



IBIS/PICsIT Status

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PICsIT very basic factsheet

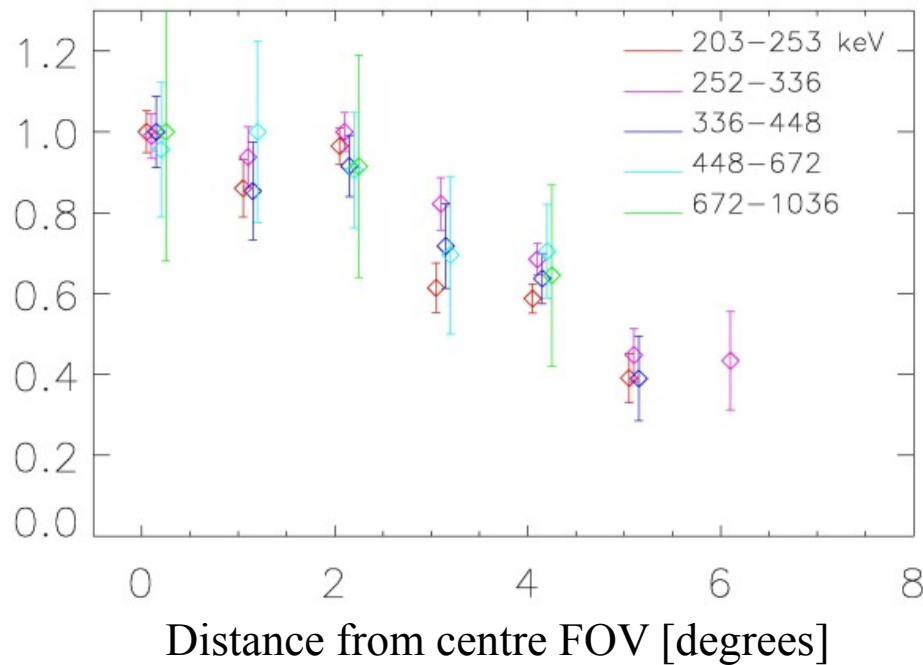
- ✓ **High-energy (0.17-10 MeV) detector of the imager IBIS** made of 4096 (64×64) CsI pixels organized in 16 semimodules. FOV=29°x29° (zero response), angular resolution ~12' (sampled in 10' pixels), PSLA < 5'. See Di Cocco et al. (2003) for more details.
- ✓ **Valid PICsIT event:** Every event that is **not** in coincidence with ISGRI events (Compton events), calibration unit tags (calibration events), VETO strobes (background event). **Single event:** a photon interacts with only 1 pixel (range 175 keV – 6.5 MeV); **Multiple event:** a photon interacts with more than 1 pixel (range 350 keV – 13 MeV).
- ✓ Events are equalized with onboard **Look-up Tables (LUT)**, integrated according to binning tables (still into LUT), and transmitted to ground. Last update at the end of rev. 169 (March 2004).
- ✓ *Because of tight telemetry budget and high background, it is not possible a complete (position, time, energy) transmission photon-by-photon (ppm) of all the PICsIT data ⇒ need for onboard processing.*
- ✓ The **Standard mode** is composed of 2 complementary submodes: **Spectral Imaging** (data cube of 256 ch x 64 pixels x 64 pixels; integration time ≈ 2ks) and **Spectral Timing** (histograms with no spatial information integrated in up to 8 energy channels and with time resolution from 0.97 to 500 ms).
- ✓ The full photon list [position (y,z), Δt, full energy (1024 channels)] is available only for calibration purposes and with limited energy channels (generally up to 1 MeV). No possibility to fully run PICsIT because of telemetry budget. PPM is activated during slews, because of very short time (≈ 120 s).
- ✓ More information at: <http://www.iasfbo.inaf.it/Research/INTEGRAL> (maintained by F. Schiavone)

Off-Axis Effect in Image deconvolution



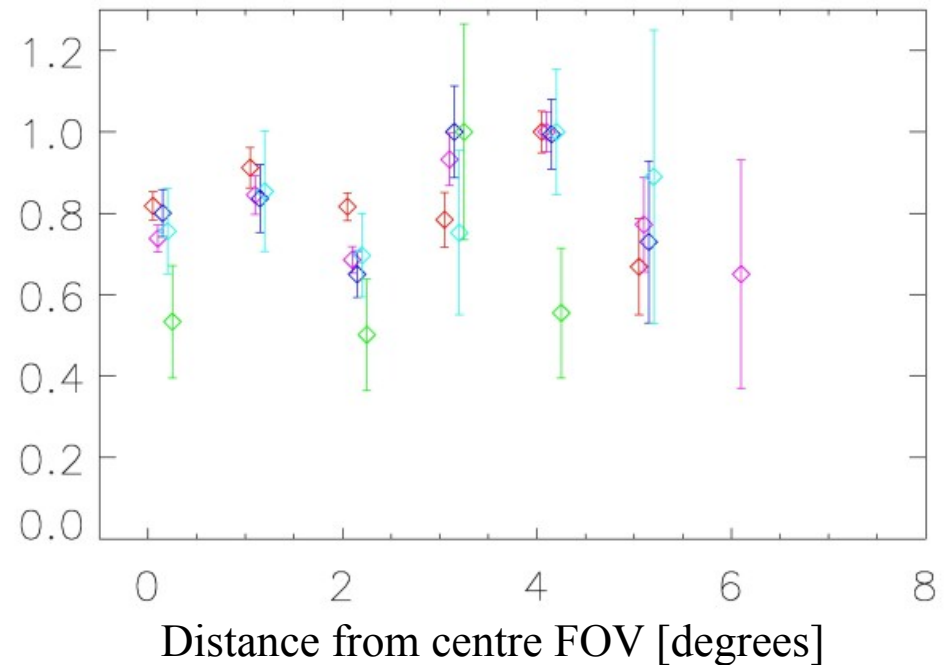
- As the source (Crab) moves out of the fully-coded field of view, there is a clear drop in the count rates. This will be corrected in the next sw version.
- Possible causes: cosmic-rays induced events (for $E < 250$ keV), changes in mask transparency, additional shielding from SPI on one side of IBIS, other unknown?

Normalized rates



OSA 5.1 (Present sw version)

Normalized rates



OSA 6.0 β (version under development)

Crab with IBIS (ISGRI+PICsIT)

Full energy range (1.1 Ms)

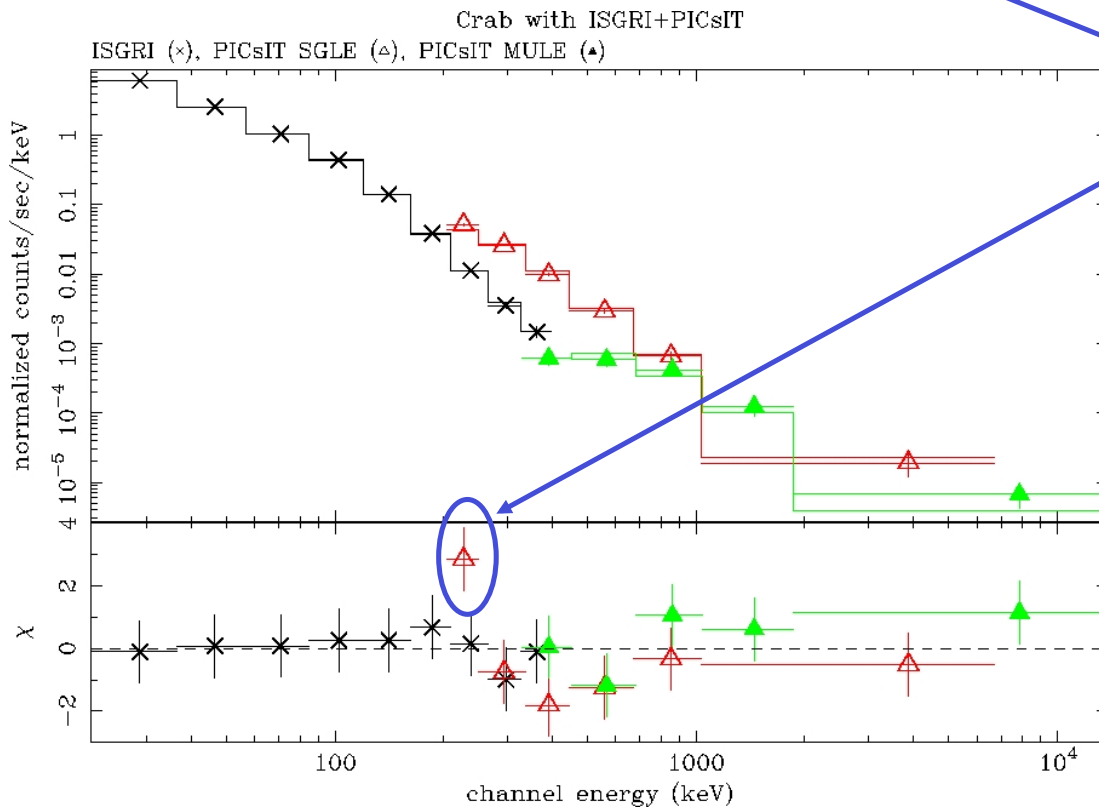


Best fit: $\Gamma=2.24\pm0.02$; Norm = 17 ± 2 ph cm⁻² s⁻¹ keV⁻¹

ISGRI (C=1, reference); PICsIT Single Events (C=0.87±0.06); PICsIT Multiple Events (C=0.38±0.07)

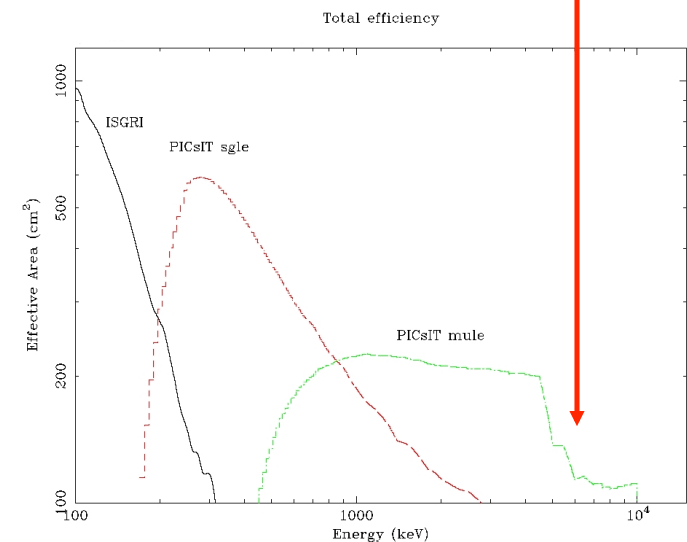
$\chi^2=25.6$ dof=21 Prob.=0.22

sys=5%



Contamination from cosmic-rays induced events (main responsible of 5% sys)

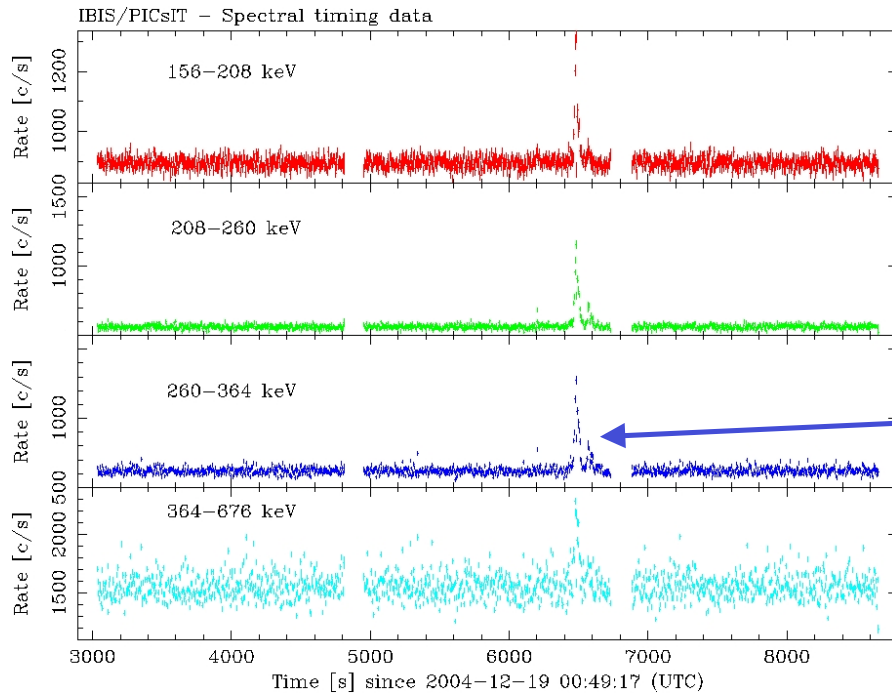
Problems in efficiency for multiples (too low, particularly for E>5 MeV). RMF/ARF under development



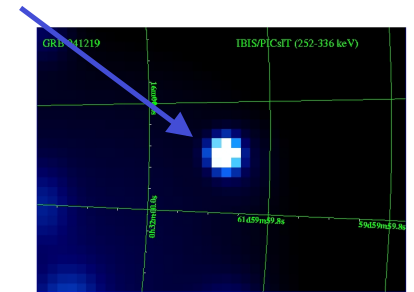
Flux [20 keV – 10 MeV] = 0.313 ph cm⁻² s⁻¹

Flux [20 keV – 10 MeV] = 0.327 ph cm⁻² s⁻¹ (expected)

Calibration of Spectral timing data



- Singles and Multiples together: no RMF/ARF available for this mode;
- Crab pulsar too faint to be a valid input;
- We used the very long GRB041219 (≈ 360 s), that was detected in both **spectral imaging** and **spectral timing** modes.



Best fit: $\Gamma=1.9\pm0.1$; Norm = 18 ± 6 ph cm⁻² s⁻¹ keV⁻¹
 SPI (C=1, frozen); ISGRI (C=0.20 \pm 0.02; saturated);
 PICsIT (C=1.0 \pm 0.1).

$\chi^2=25.6$ dof=23 sys=10% Prob = 0.32

Energy [keV]	Joint Fit Flux [10 ⁻² ph cm ⁻² s ⁻¹]	Rate SpTi [c/s]
156-208	4.22	6.3 \pm 0.1
208-260	2.47	12.0 \pm 0.1
260-364	2.89	14.0 \pm 0.1
364-676	3.48	15.0 \pm 0.1

