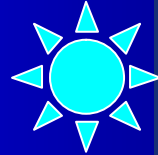


Integral Out of the FOV Imaging and Spectral Capabilities

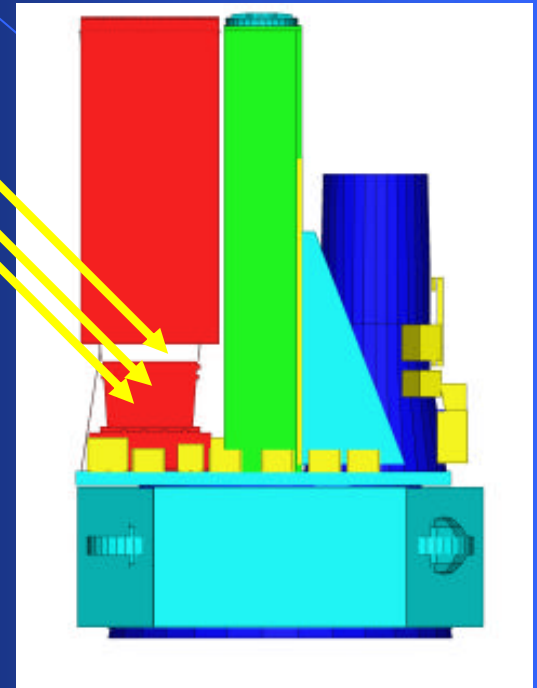
P. Laurent, M. Denis,
R. Marcinkowski, T. Bulik

Integral out of FOV observations

Need a bright, hard source with a recognisable signature

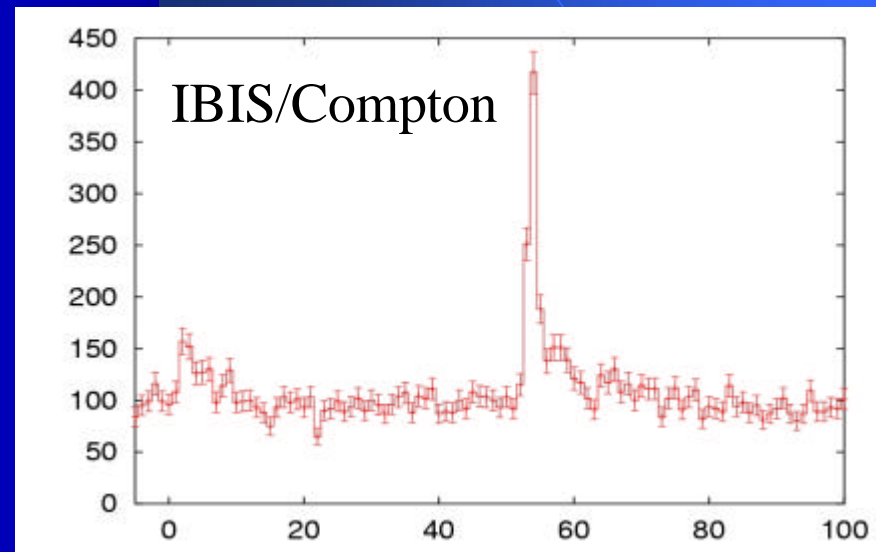
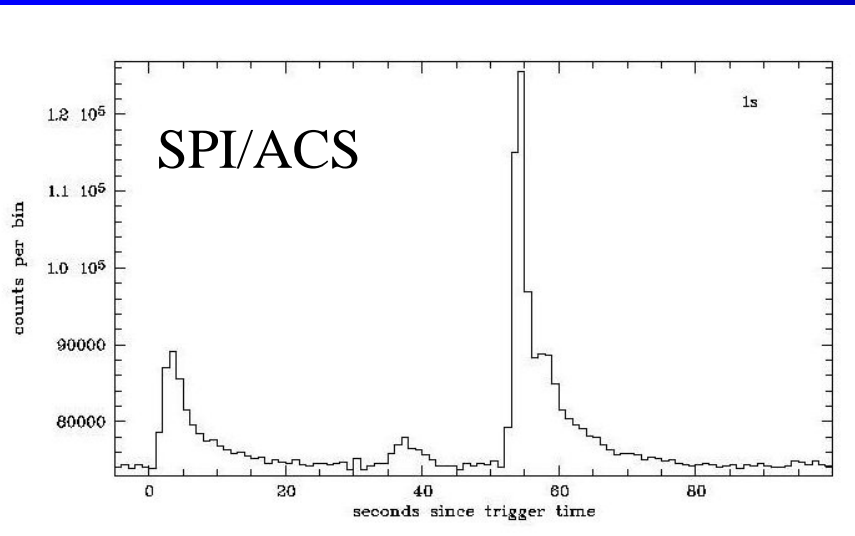


- ⇒ Alert for GRB.
- ⇒ Search for hard bright novae.
- ⇒ Study of the 511 keV and ^{26}Al line.
- ⇒ Study of the Sun.
- ⇒ Help for the image corrections.



Out of FOV observations of GRB

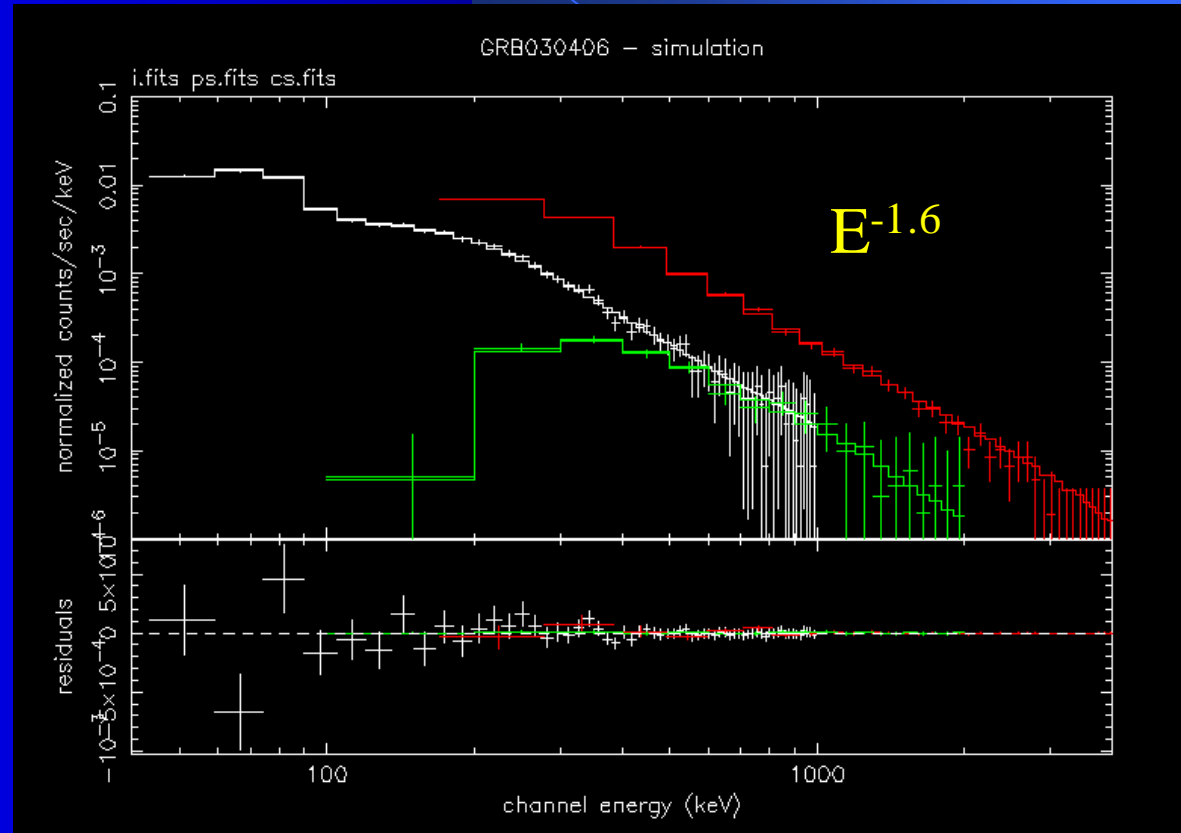
Observations of GRB: GRB 030406 at 37° off-axis



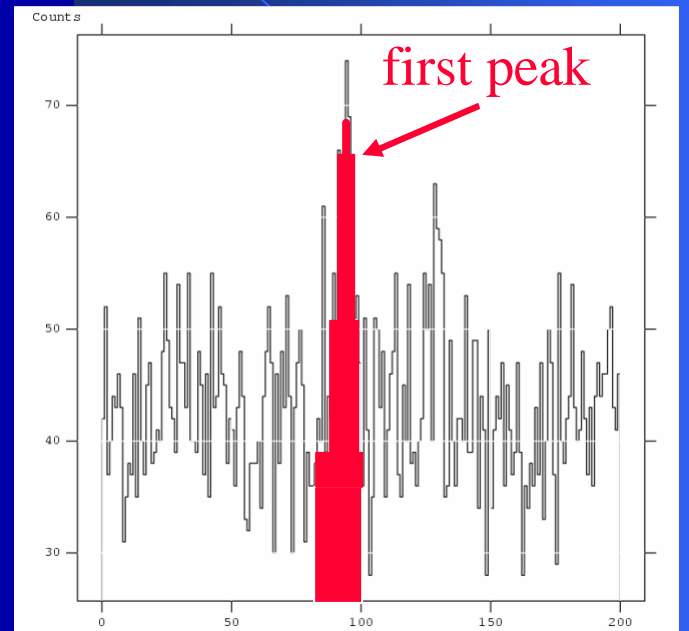
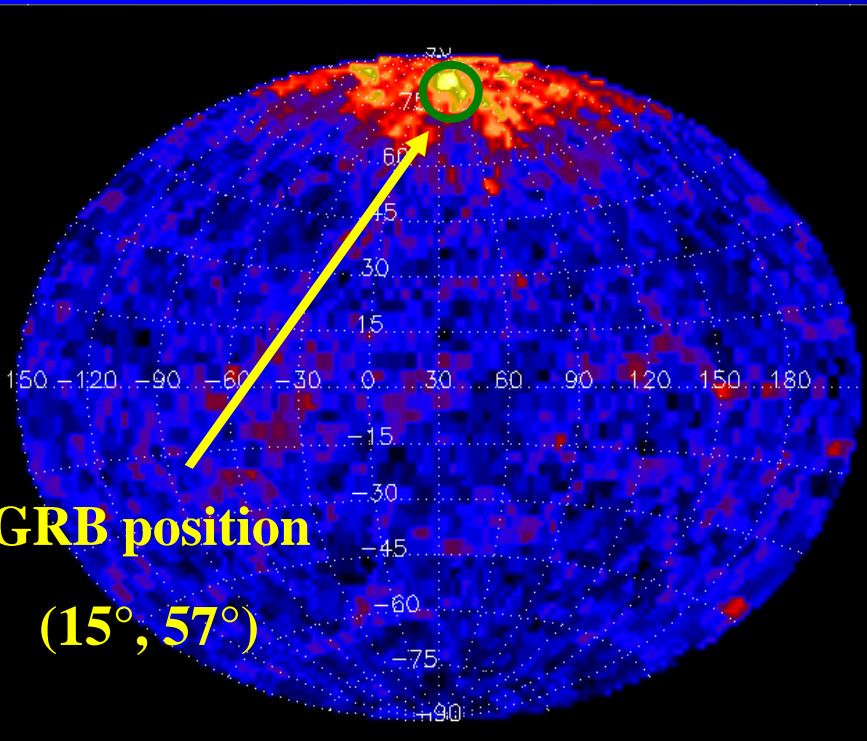
See M. Denis' talk next Friday !!

Observations of GRB: Response Matrices

Simulation of
GRB030406 at 37°
off-axis detected by
ISGRI, PICSIT, and
Compton.



Observations of GRB: Compton mode (GRB 030320)



150-450 keV: sec.

464 events

Out of FOV observations of GRB: Conclusions

- Integral can detect GRB at high off-axis angle.
- In some cases, the GRB position can be given with a few degree precision by the Compton mode.
- GRB spectrum can be determined by IBIS from 150 keV to 5 MeV.
- IBAS will take into account the Compton imaging to get the GRB position.
- We will modify the PICSIT ST configuration to enhance the capacity of analysing GRB spectra evolution with PICSIT.

Search for bright X-ray novae

Search for bright hard novae

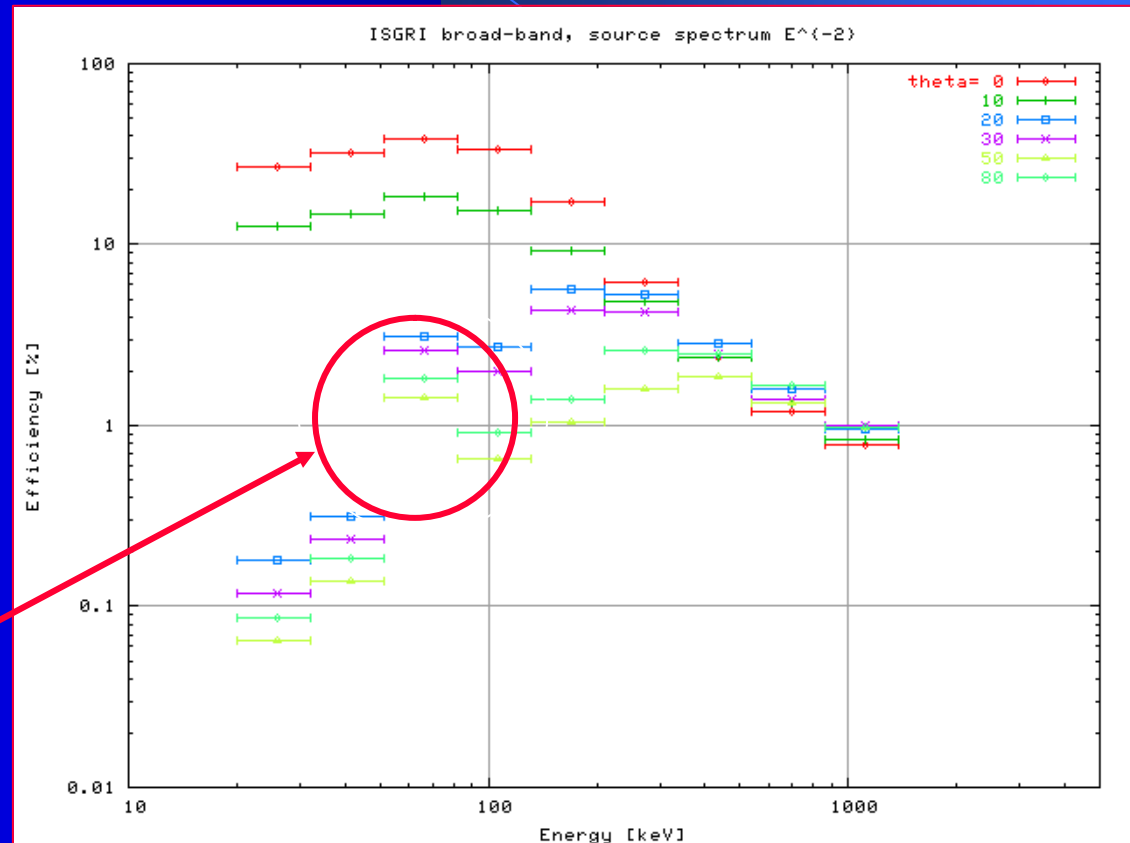
- A bright hard nova (intensity of a few Crab) can be detected by ISGRI even if off-axis (SPI ACS ?).
- It can be roughly positioned with the Compton imaging.
- Possibly, alert for a TOO ...

Search for bright hard novae: ISGRI detection

ISGRI efficiency vs
offset angle

E^{-2} spectrum

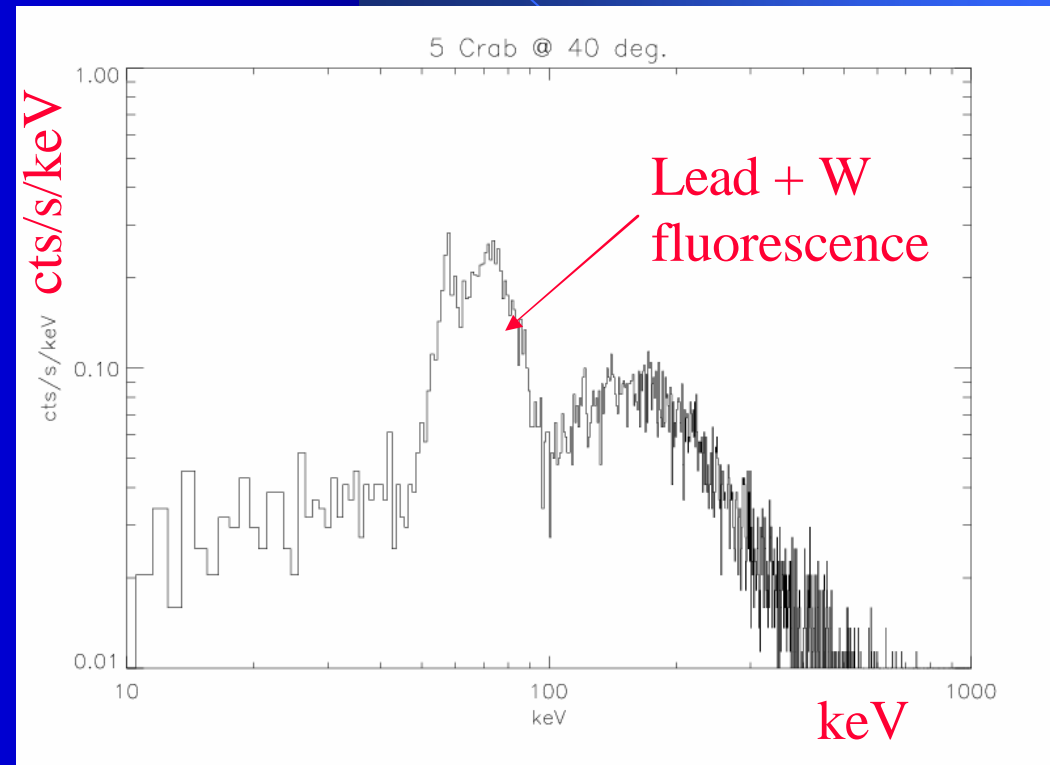
Jump in efficiency
due to the Pb-W
fluorescence



Search for bright hard novae: ISGRI detection

Simulation of a off-axis
(40°) 5 Crab nova:
ISGRI spectrum

⇒ possible detection in
the Pb/W fluorescence
line.



Study of the 511 keV and ^{26}Al lines

Study of the 511 keV line

IBIS shield is almost transparent at 511 keV.

Can we have information about the annihilation line from out of FOV observations with IBIS ?

⇒ Study on-going with the Compton mode

⇒ Can we get something from ISGRI/PICCSIT images ?

Study of the ^{26}Al line

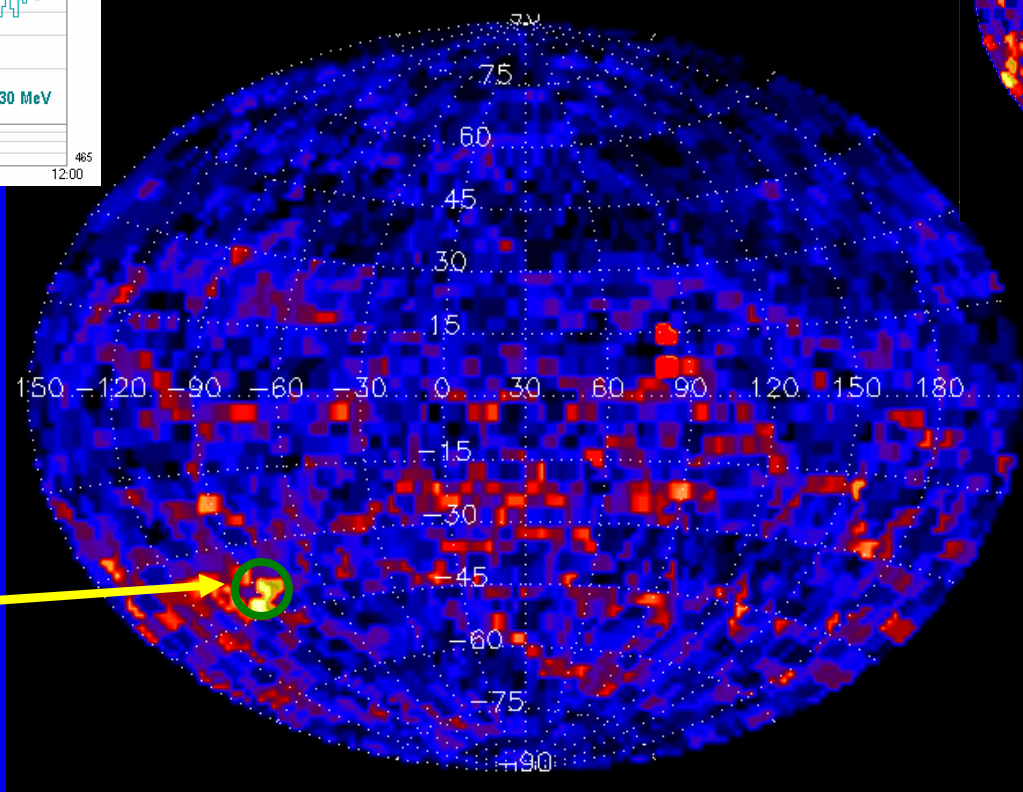
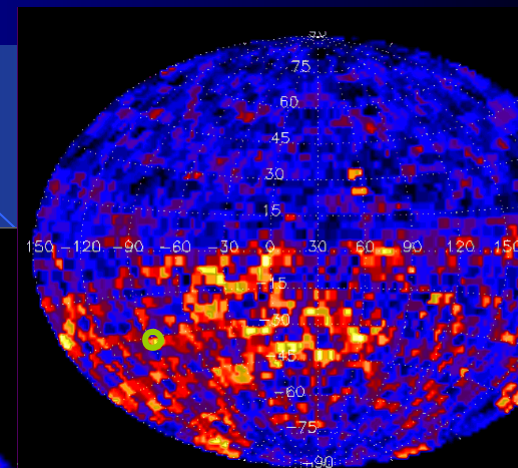
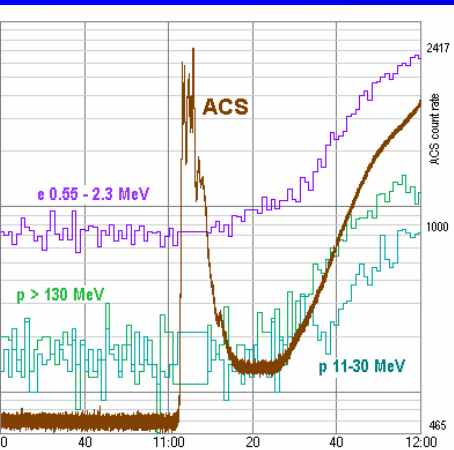
IBIS shield is transparent at 1809 keV. Can we have information about the ^{26}Al with IBIS ?

⇒ Can be studied by the Compton mode, but the Compton selection threshold has to be lowered to about 1.5 MeV, instead of 5 MeV actually, to have a 2π field of view.

⇒ Can we get something from PICSIT images ?

Sun observations

October 28th, 2003 solar flare observations above 2 MeV



Sun position
(-90°, -32°)

2000-2500 keV
630 events

Image corrections

Image corrections

- Image above 150 keV can be polluted by out of FOV bright sources.
- \Rightarrow study, with the MM v5.2, of the influence of these sources is on-going ...

That's all !!!

Alert for bright hard novae: ISGRI detection

ISGRI Background

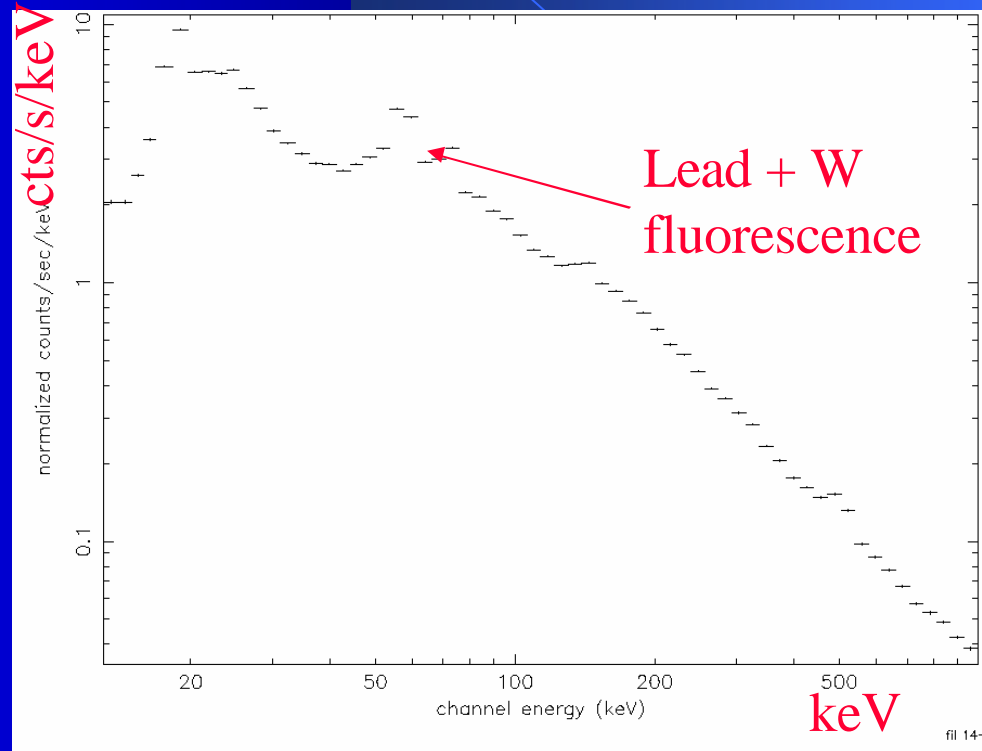
Pb/W fluorescence line:

≈ 50 cts/s

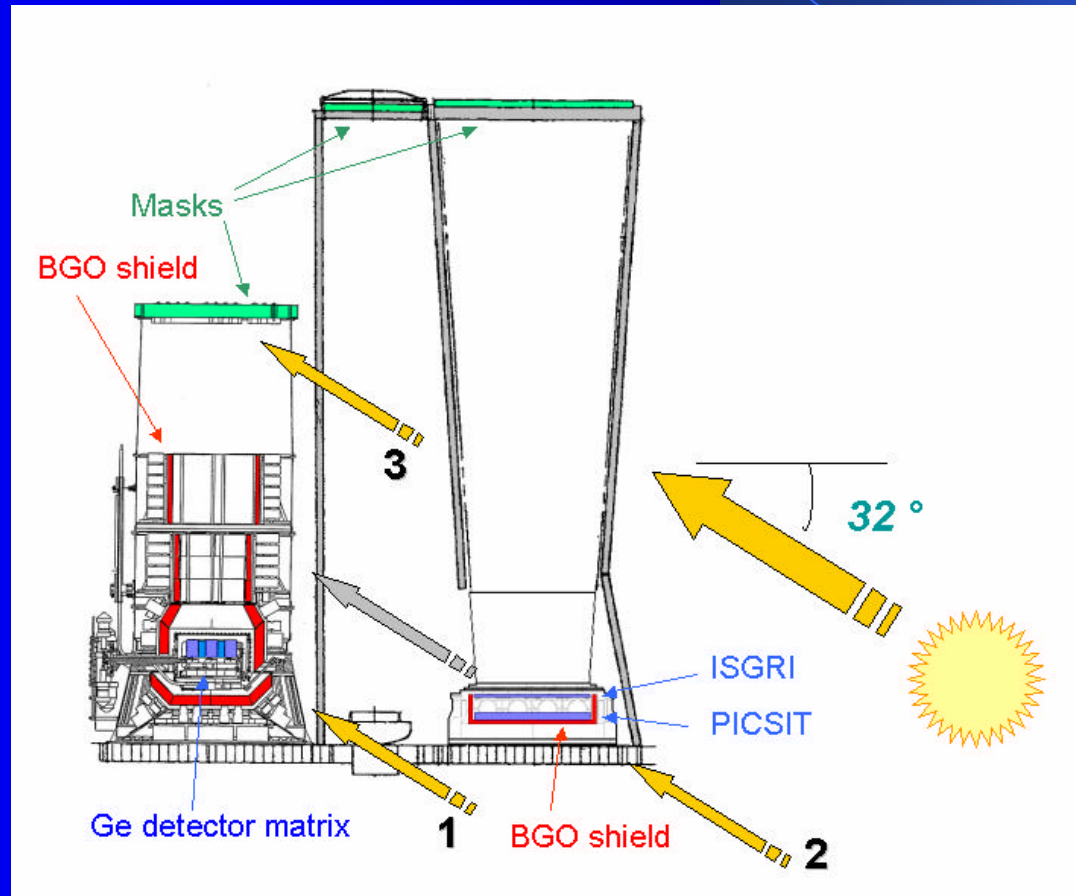
Hard nova (5 Crab)

Pb/W fluorescence line:

≈ 5 cts/s

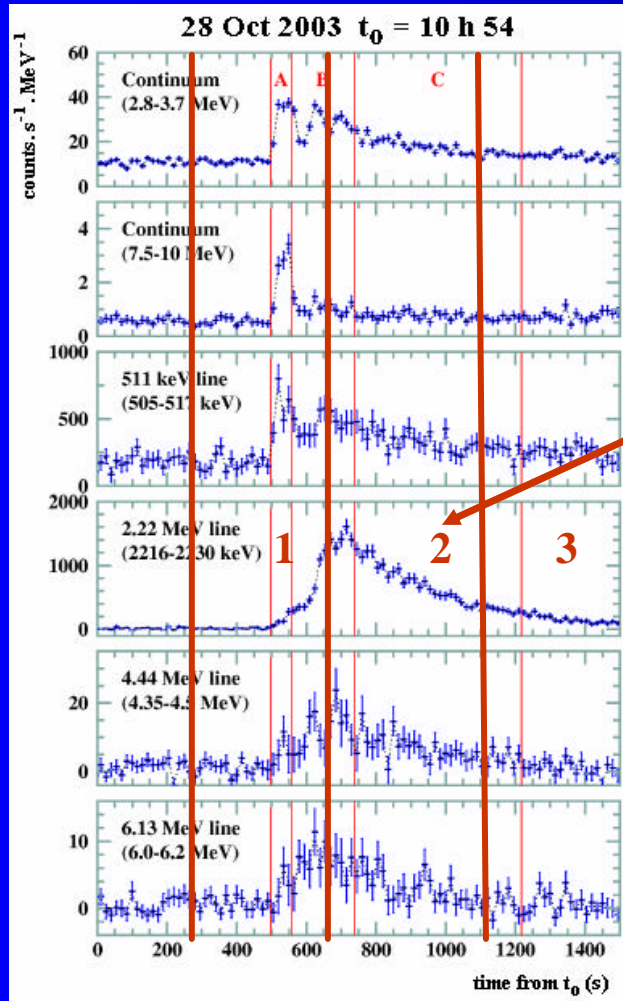


October 28th, 2003 solar flare observations above 2 MeV



M. Gros et al., 2004

October 28th, 2003 solar flare observations @ 2.2 MeV



SPI light curve @ 2.2 MeV

⇒ 3 time intervals

M. Gros et al., 2004

Alert for bright hard novae

Simulation of a off-axis (40°) 5 Crab nova: ISGRI image

hopper shadow

\Rightarrow hopper imaging !

