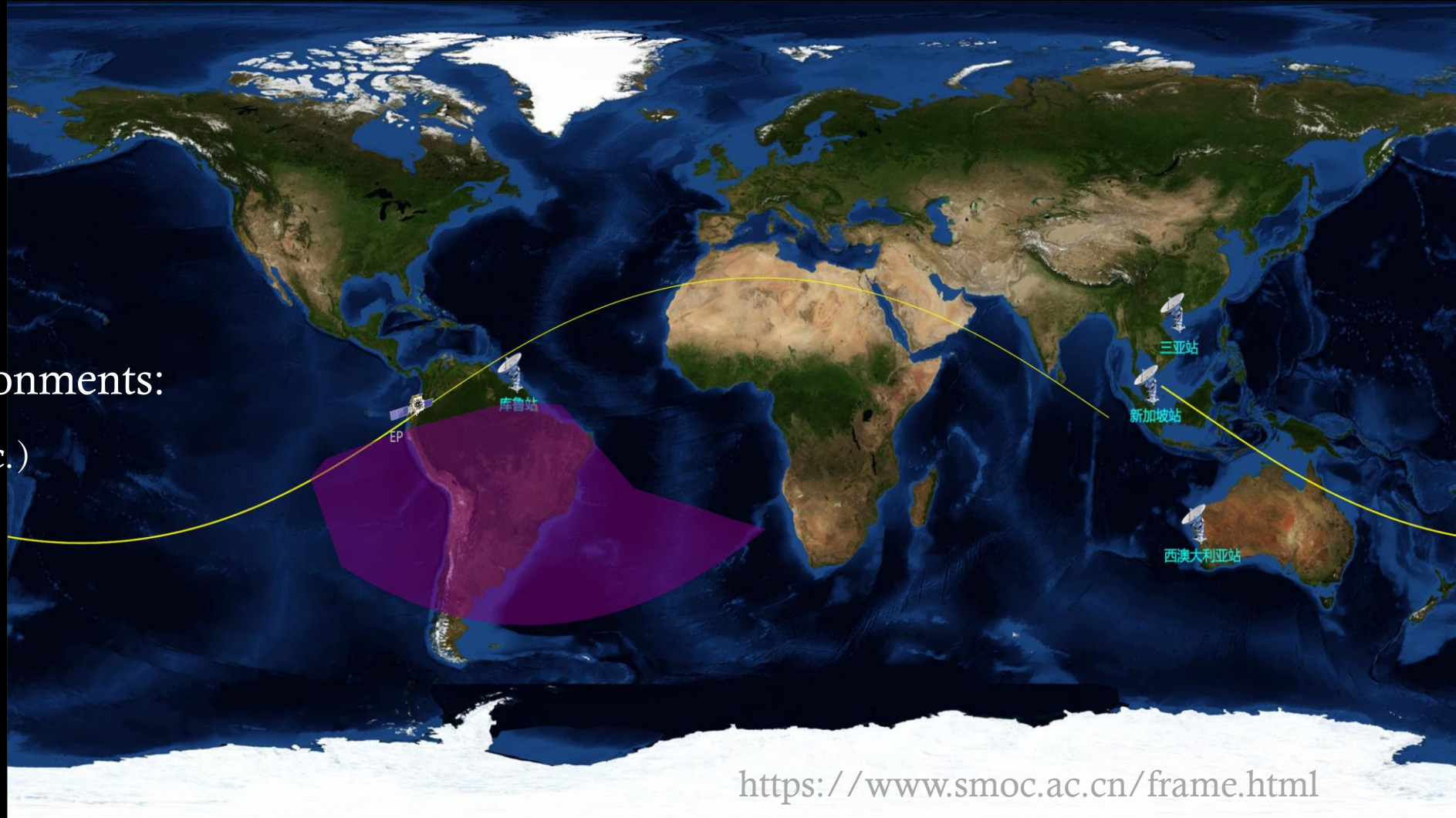
➤ Low Earth Orbit:

altitude ~ 580km

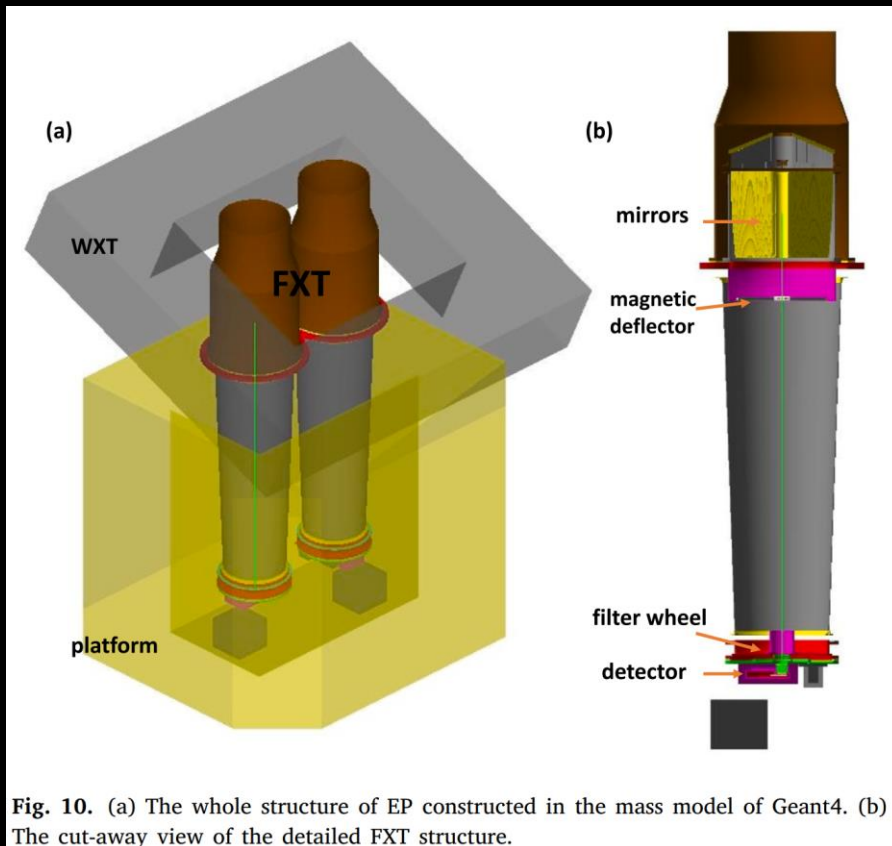
inclination ~ 30deg

➤ Space radiation environments:

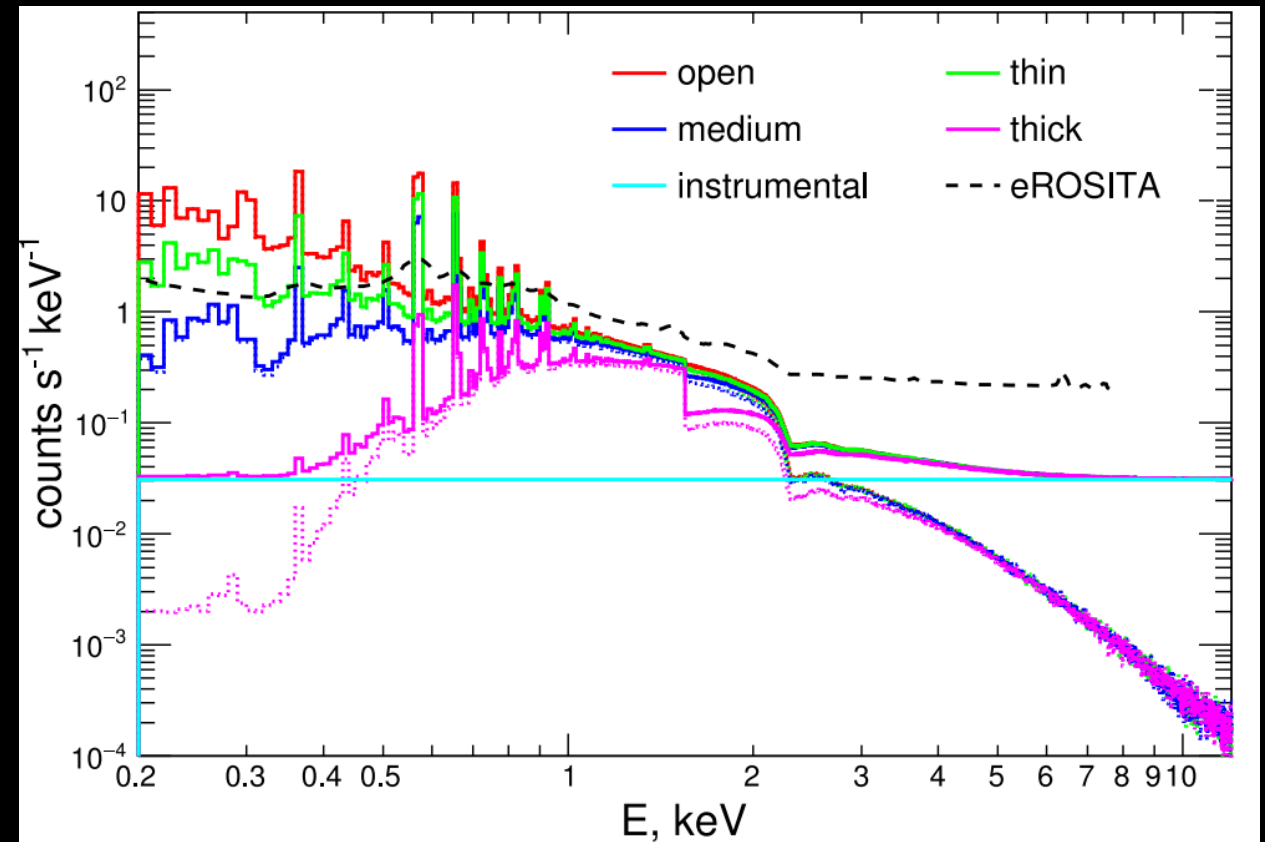
- Cosmic rays (p,He, e^{\pm} , etc.)
- Diffuse X-ray emission
- Albedo gamma rays
- etc.



Simulation before launch

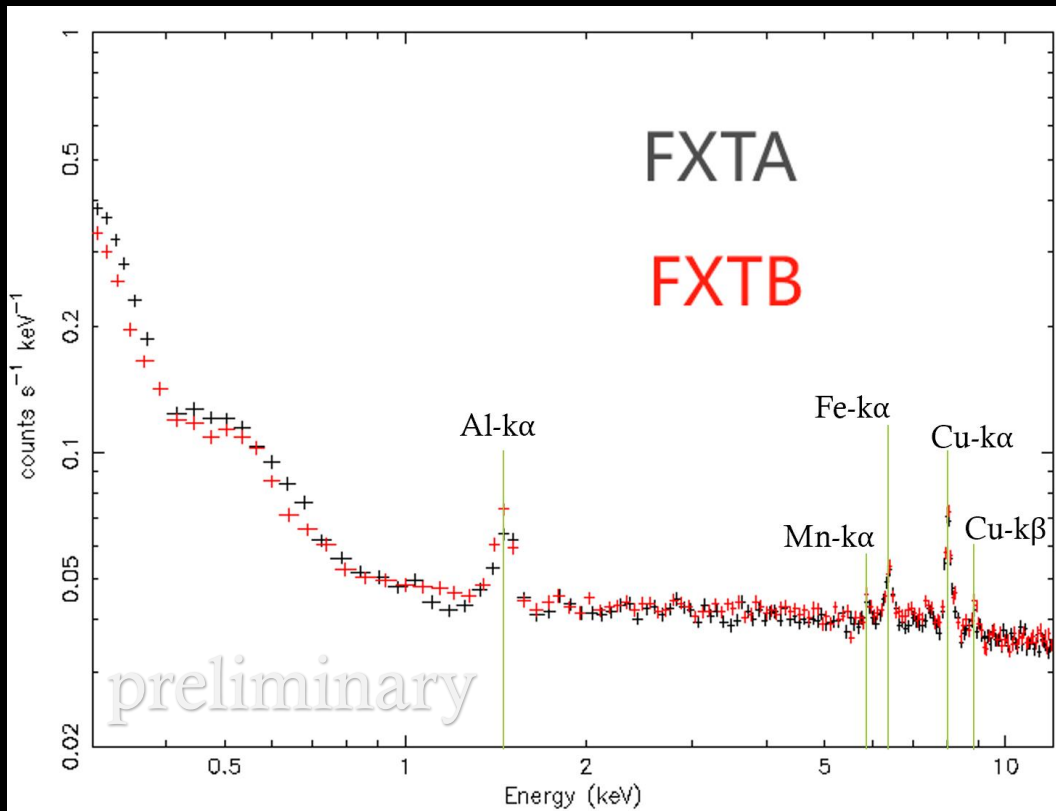


instrumental bkg $\sim 3.1 \times 10^{-2}$ cts/s/keV@0.5-10keV



Closed-filter background

Feb 5-22, filter wheel closed position



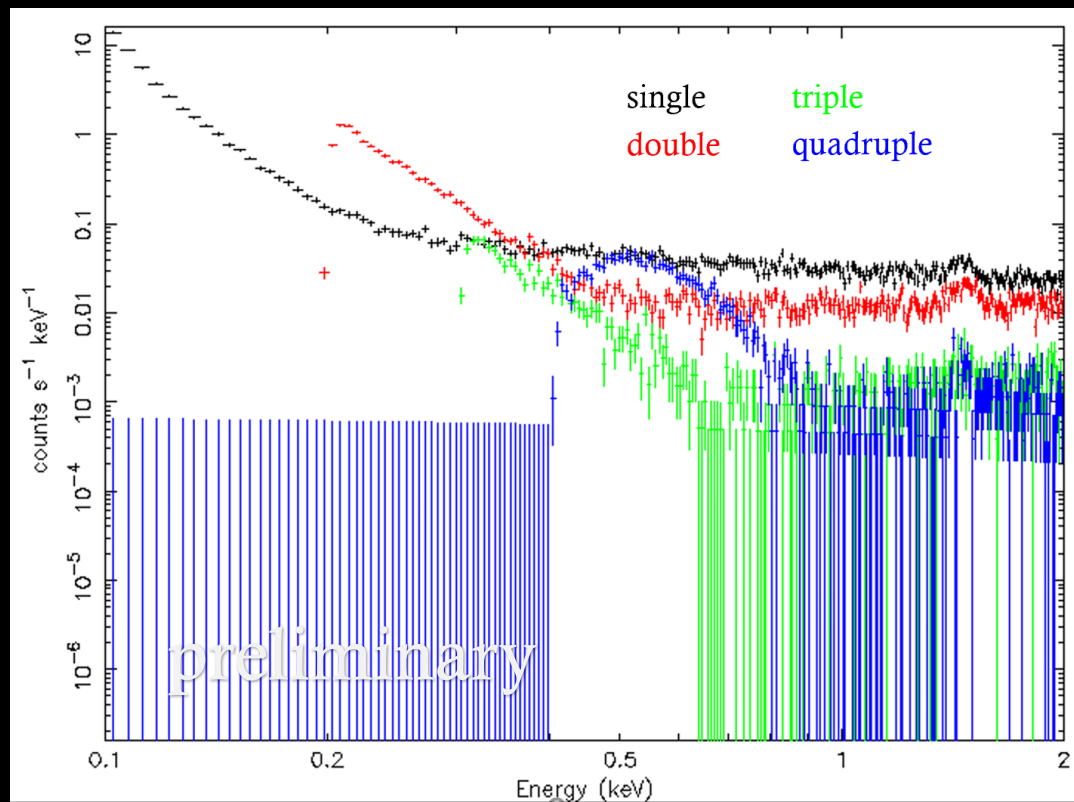
obs VS sim

Rate, $\times 10^{-2}$ cnts/s/keV	0.5-2 keV	2-10 keV
FXTA obs. 288.8ks	5.5	4.1
FXTB obs. 288.4ks	5.5	4.2
simulation	4.0	2.9

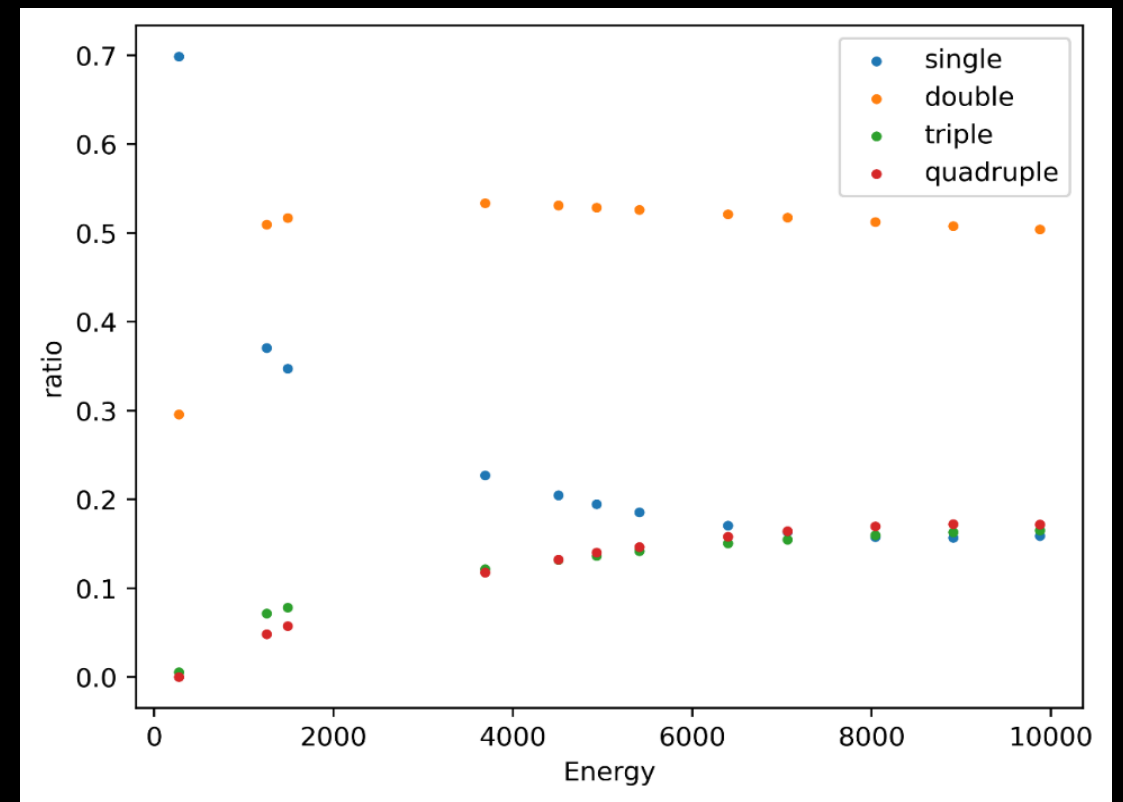
instrumental bkg@2-10keV:
obs \sim sim \times 1.4 (obs \times 0.7 \sim sim)

Pattern fraction of instrumental bkg

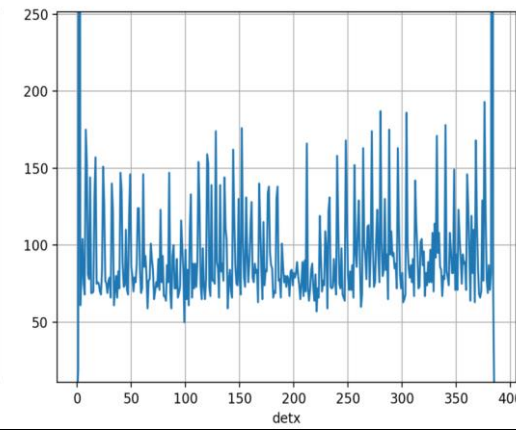
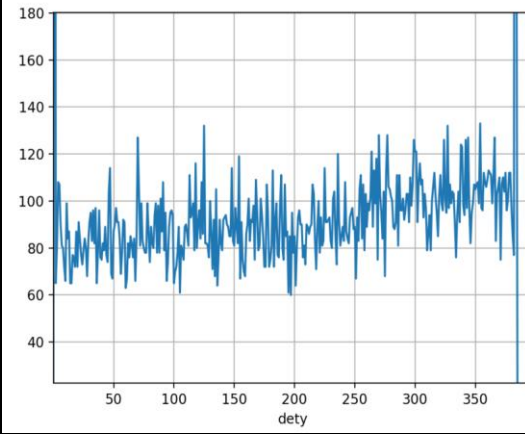
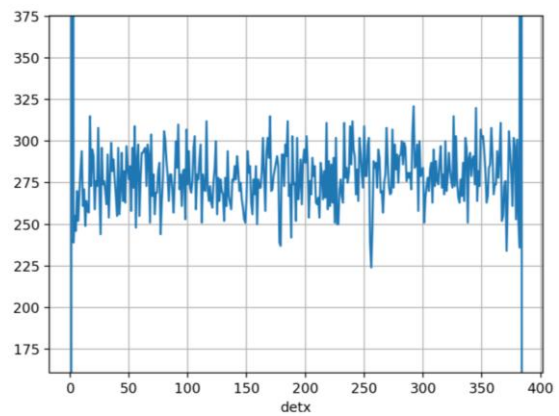
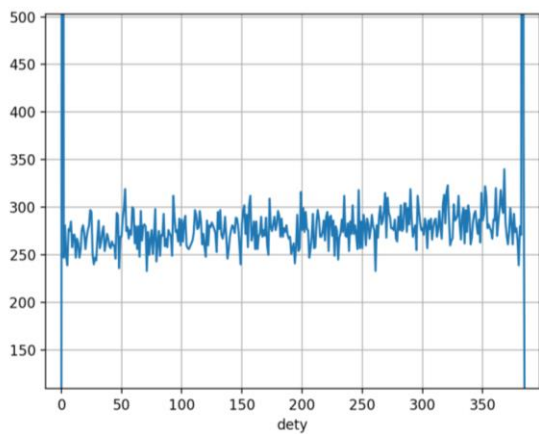
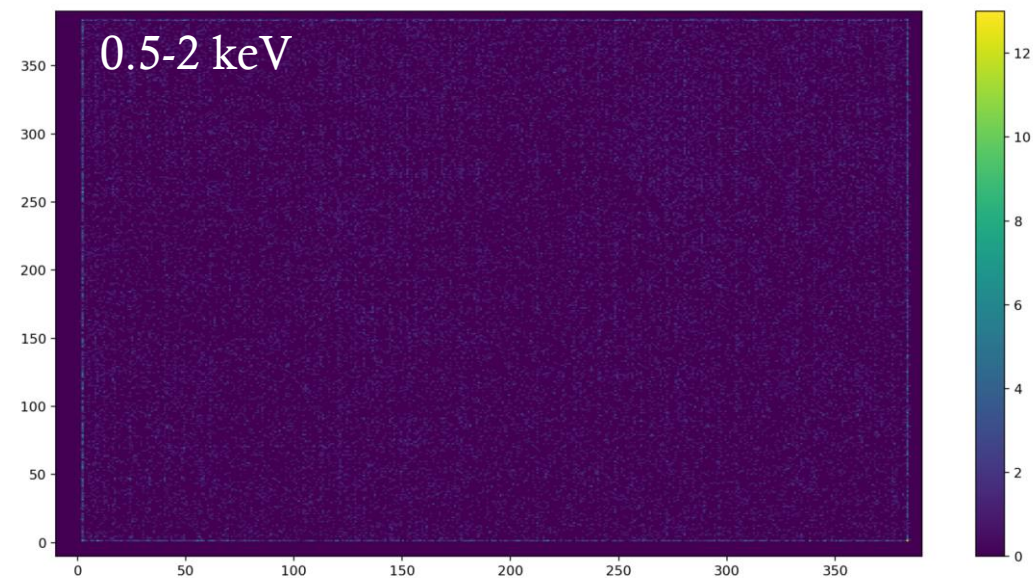
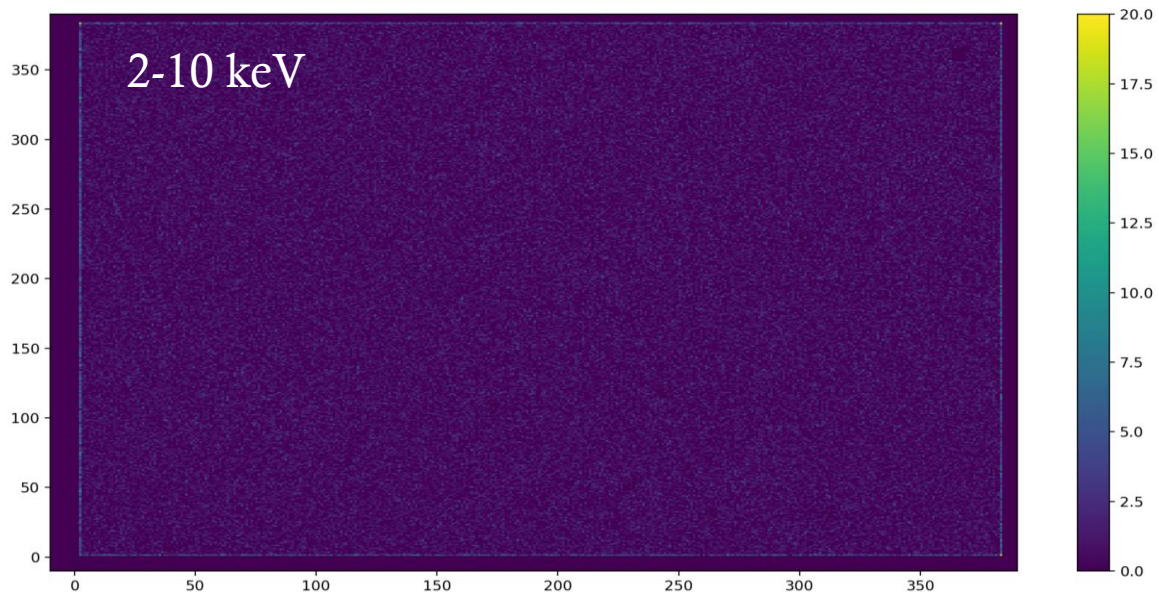
Closed wheel spectra of different grades



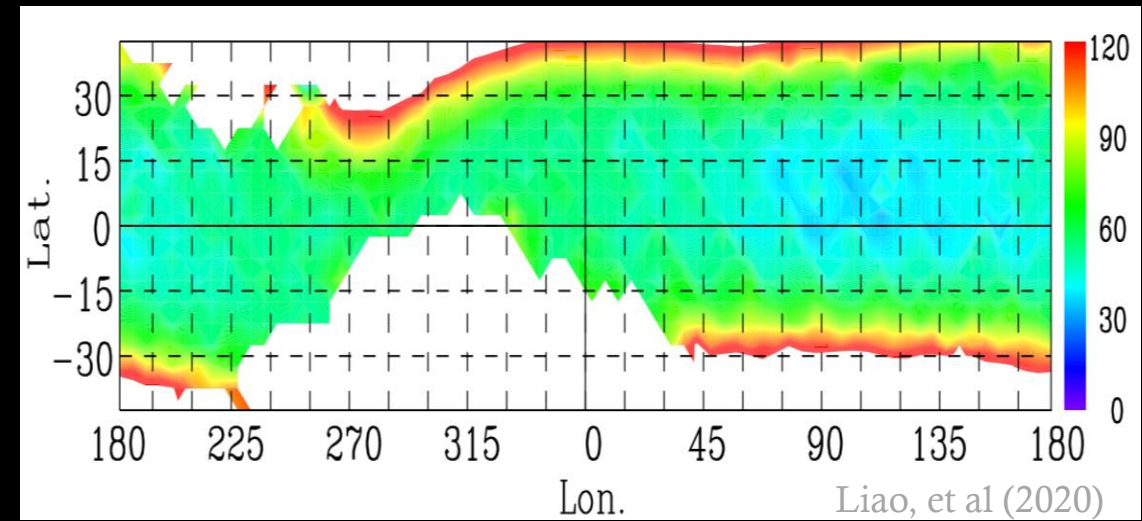
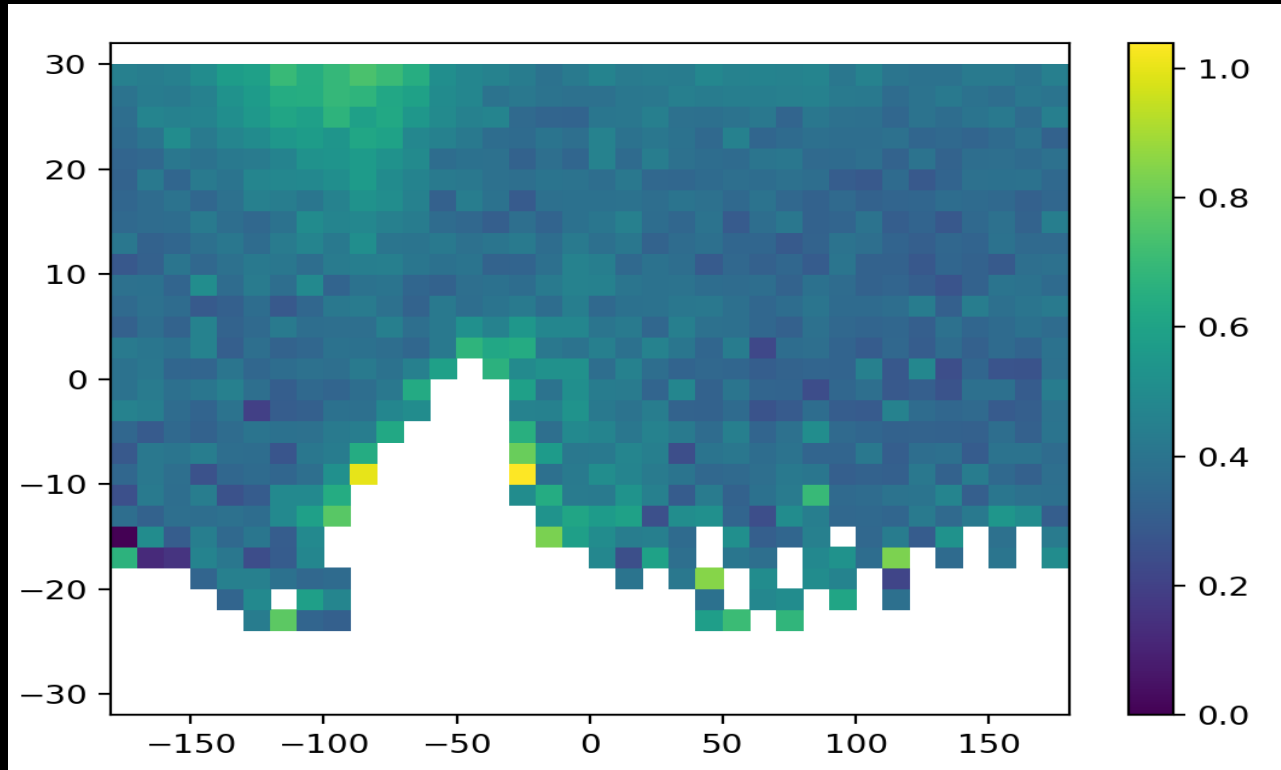
Pattern fraction from ground calibration



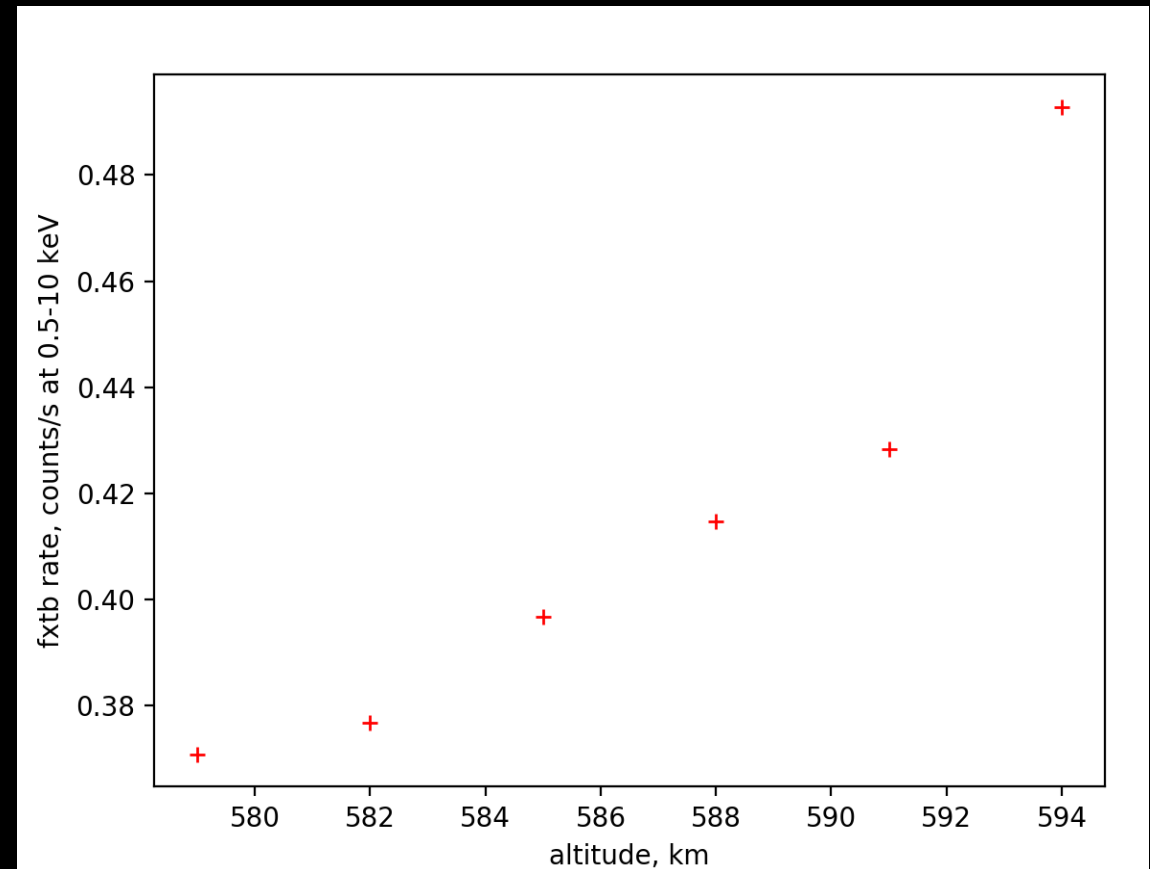
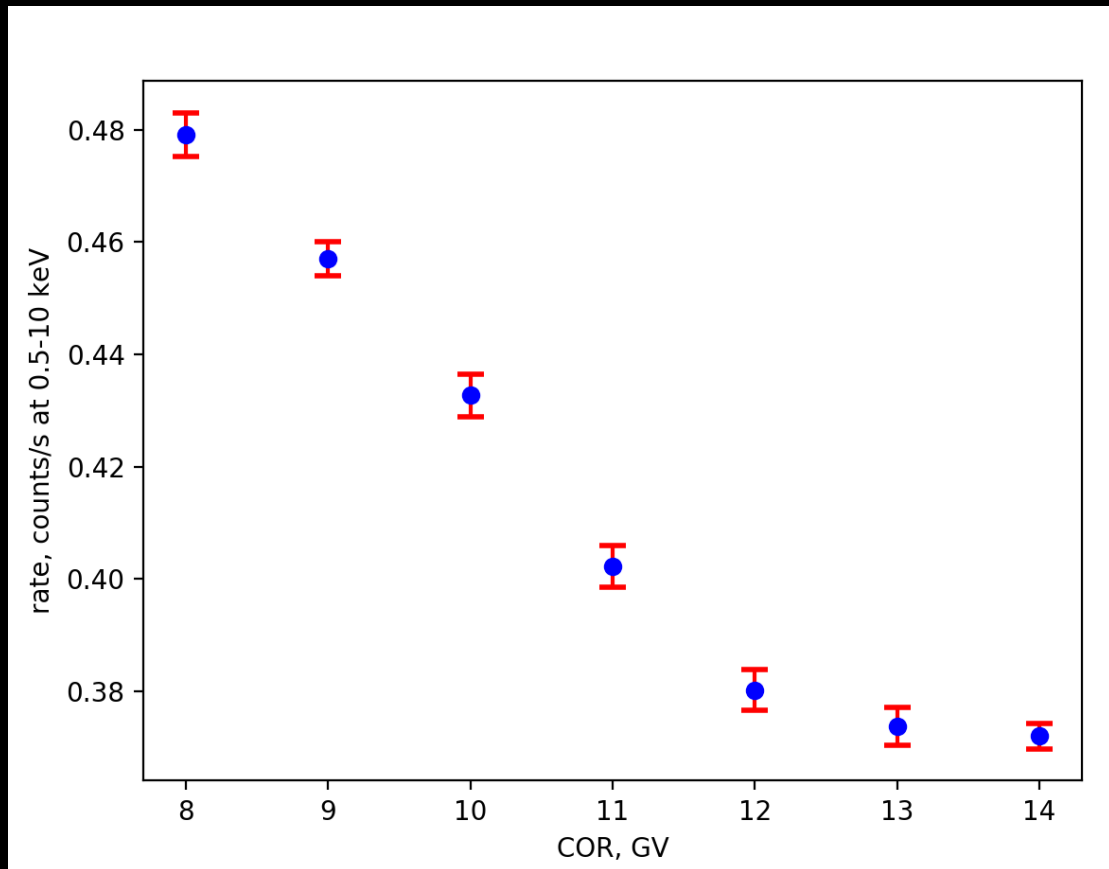
Distribution on pn-CCD



Geography distribution

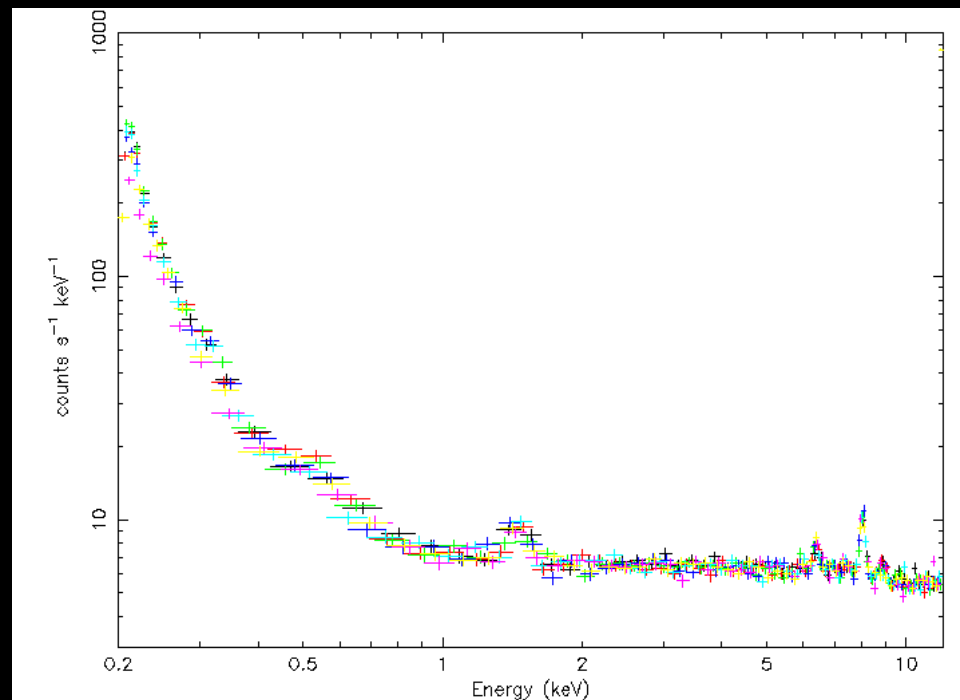
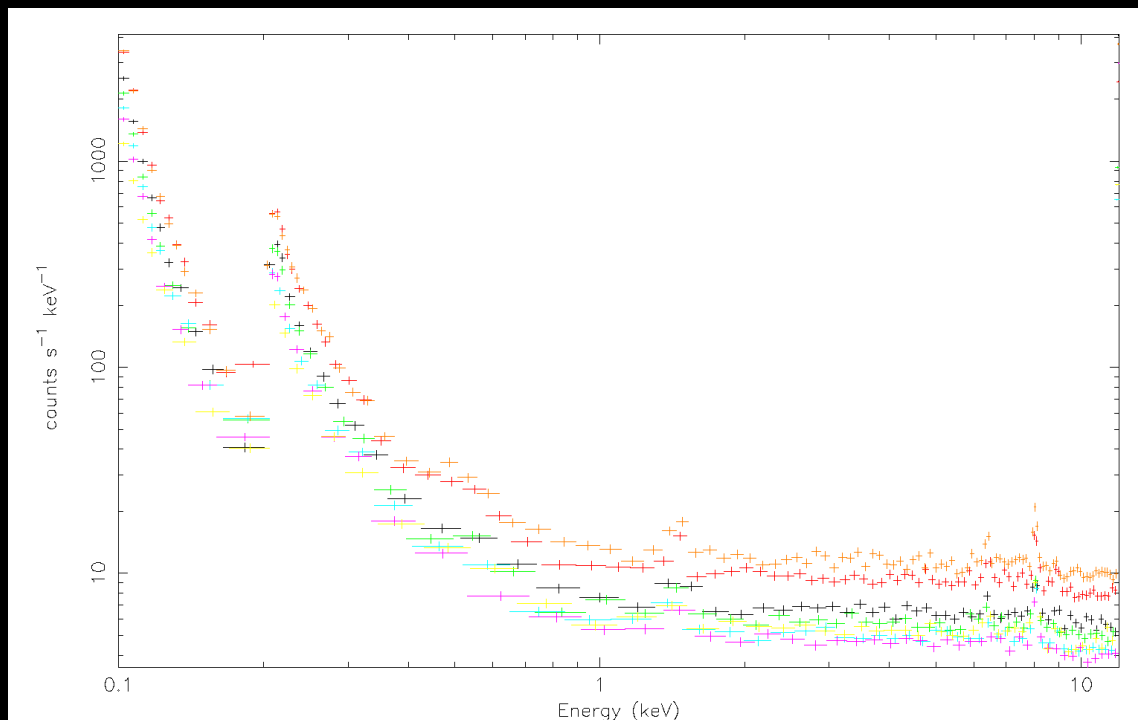


Variation with COR & altitude



Preliminary

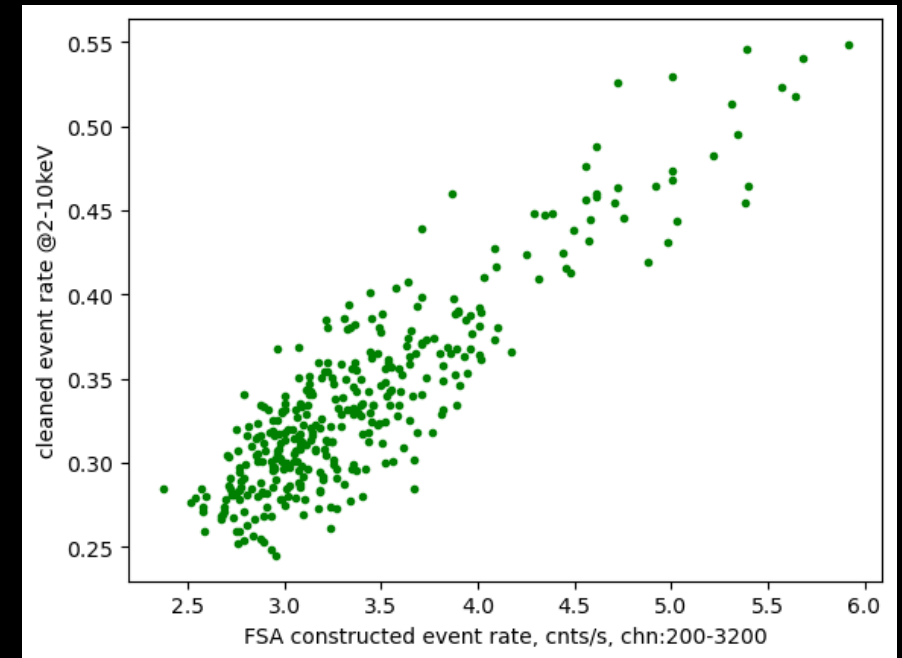
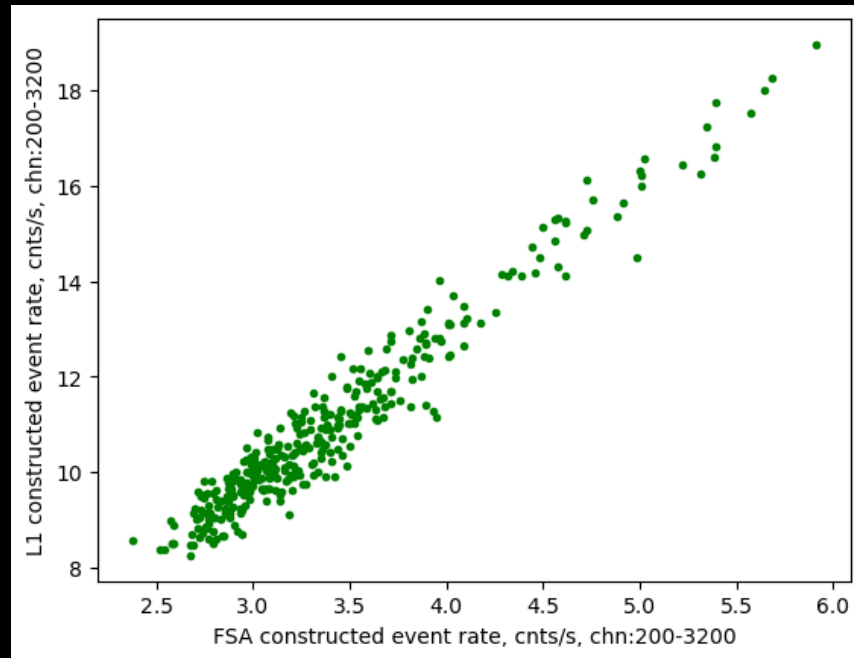
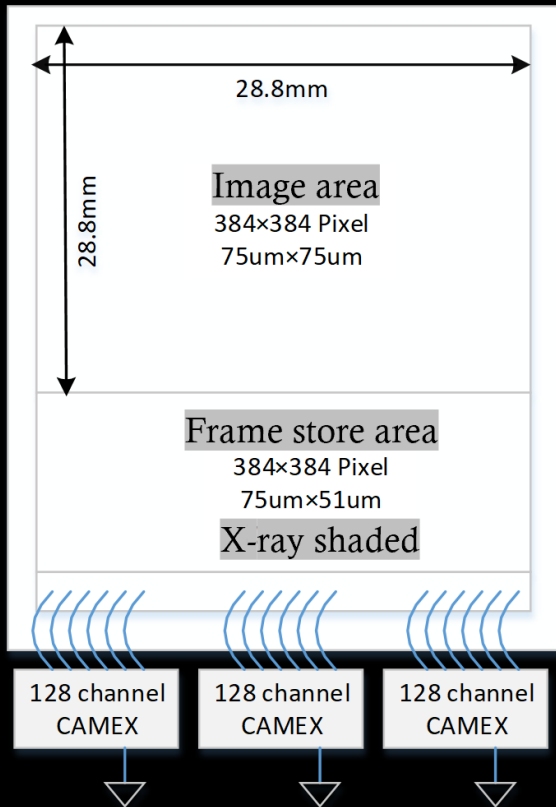
Spectra at different COR



Preliminary

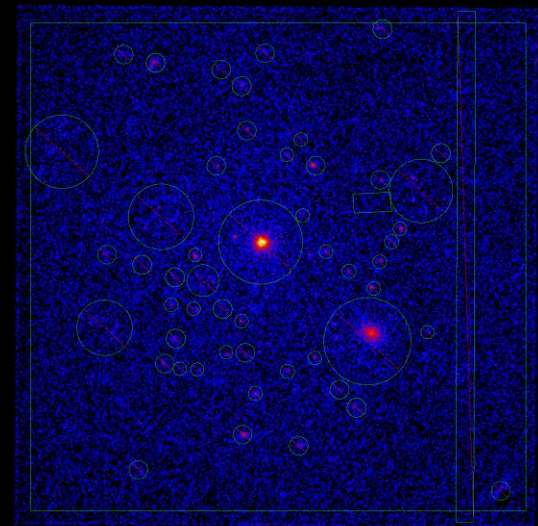
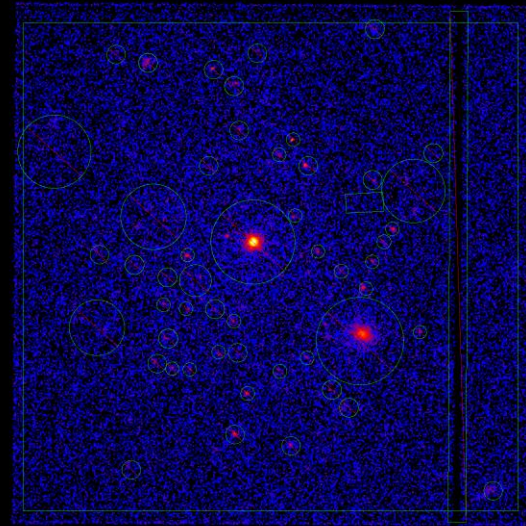
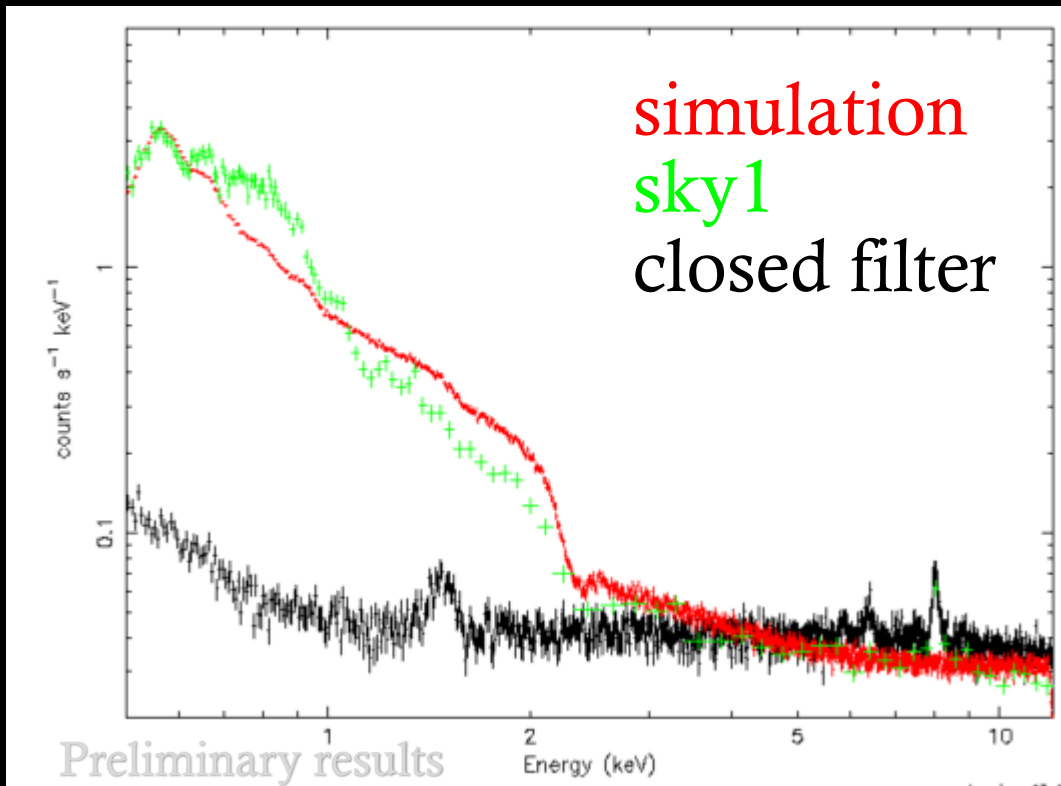
Frame store area event

Preliminary results



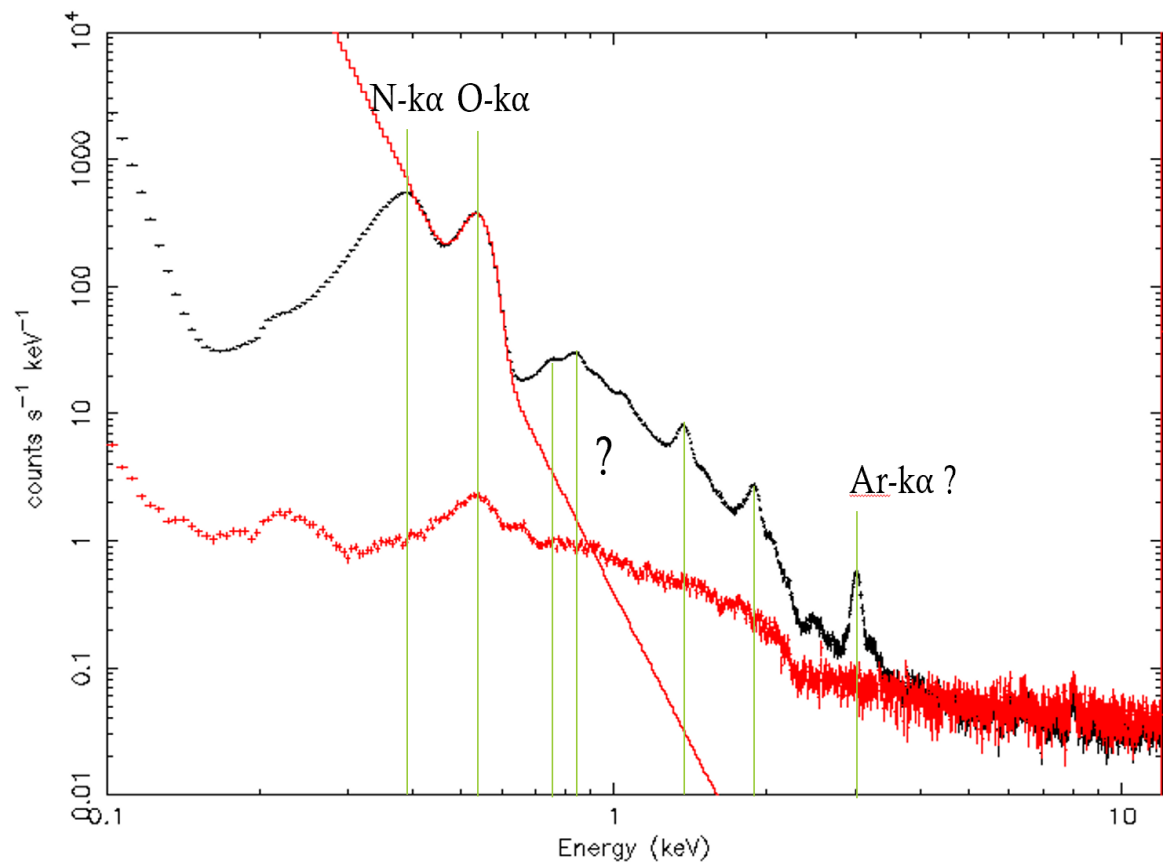
Correlation: the instrumental background of the image area \sim the FSA events
--> Using the simultaneous measurements at FSA as a real-time indicator of the instrument backgrounds of image area

sky background spectrum

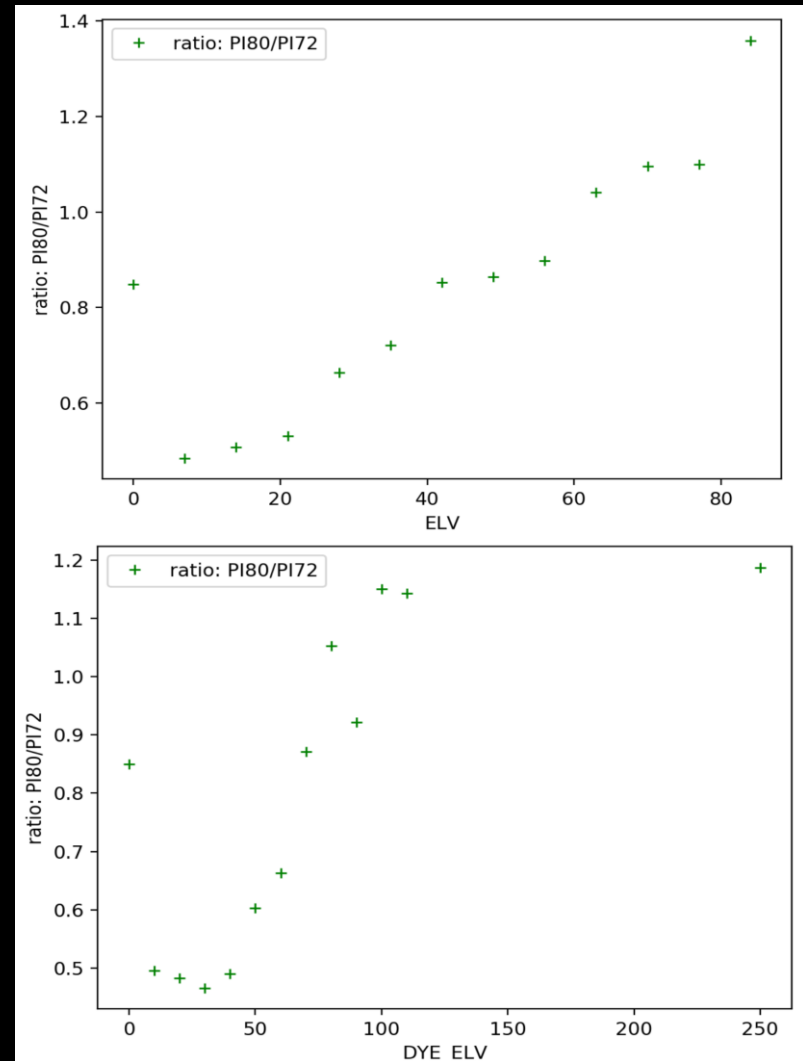


→ definition of “blank sky”

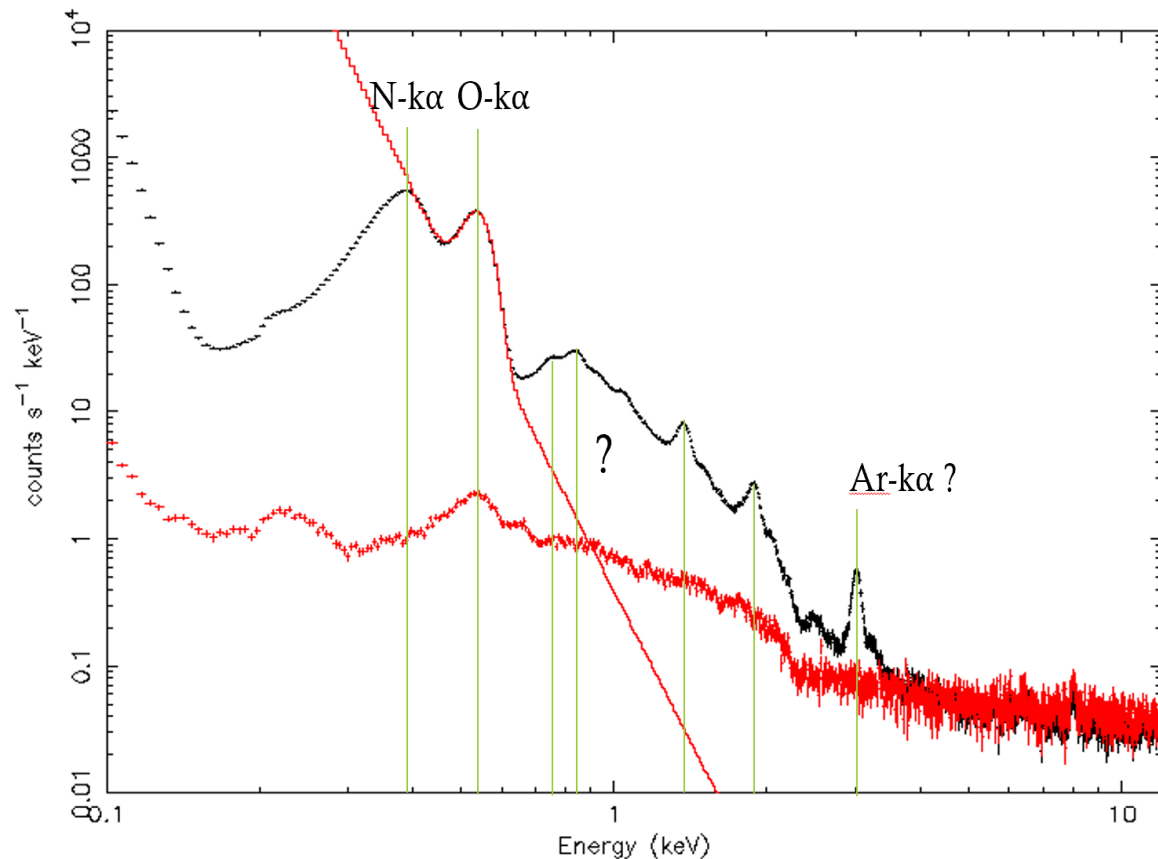
Lines from the earth atmosphere?



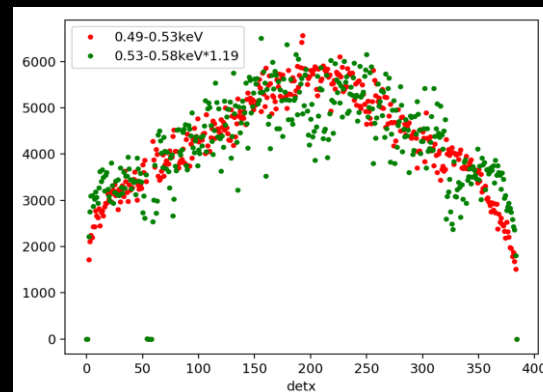
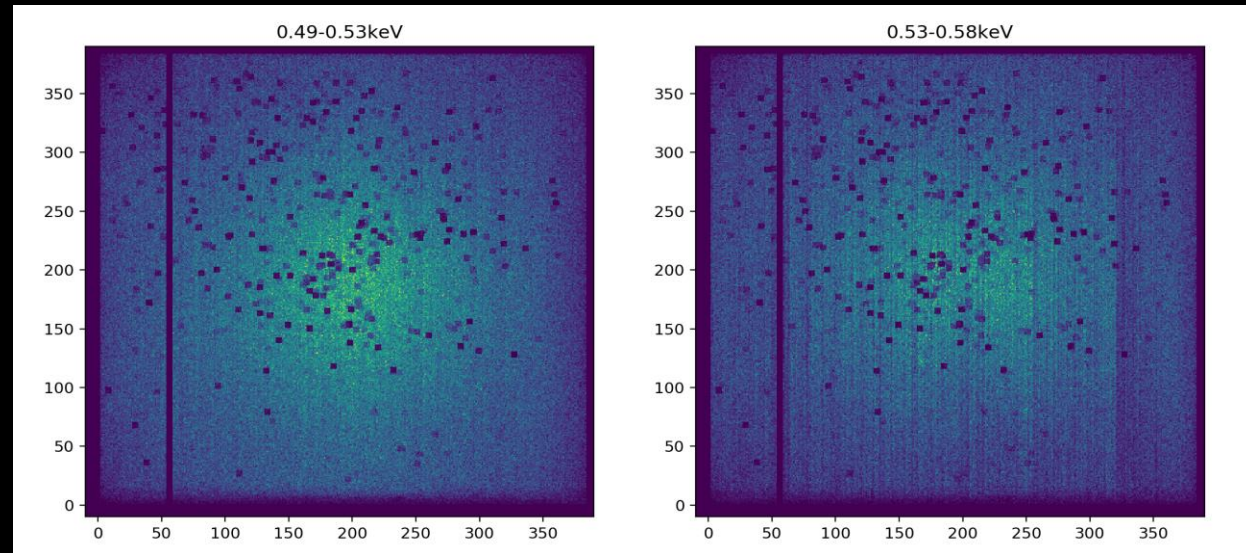
Preliminary results



Lines from the earth atmosphere?



Preliminary results



Vignetting effect -->
Events incident from the FOV

Summary

- ◆ Instrumental background level ~ pre-launch simulation
- ◆ Instrumental backgrounds share the same spectral shape at different COR
- ◆ The presence of O, N, Ar, etc. lines when the bright earth is visible to EP
- ◆ Correlation of the frame store area events with the image area backgrounds

➤ Discussion

Thanks

- ◆ Define and choose the 'blank sky' for sky background accumulation/investigation
- ◆ The origin and subtraction/modeling of the 0.5+keV line in the sky background