

# *Atmospheric Space Interaction Monitor (ASIM)- Results first ten months*

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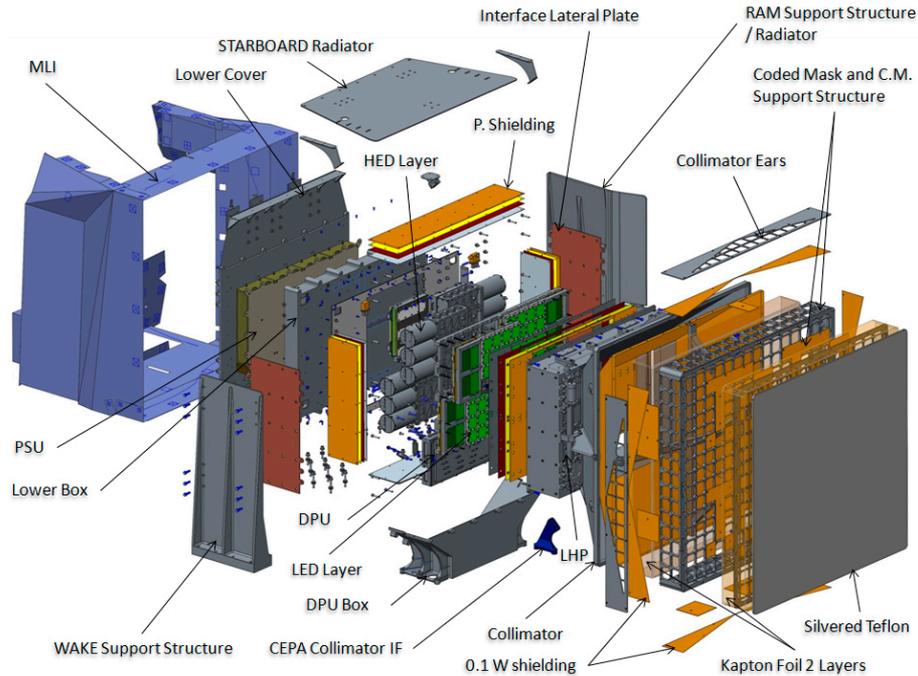
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- 3) University of Valencia, Spain
- 4) University of Alabama, Huntsville
- 5) Louisiana State University

1) The MXGS instrument on ASIM / Commissioning

2) First results from ASIM

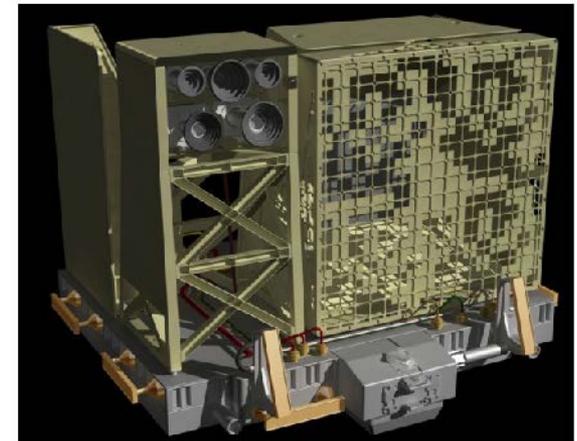
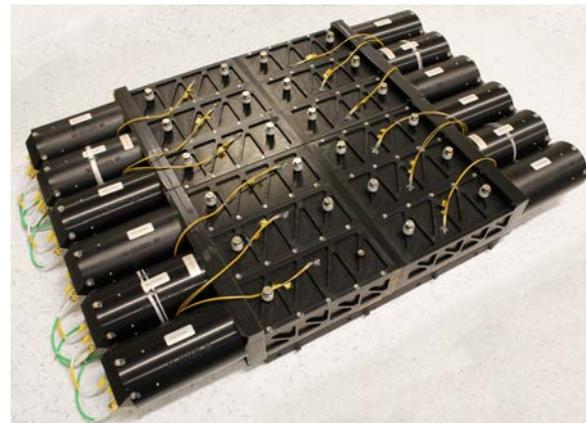
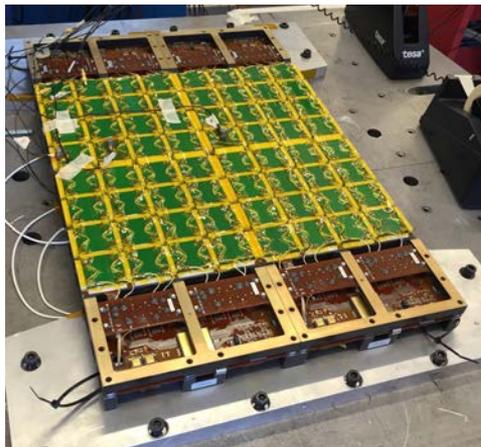
1) The MXGS instrument on ASIM

2) First results from ASIM



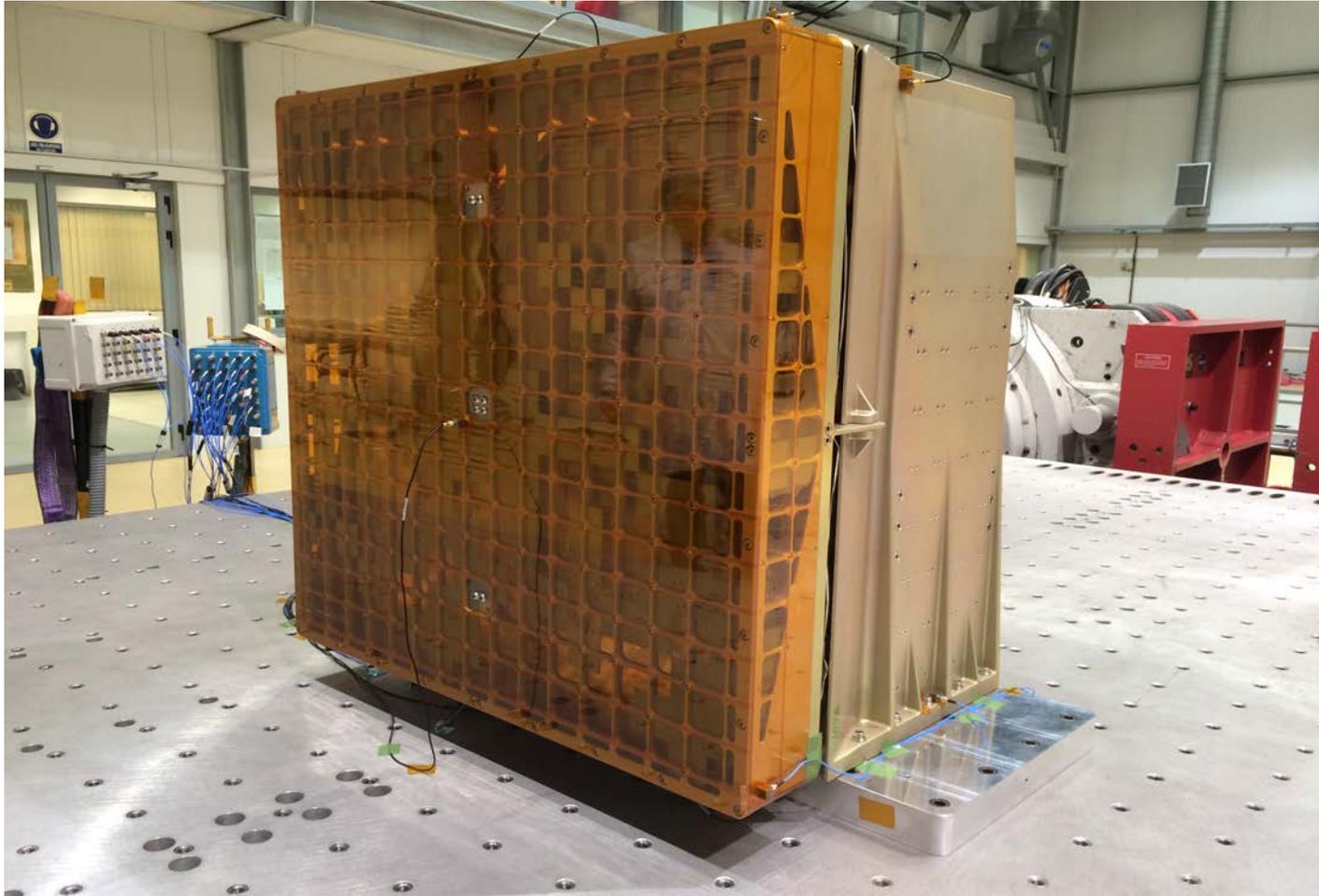
MMIA – cross trigger to/from  
MXGS,  
<10 us accuracy

3 PHOT:  
337 nm  
180-230 nm  
777 nm



50-400 keV, 1.4 us, 16000 pixels

300keV- above 30MeV, <1 us



## Temporal resolution, pile-up and dead time

	LED	HED
Temporal resolution	1 $\mu$ s	27 ns
Dead time	1.4 $\mu$ s	550 ns
Pile-up	Multi-hit	Fast event (tail)

### 4 trigger windows:

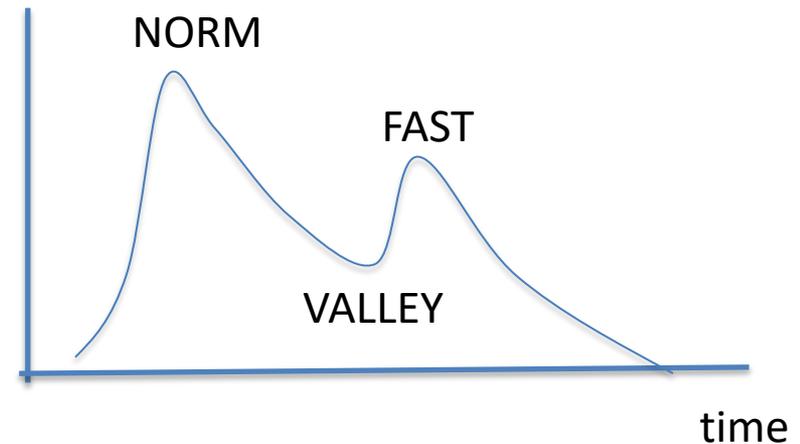
- 300  $\mu$ s
- 1 ms
- 3 ms
- 25 ms

Number of counts above a certain level of background counts

If MXGS trigger (any window) -> send trigger to MMIA

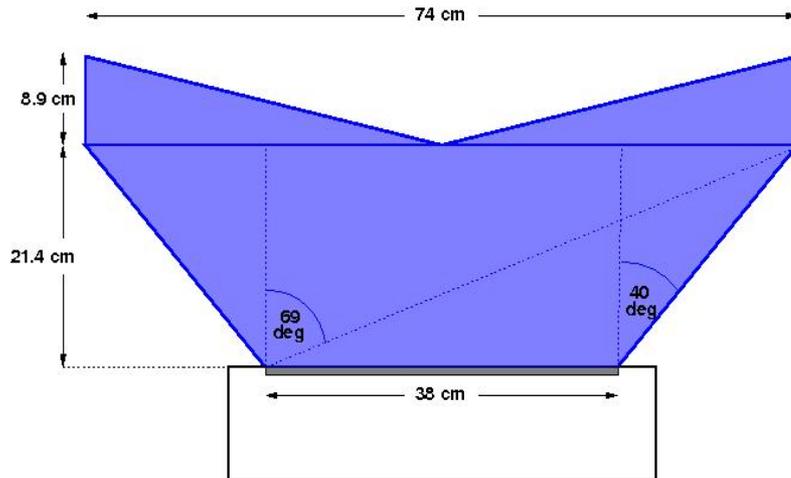
2 second data are telemetered from HED, LED and MMIA  
(same for MMIA to MXGS)

Accept 100 triggers pr LED+HED pr day: 98-99% are false



## IMAGING

- Collimator
- Shielding
- Coded Mask Pattern
- Field of View:  $80^\circ \times 80^\circ$
- Software package



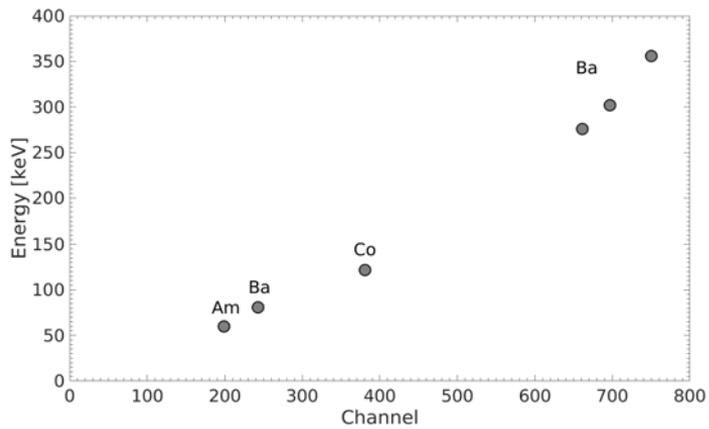
## Requirements

- Night observations
- $>32$  counts in LED

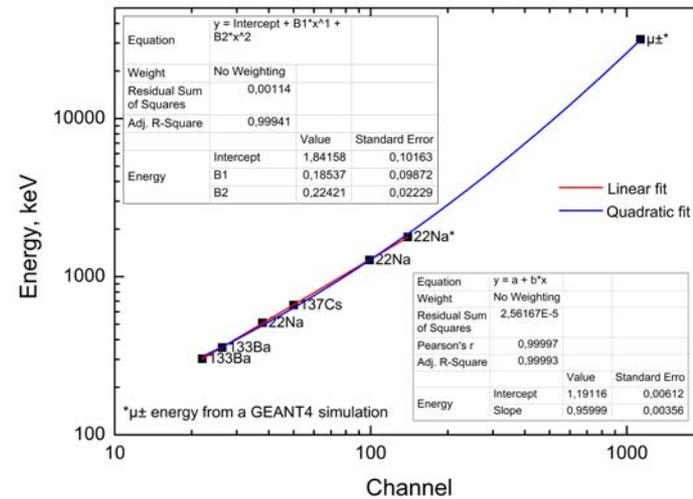


Pre-launch energy calibration:  
ONLY for Channel to keV

LED



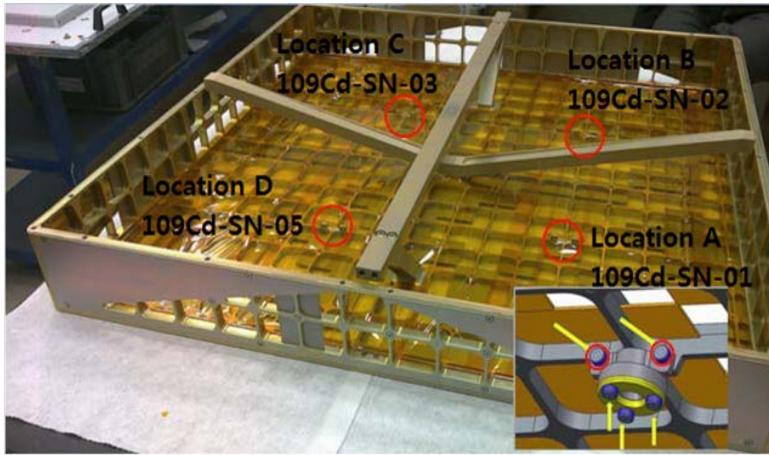
HED



The muon peak: 31.7 MeV

## On-board energy calibration

### LED

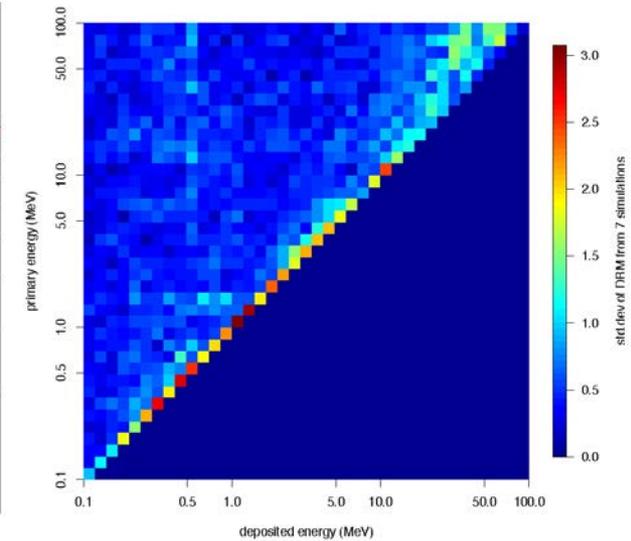
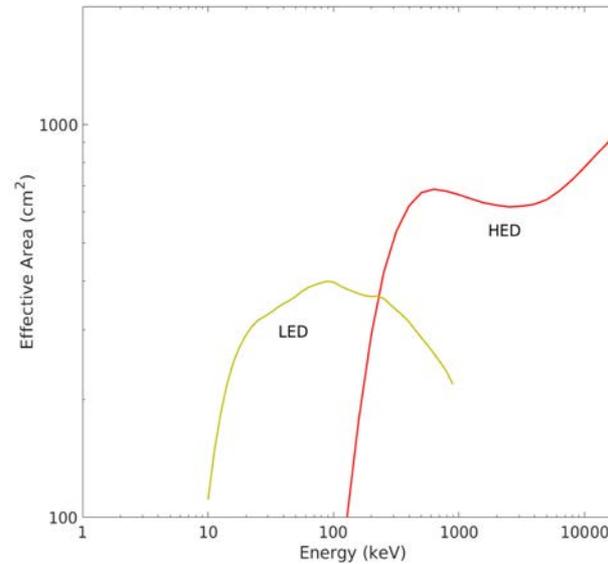
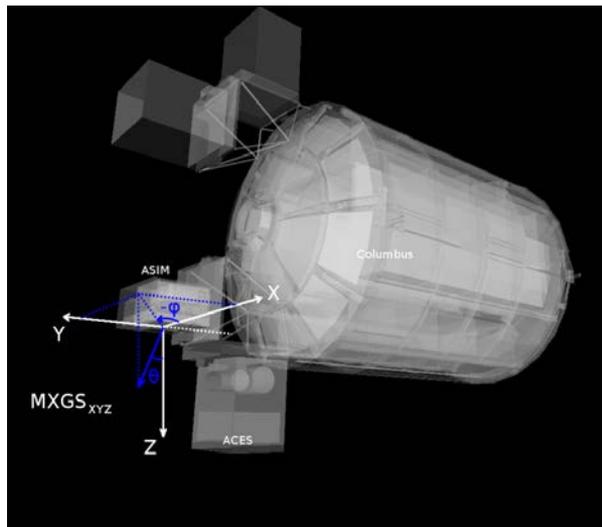


### HED



	LED	HED
109 Cd	88.7 keV	
22 Na		551 keV & 1275 keV
Tungsten fluorescence	58.5 keV & 67.5 keV	
Proton peak		31 MeV

## Energy Response Matrix

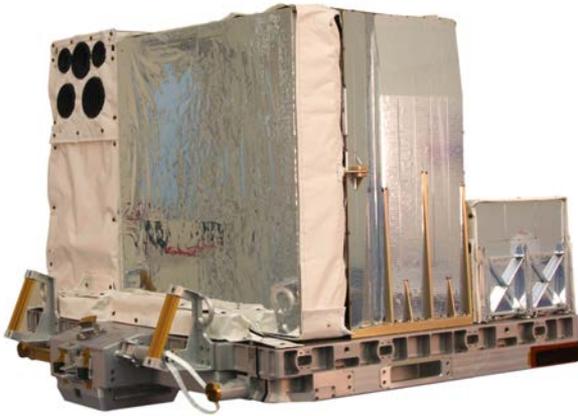


Full implementation of MXGS and surrounding material in GEANT4

Matrices: 40 logarithmic scaled energies  
15° resolution in azimuth and polar angles

In the news:

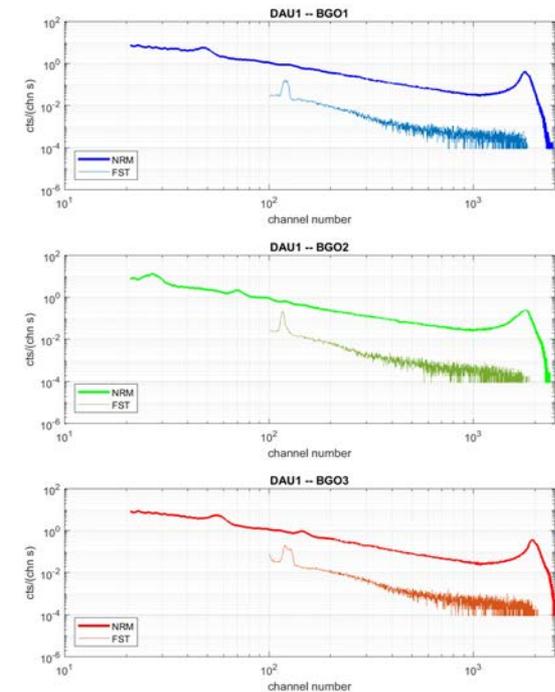
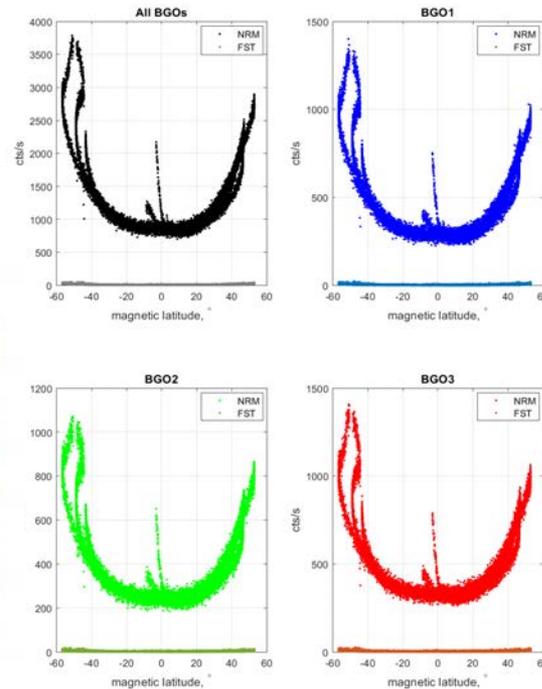
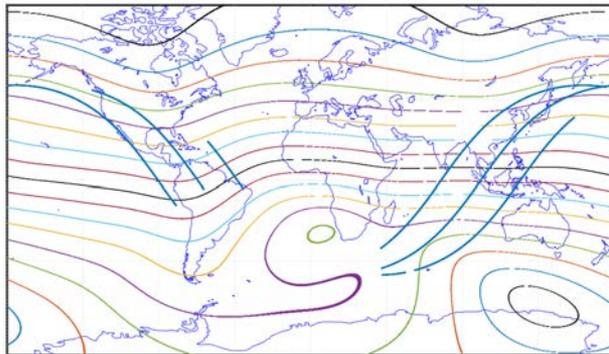
350 total  
~70 Norway



## HED

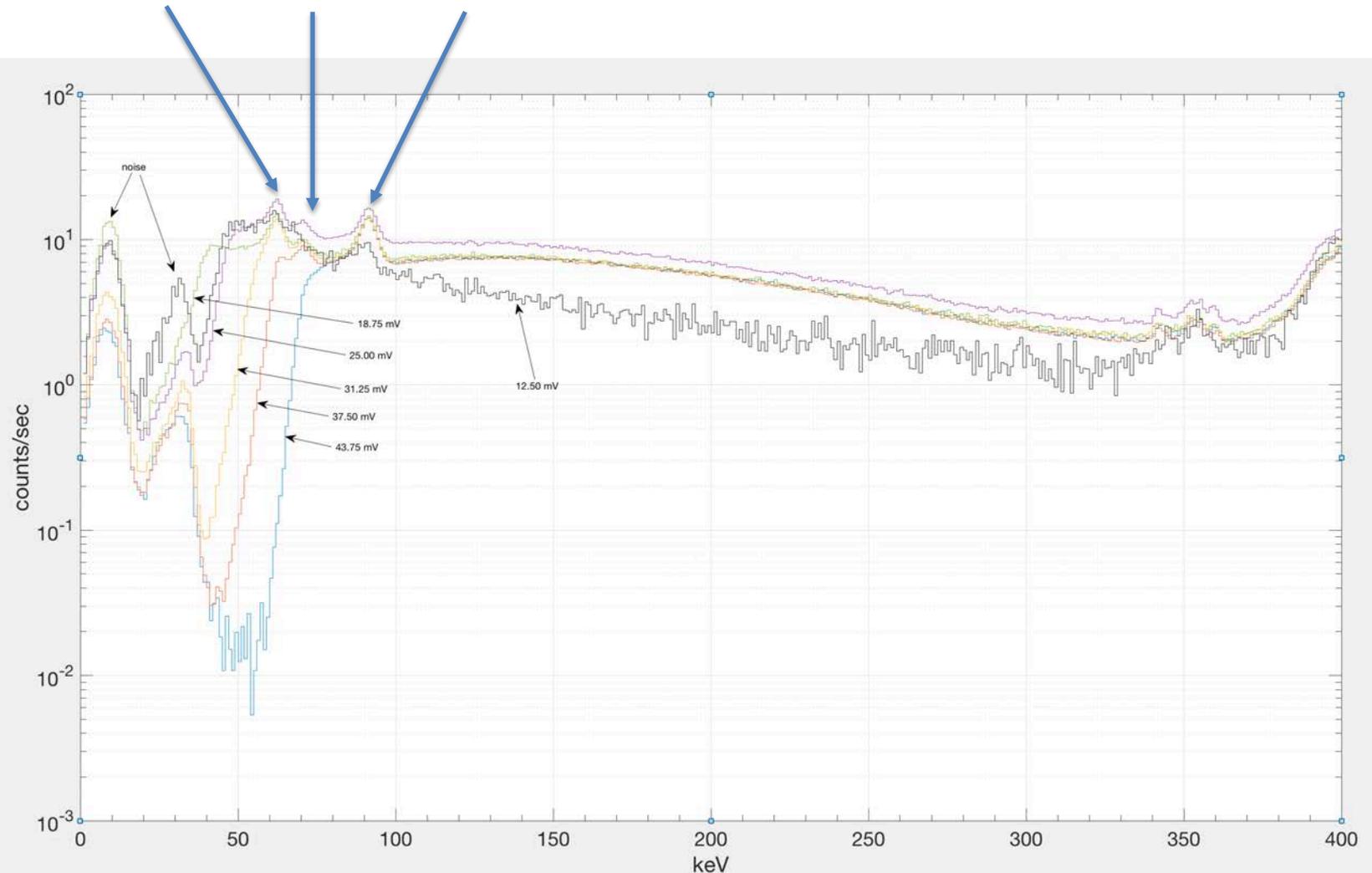
Tuning the settings:

1. Total counts: 3000-12000 – acceptable for DPU
2. number of false triggers: 100 pr day (one real TGF)
3. Need to identify, 551 keV, 1275 keV, 31 MeV (onboard calibration)



## LED

1. Global threshold for ASIC: 25 mV: reduce background (5000-16000 counts/s)
2. 58.5 keV & 67.5 keV 88.7 keV – FOR ONBOARD CALIBRATION



## Summary

Very successful

We understand the instrument behavior fairly well

Some Software Changes to optimize the performance

Even without SW changes: First year of data are very good

With SW changes we can:

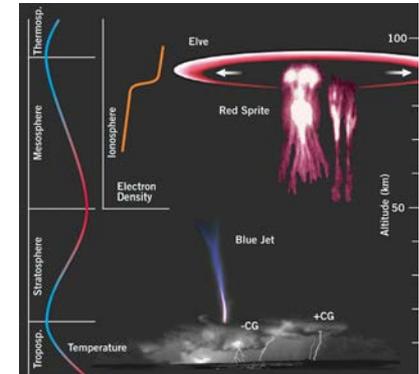
- reduce thresholds to see even fainter TGFs
- get the relative timing from +/- 80 us down to +/- 5 us

1) The MXGS instrument on ASIM

2) First results from ASIM

## ASIM FIRSTS:

- 3 simultaneous TGFs observations by FERMI and ASIM.  
2 with imaging of TGF.
- 15 events with TGF and ELVE from same thundercloud system:  
typically 1-200 ms up to 2 second apart - 2 simultaneous (+/- 80 us)
- 28 events good for imaging
- 94 events with TGF and photometers, solving the sequence of TGF and optical lightning



## ALSO:

- Many multi-pulse TGFs
- Many bright TGFs
- Lightning induced Electron Precipitation (LEP) events
- Terrestrial Electron Beam (TEB)

