Status of the Integral/IBIS calibrations

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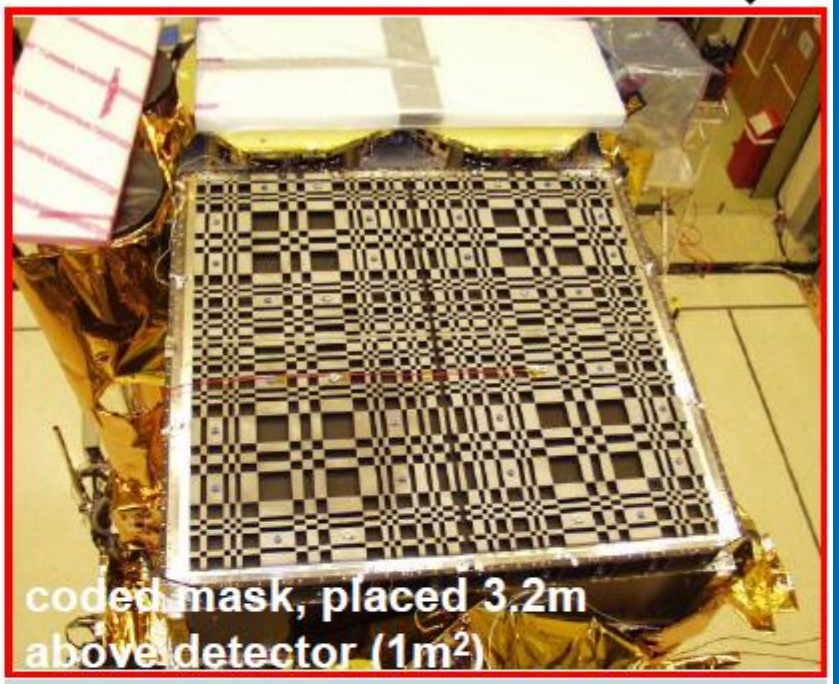
Plan

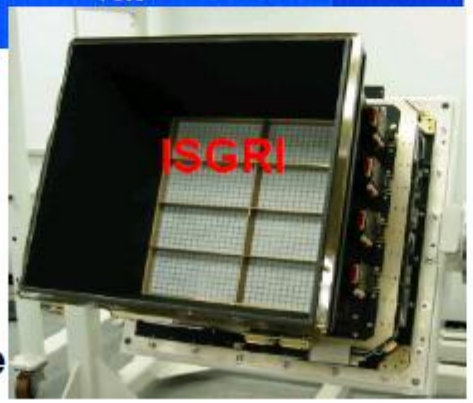
1. The IBIS telescope
2. IBIS background evolution.
3. Status of the IBIS imaging calibration.
4. Status of the IBIS energy response.

The IBIS telescope



IBIS detector assembly:

two stacked detection planes, lateral and bottom veto anticoincidence, passive tungsten shield



Collection area ~ 3000 cm²

Two-Layers detector:

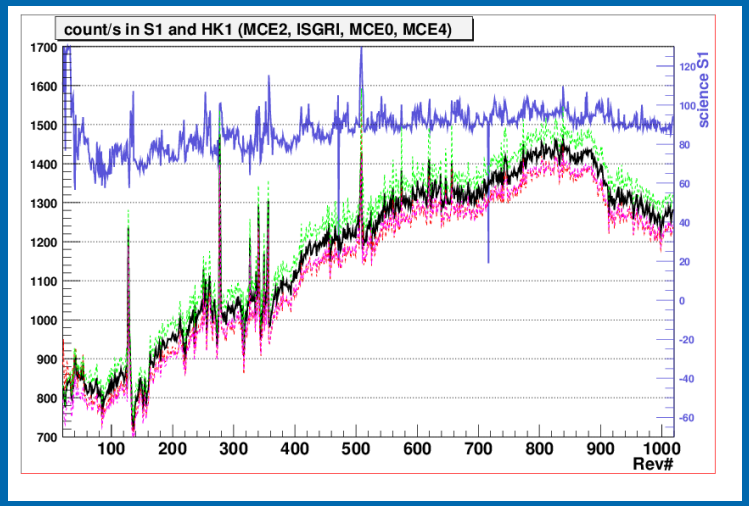
1) 2mm thick CdTe (ISGRI)

2) 30mm thick CsI (PICsIT)

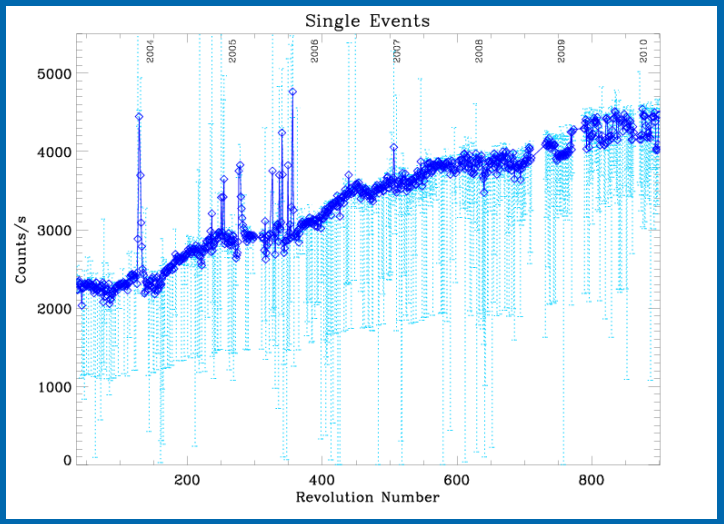
Field-of-view: ±14.5° FWZR (± 4.5° fully coded)

IBIS background evolution

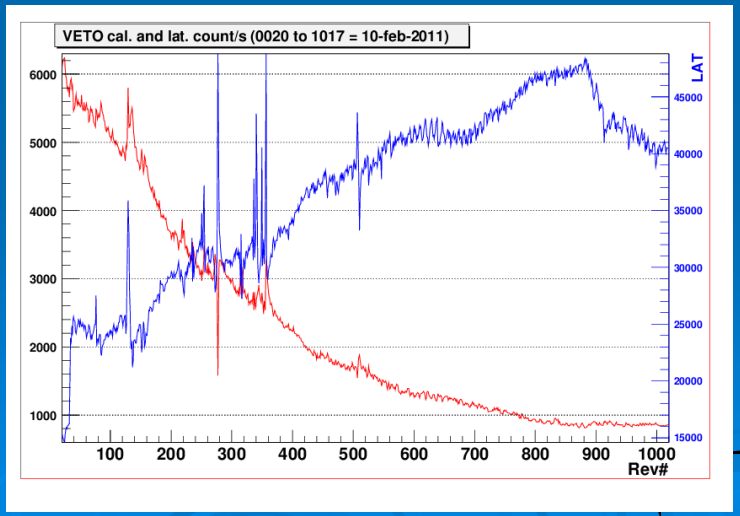
Decrease of the IBIS background



ISGRI



PiCsIT

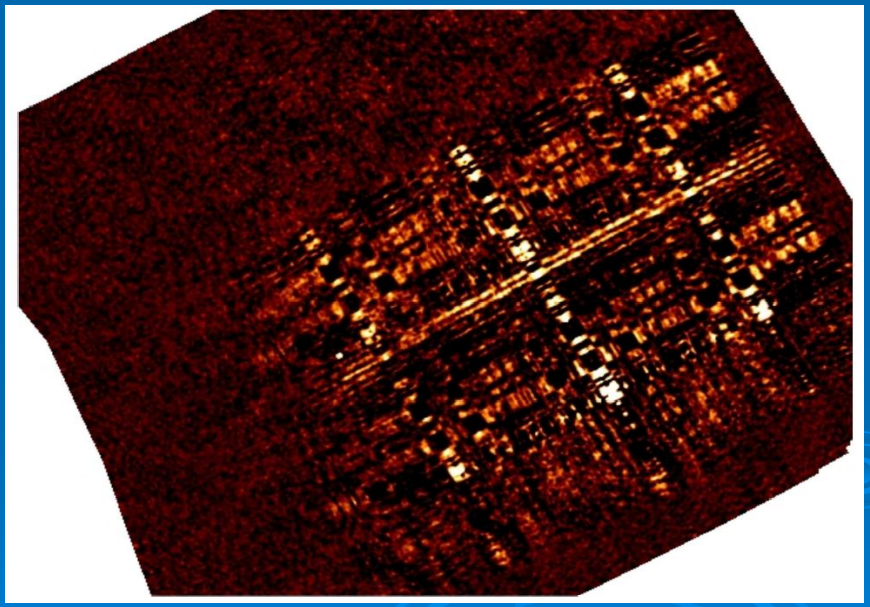


VETO

IBIS/ISGRI imaging calibration status

IBIS imaging response : the problem

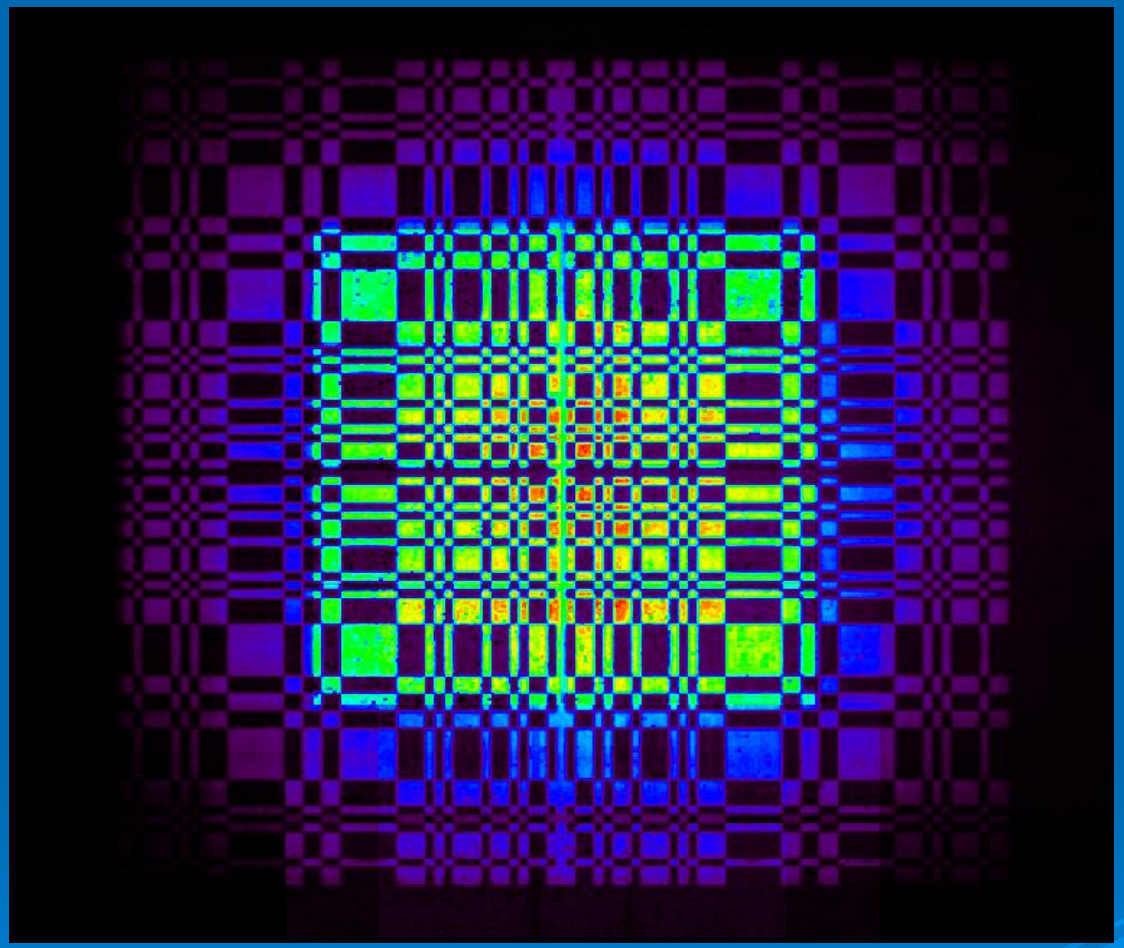
- Since several years, we see defects in the ISGRI images that are clearly linked to the presence of bright sources (ghost residuals)
  - Strange PSF
  - Lines
- Finally, we got convinced that it is due to glue spread over the mask holes



What can be done ?

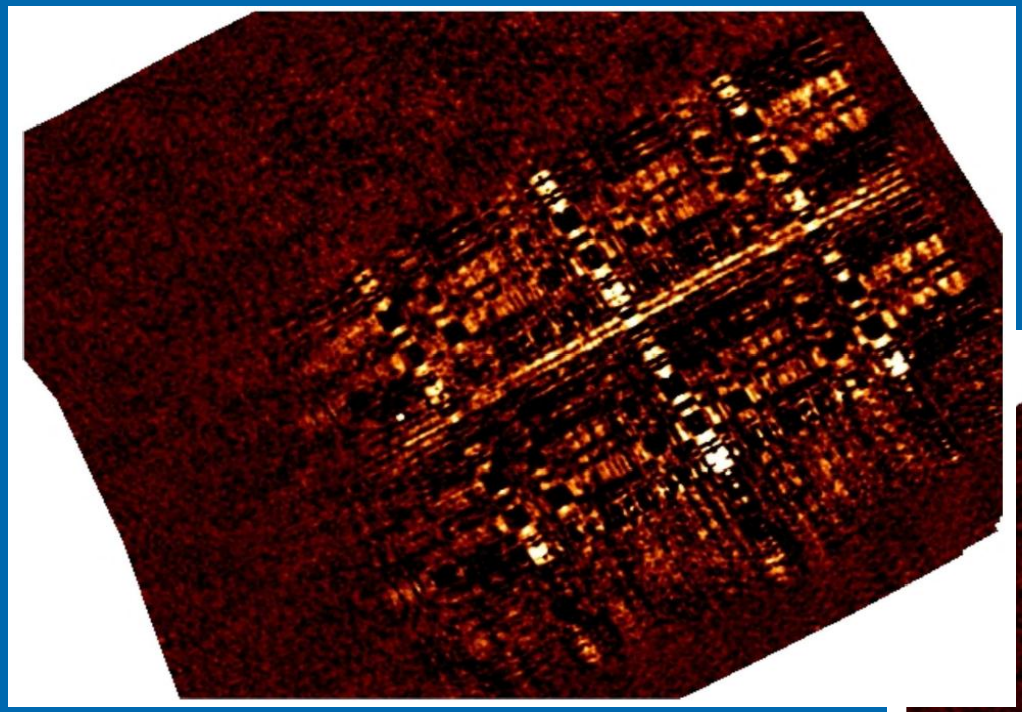
- The regions affected by an unknown amount of glue can be discarded from the deconvolution process
- However this means removing several percent of the sensitive area for each detected source. In crowded regions (e.g. the Galactic center) this leads to an unaffordable loss of sensitivity.
- The proper way to deal with this problem is to improve the mask model used for the deconvolution and the source cleaning.
- So we are measuring it from in-flight measurements i.e. perform a mask radiography.

Mask radiography with the Crab



Detector image of the mask illuminated by the Crab

Present improvement due to a better mask model



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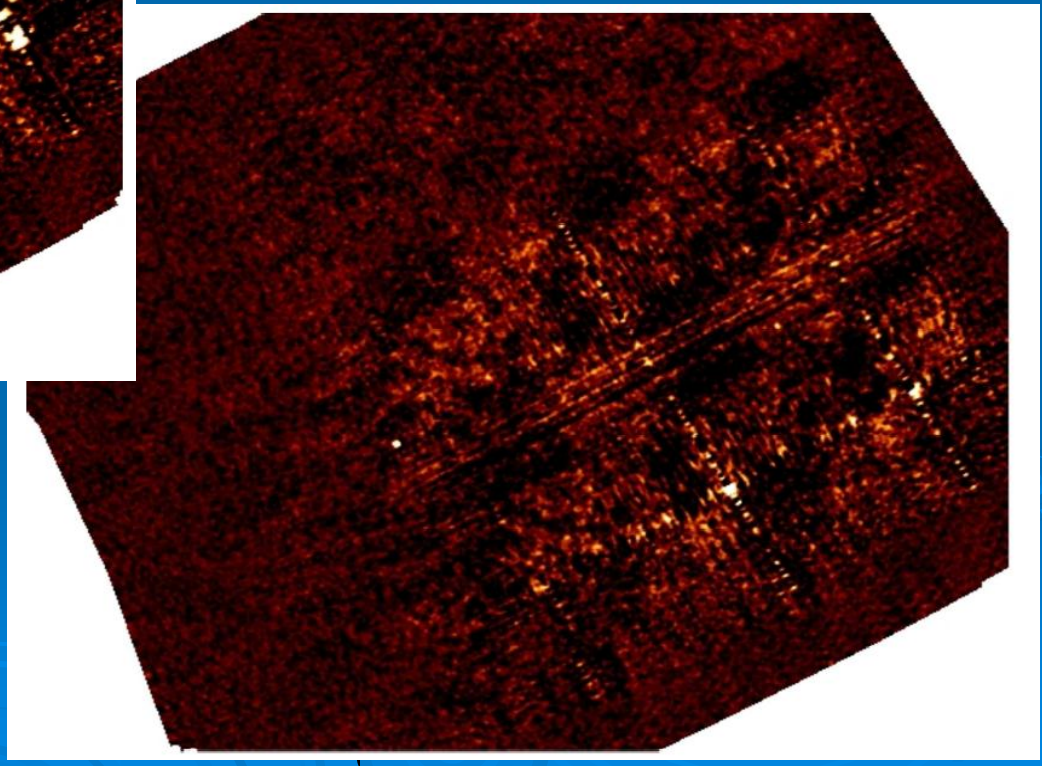
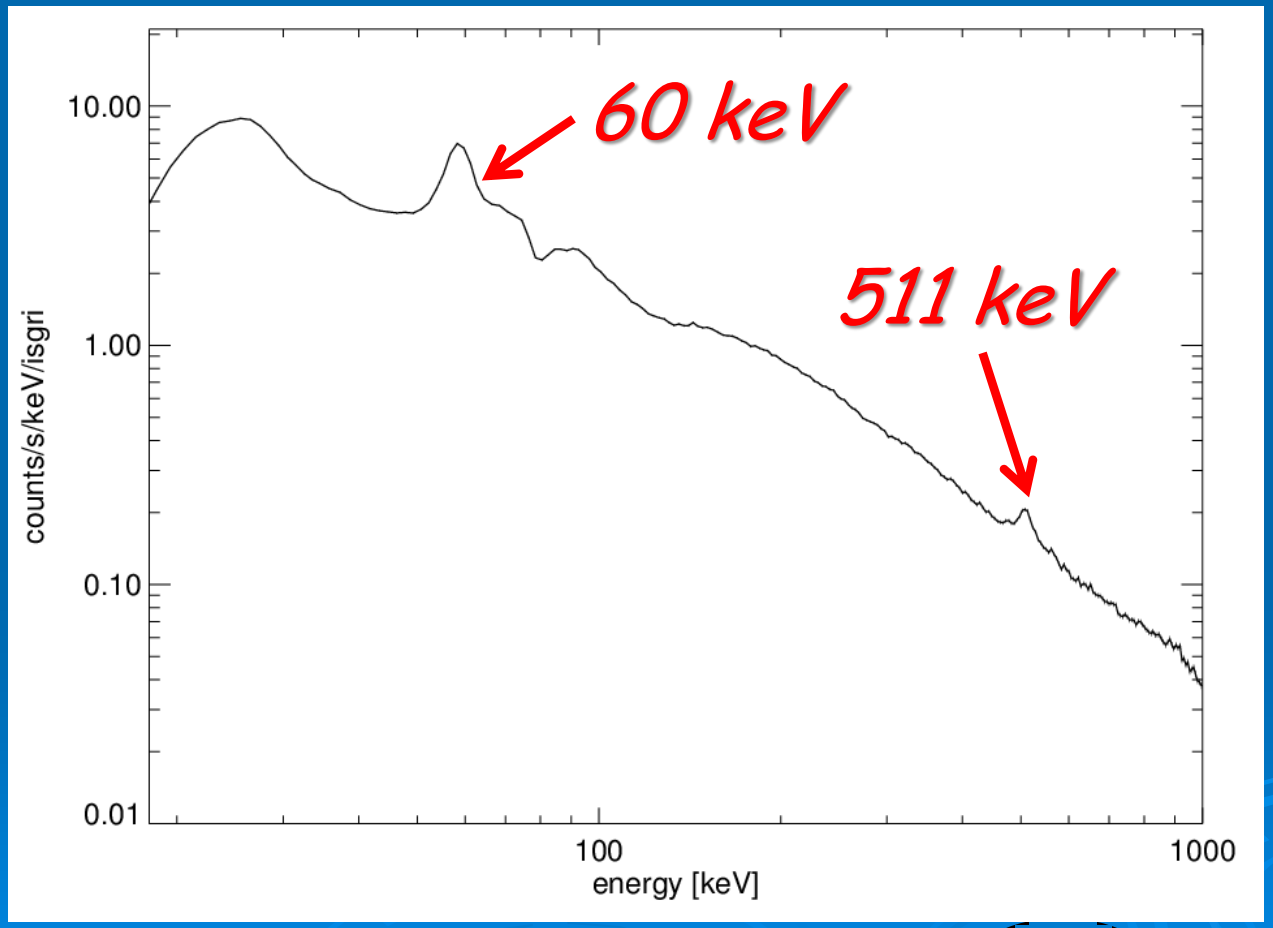


IBIS/ISGRI energy response calibration status

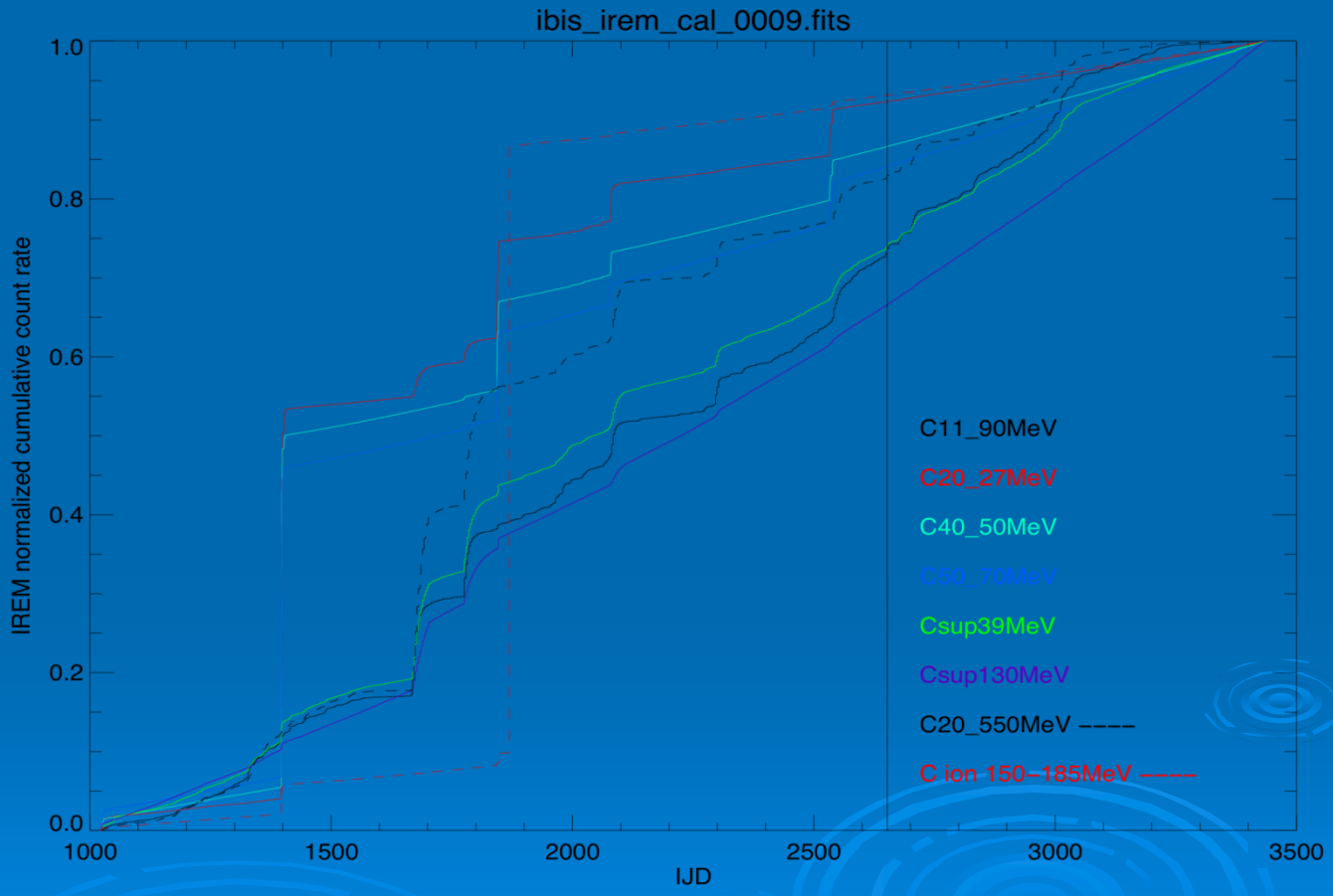
Typical ISGRI background spectrum used for gain-offset measurement



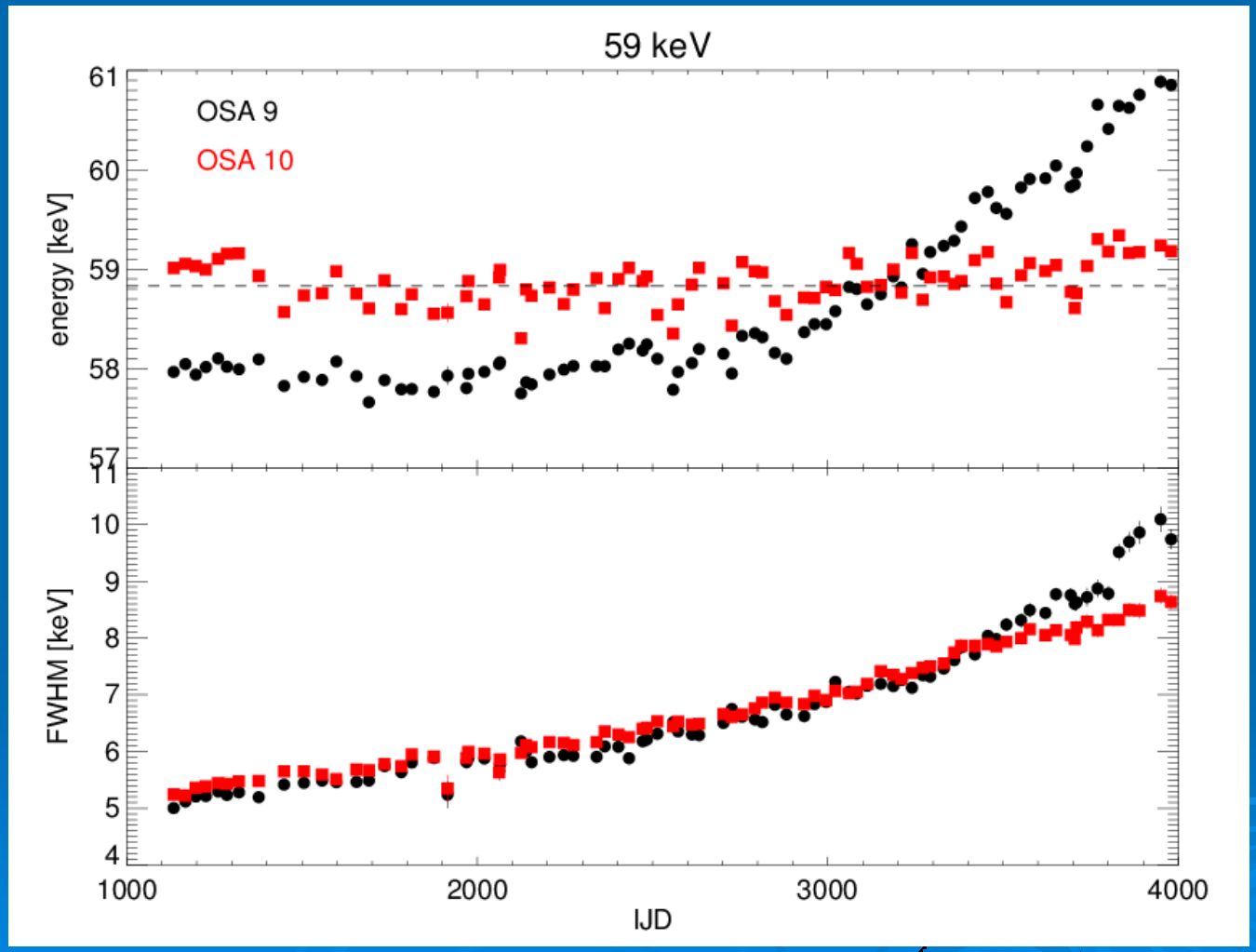
OSA 9 energy correction principles

OSA 9 :

1. Temperature variation taken into account at ISGRI level.
2. PH gain-offset evolution described using IREM counters



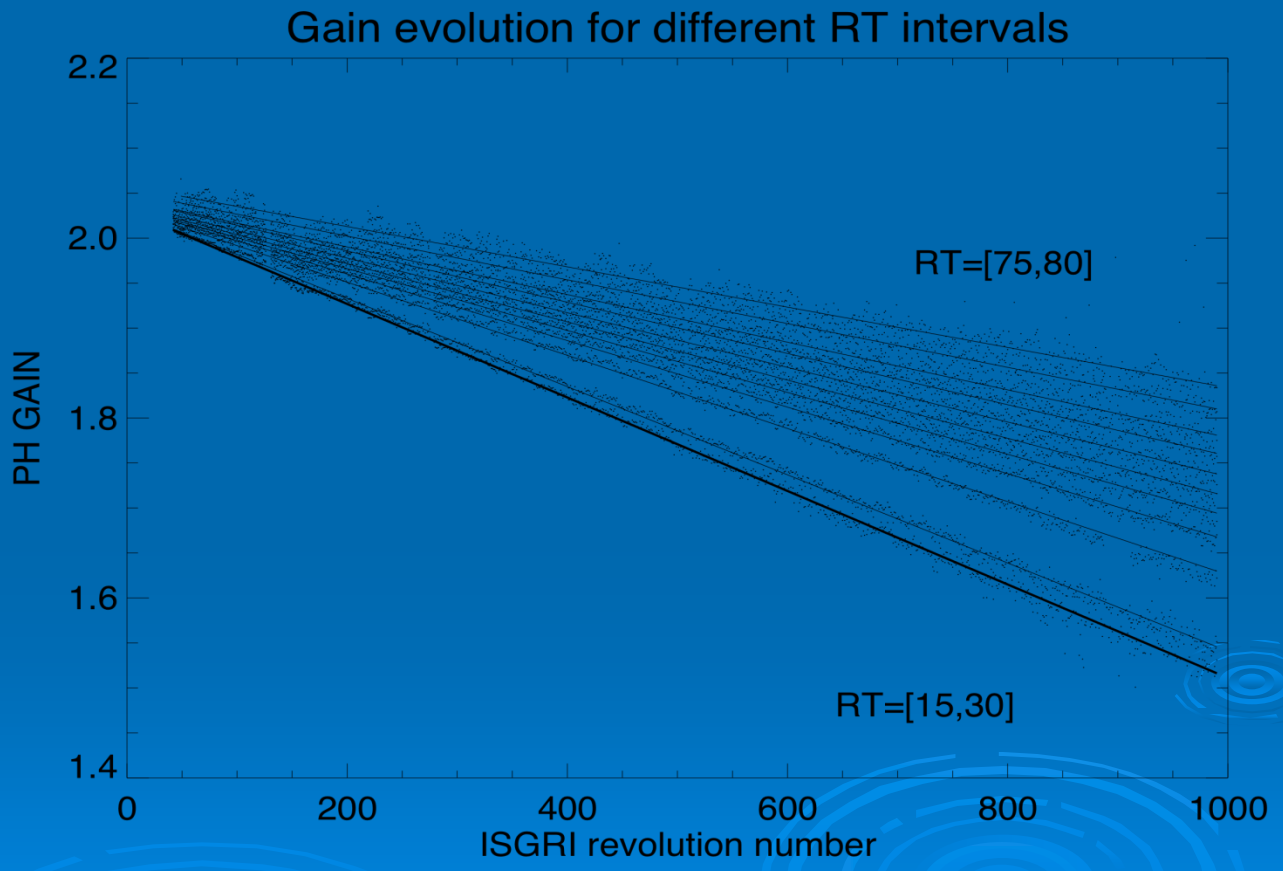
Evolution of the W line position



OSA 10 energy correction principles

OSA 10 :

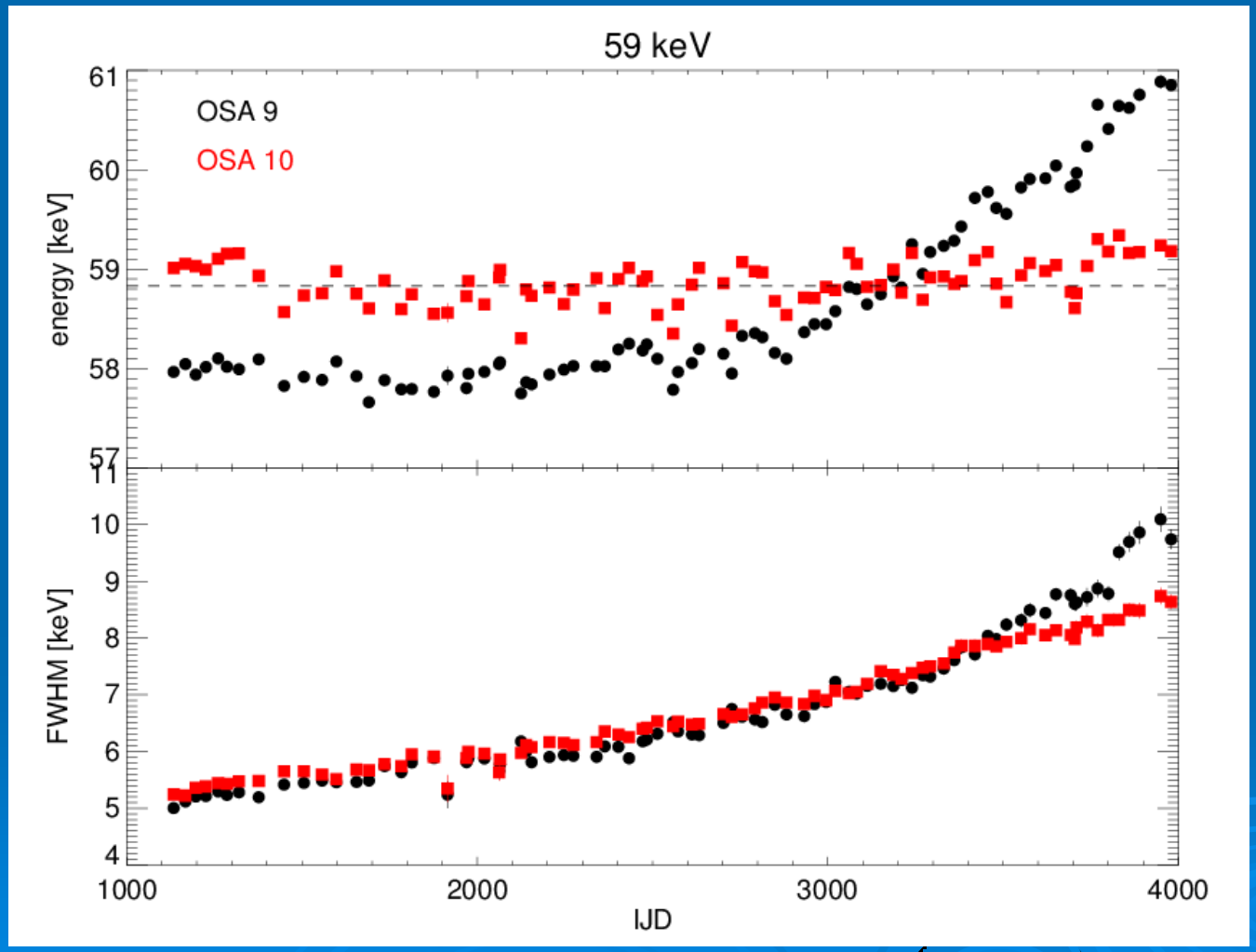
1. Temperature variation taken into account at MDU level.
2. PH gain-offset described as a function of time (and RT), not using IREM counters



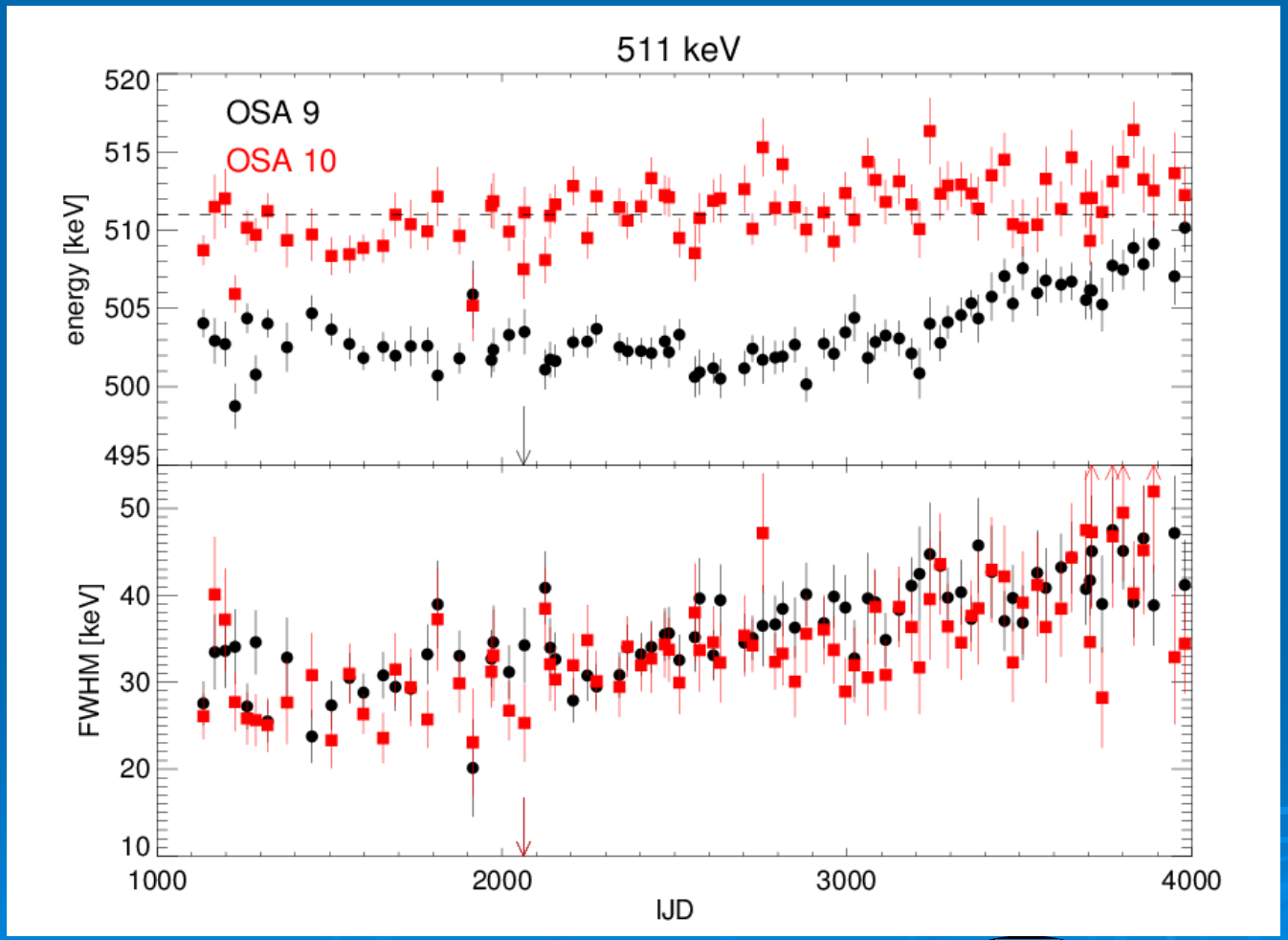
OSA 10: ISGRI_energy status

- Code developed in IDL and validated on ~ 80 SCWs sampling the mission duration
- Spectral drift properly corrected
- Small improvement in spectral resolution due to MDU temperature correction and better drift correction (not visible on single SCW)
- Code translated in C
- Identity of results with the two codes (C and IDL) tested
- C code being tested in OSA environment at Saclay, APC, and ISDC
- Needed new calibration files implemented at ISDC
- A new set of ARFs must be produced and delivered

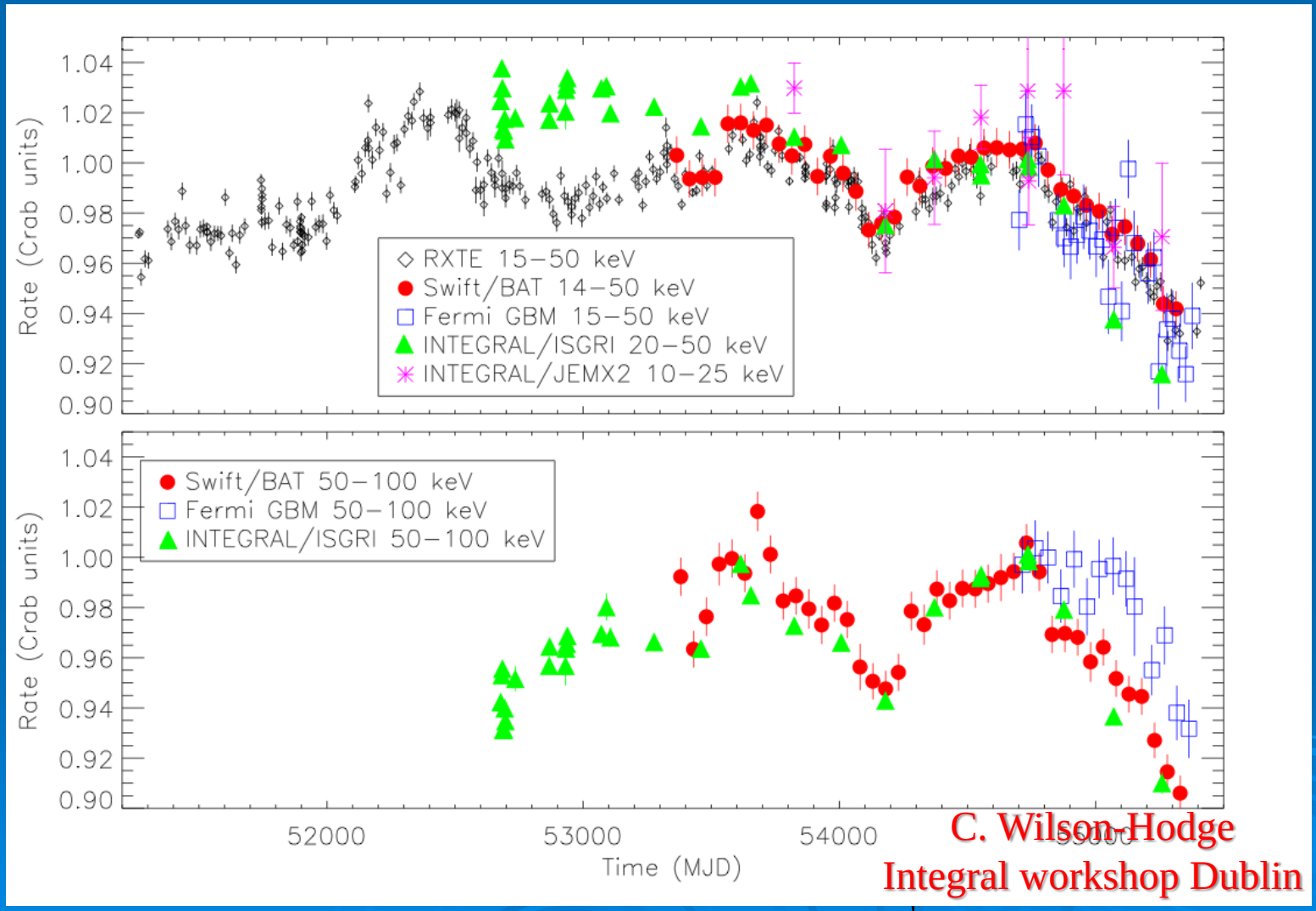
Evolution of the W line position



Evolution of the 511 keV line position



Evolution of the Crab flux



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Evolution of the Crab flux