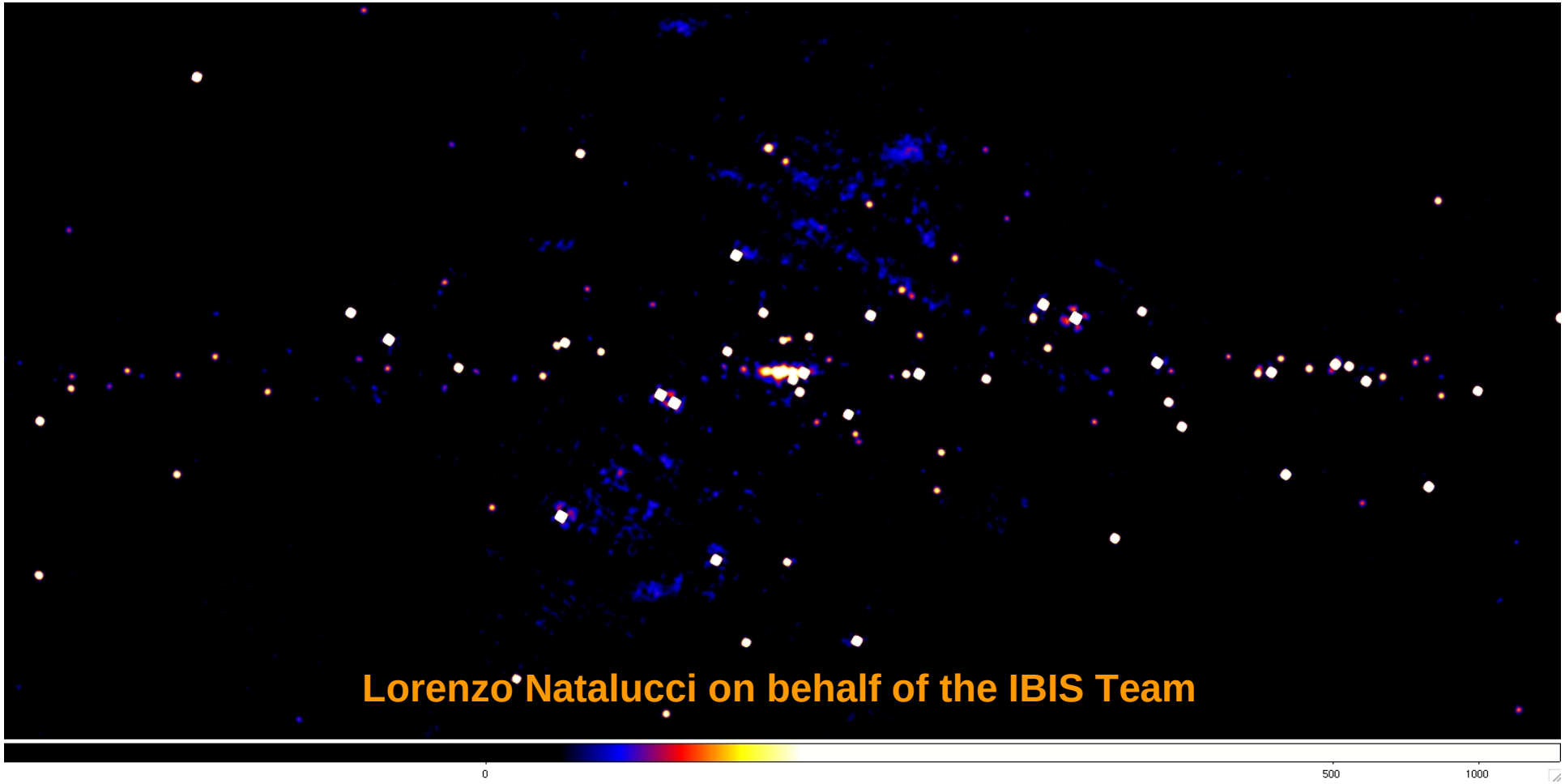
# IBIS - IN FLIGHT CALIBRATION ACTIVITIES

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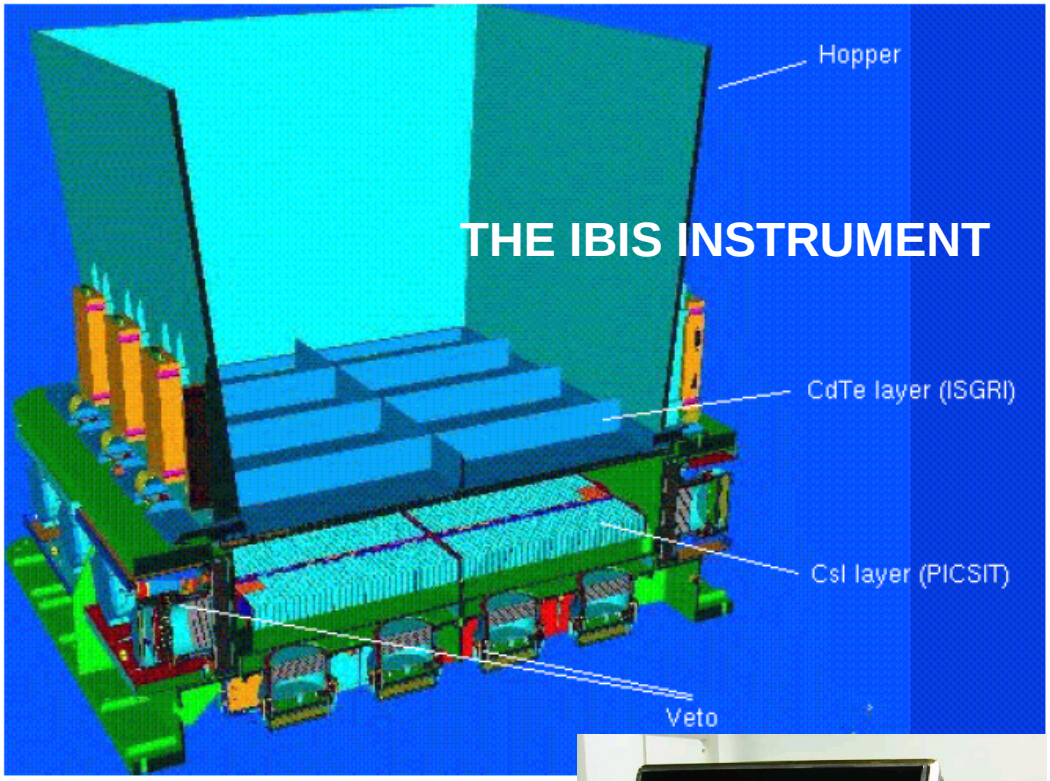
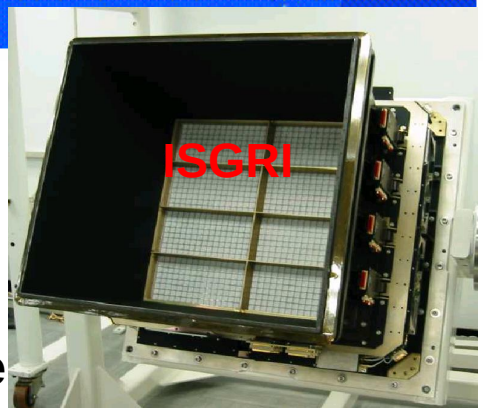
# INTEGRAL/IBIS Calibration Update





**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)**

# INTEGRAL/IBIS Calibration Update

**Operating nominally since end of PV phase, ~5.5 years (all devices are ok), will soon enter AO-6 Programme execution**

**Highlights mainly from point sources observations: takes advantage of the large FOV and high angular resolution of IBIS (12')**

**Constantly increasing number of sources in IBIS survey database: status by Oct 2007: 460 sources**

## ISGRI INSTRUMENT PERFORMANCE

**Imaging performance is as expected: e.g. 1.8' position error in ISGRI for 10σ source (verified on survey data against position of known sources)**

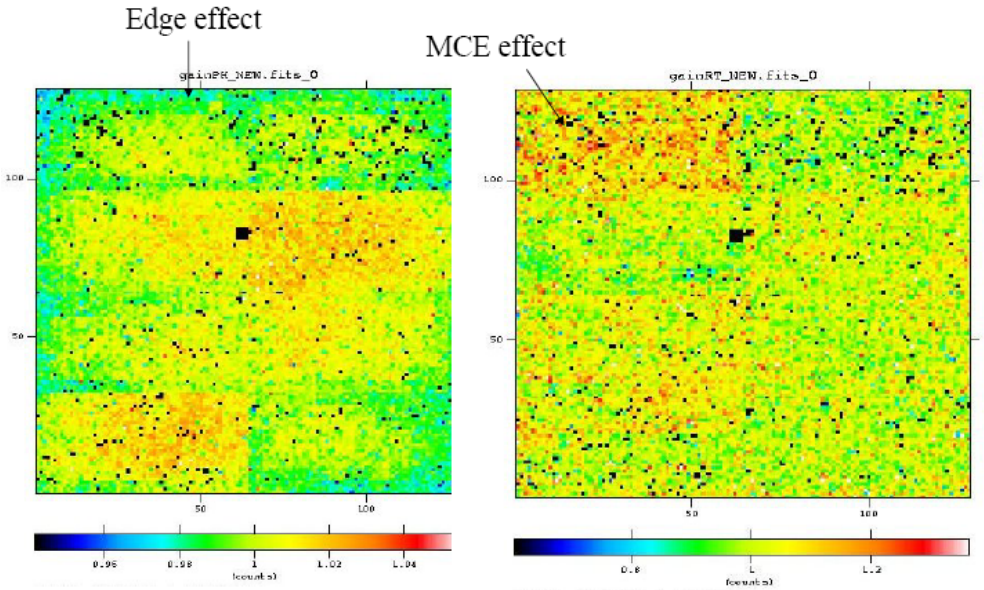
**Spectral performance is nominal, a better gain calibration and improved charge loss correction, implemented in OSA-7 software package, allows to reconstruct better quality spectra**

**Crab observations used to verify response stability and to correct for narrow band gain variations (broadband spectra are stable throughout the mission)**

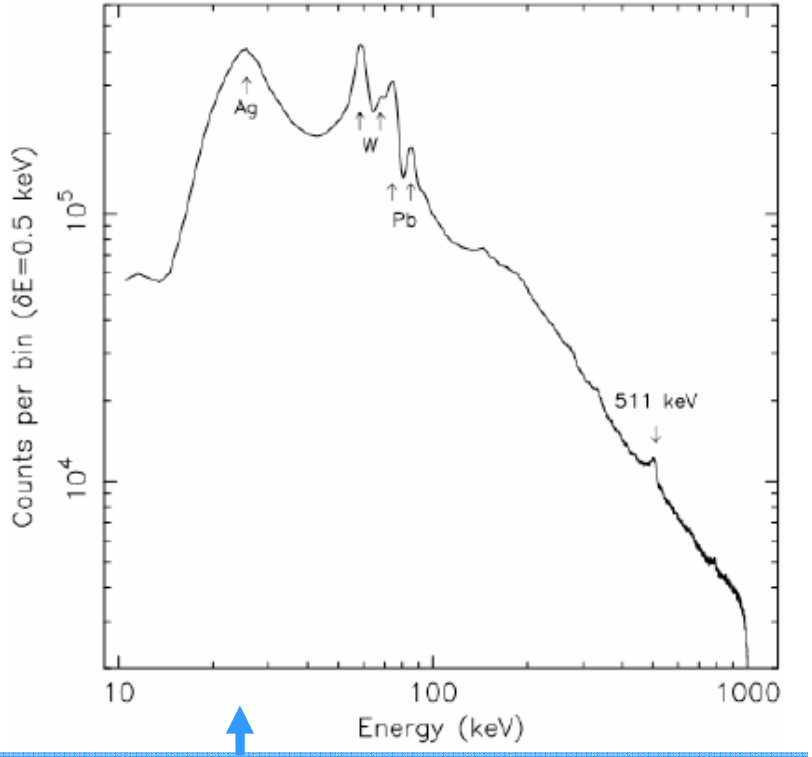
## ISGRI GAIN CALIBRATION

**ISGRI pixels gains are corrected vs variations against time, temperature and space environment conditions (using rates of the IREM particle counters)**

**Lower threshold drift correction, better low energy performance**




**pixel-to-pixel gain variations**

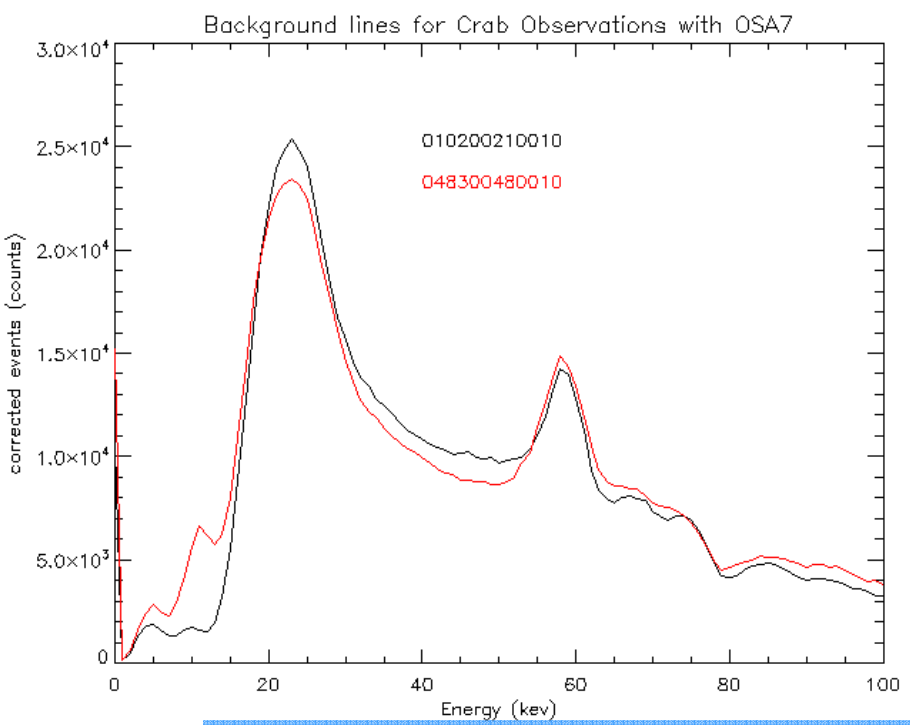


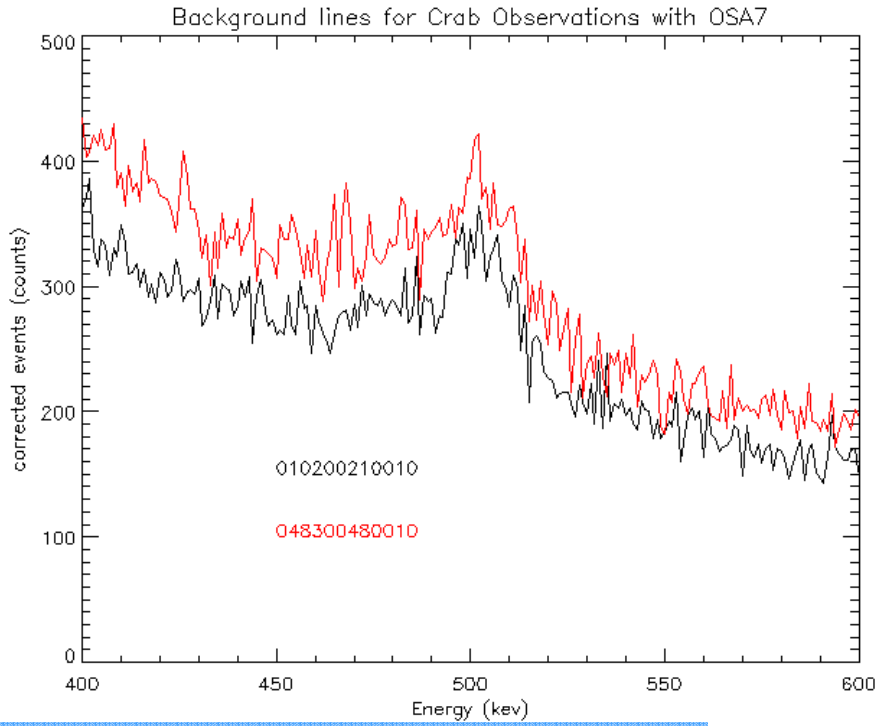

**Background spectrum for ISGRI reconstructed with OSA7 (spectrum from empty field observations during revolution 96 (effective exposure 36.4 ks)**

## GAIN STABILITY

**The performance of the gain correction can be checked by measuring corrected line energy positions, taken at different mission times**

**ISGRI continuous gain decrease: on average ~3% /year**

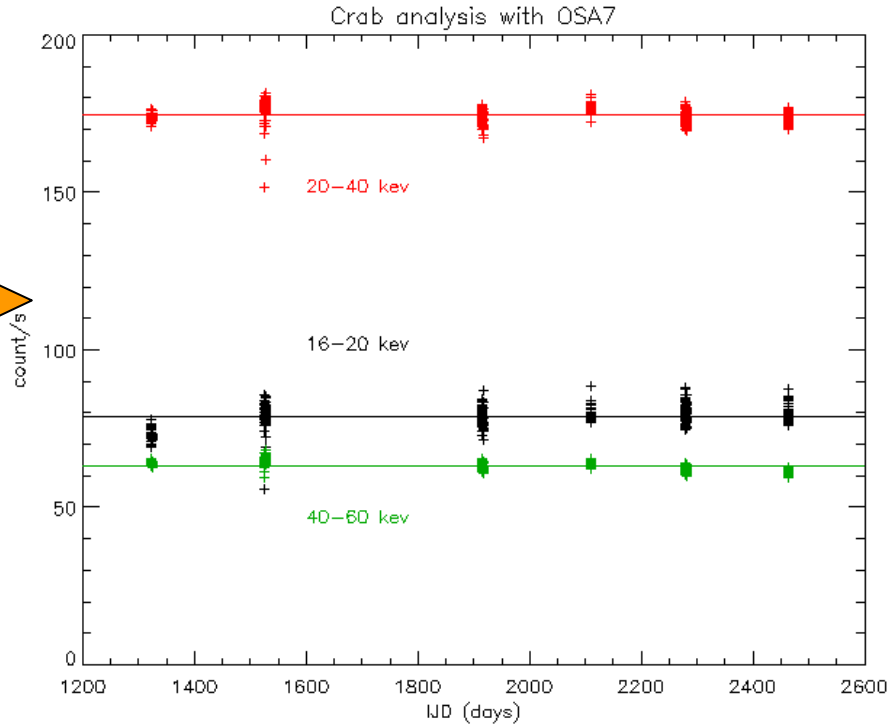



**Background lines measured during Crab observations, 2ks pointings (comparison of data taken 3.1 years apart)**

## OVERALL RESPONSE STABILITY

**ISGRI Crab rates in broad energy channels are constant throughout the mission**




**Minor, residual variations cause unwanted systematic deviations in the energy channels when building spectra: this effect is measured on the Crab and compensated by time dependent ARFs**

**Good χ2 values can be obtained for sources as strong as the Crab or Cyg X-1 with corrected response and assuming average systematic error of ~1-2%**

## UPDATE AND OPEN ISSUES ON CRAB SPECTRA MODELLING

**Improved model for charge loss, applied to the Crab count rate spectra yields evidence for either a break or curved shape**

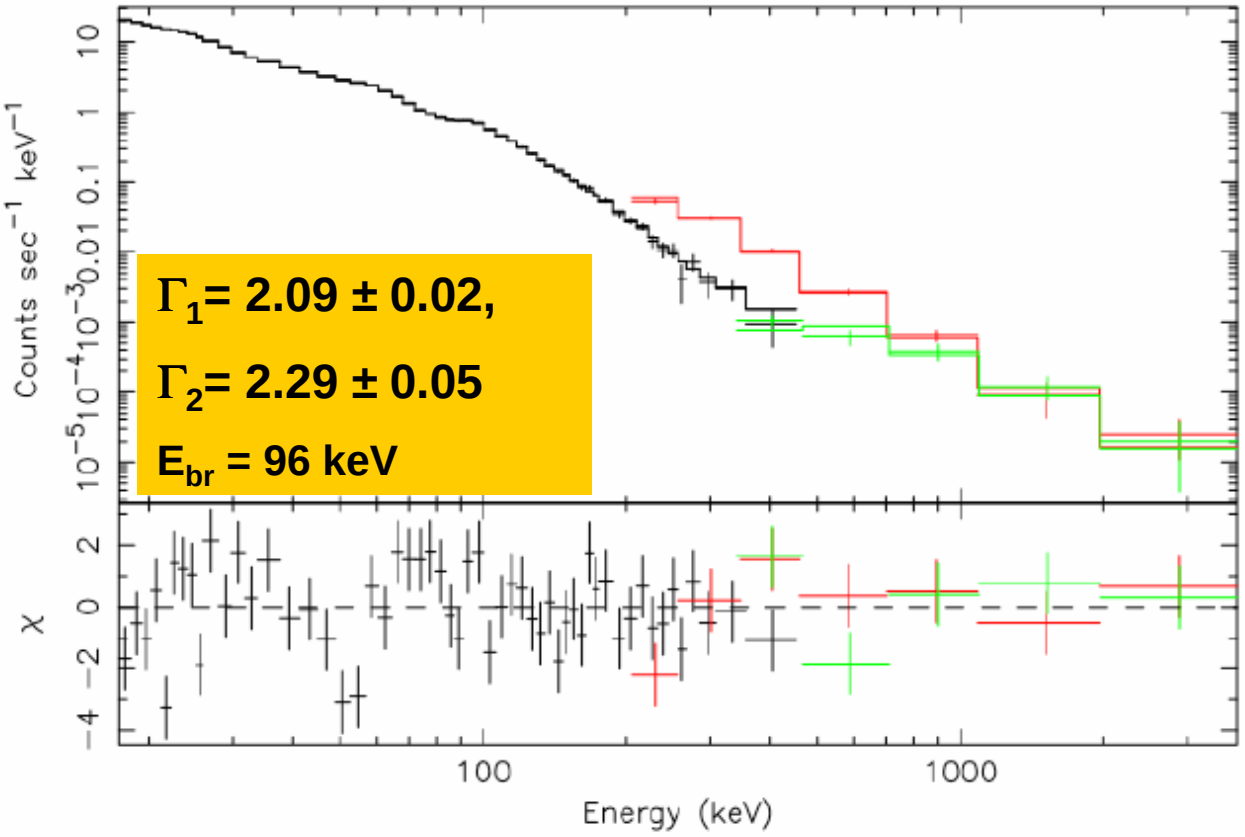
**A spectral break is best found around 100 keV, slope below this energy is ~2.13: normalization at 100 keV and low energy shape are very similar to SPI ones**

**There are difficulties to constrain the high energy index, residual systematics do not allow an accurate absolute measurement. Index is taken from SPI measurement and response calibrated accordingly**

**Work in progress: achieve better model at higher energies**

# INTEGRAL/IBIS Calibration Update

## IBIS COMPOSITE CRAB SPECTRUM (ISGRI+PICsIT)




**The IBIS Crab spectrum composed by ISGRI data from rev. 300 (net time: 30ks) and PICsIT data from revolutions 39-45 (net time: 563 ks).**