2008 Senior Review

General Comments

- Challenging task.
  - Limited funds
  - Large and small missions.
- ESA missions can be seen as easy targets :
  - Guarantee of continued mission
  - Duplication of GOF / data archive

2008 Senior Review

INTEGRAL

- Unique, but incremental science.
- Potential synergy with GLAST.
- Size of US community small compared to other missions that were reviewed.
- ADP seen as a potential funding source.

2010 Senior Review

INTEGRAL

- Synergy with GLAST and AGILE
- Synergy with TeV?
- Swift and Suzaku are potential competitors. Need to emphasize differences and advantages of INTEGRAL (energy range, sensitivity, FoV).
- Emphasize GO funding (maximizes science and reduces duplication of effort).
- Support through 2012 will take us to projected end of mission.

INTEGRAL Polarimetry

- SR08 included discussion of the Crab results.
- At that time the Nature paper (Dean et al.) had not been released (or not quite yet released).
- GRB results were included in (separate) GRB section.
- GRB results are not entirely convincing.
- INTEGRAL is leading the efforts in this area.

INTEGRAL Polarimetry

CRAB

- INTEGRAL / SPI (0.1-1 MeV) Dean et al. (2008)
- INTEGRAL / IBIS (200-800 keV) Forot et al. (2008)

GRB 041219a

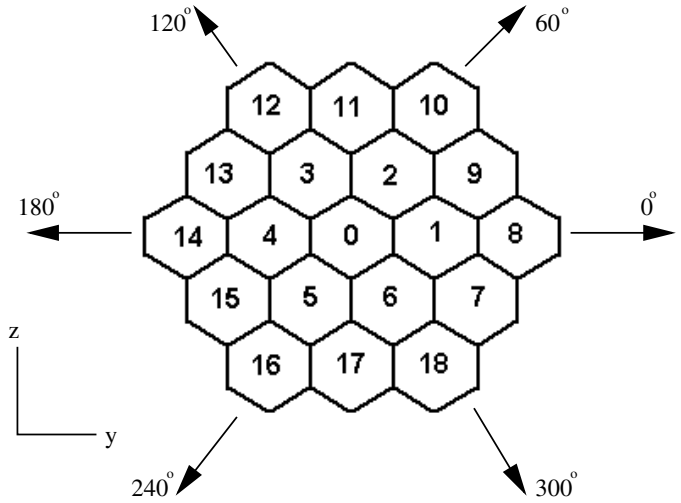
- INTEGRAL / SPI (100-350 keV) Kalemci et al. (2007)
- INTEGRAL / SPI (0.1-1 MeV) McGlynn et al. (2007)
- INTEGRAL / IBIS (200-800 keV) Götz et al. (2009)

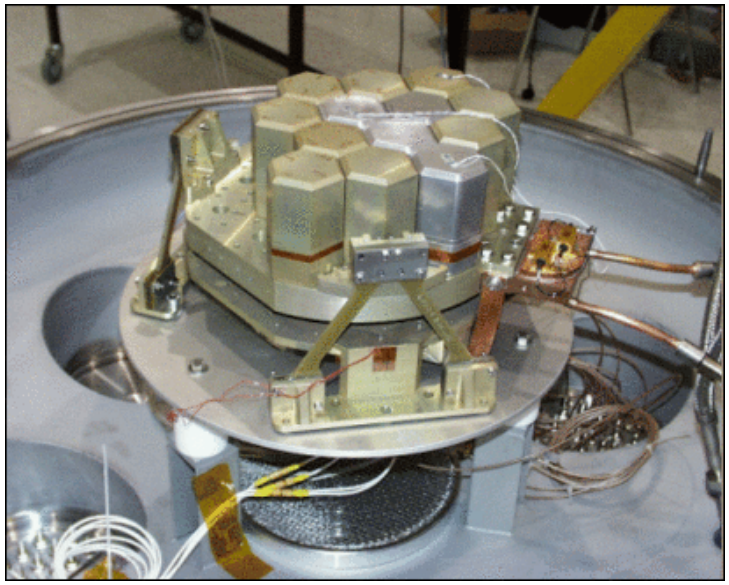
GRB 061122

- INTEGRAL / SPI (0.1-1 MeV) McGlynn et al. (2009)

INTEGRAL / SPI

18 Ge detectors
20 keV - 8 MeV
16° FC-FoV, 34° PC-FoV





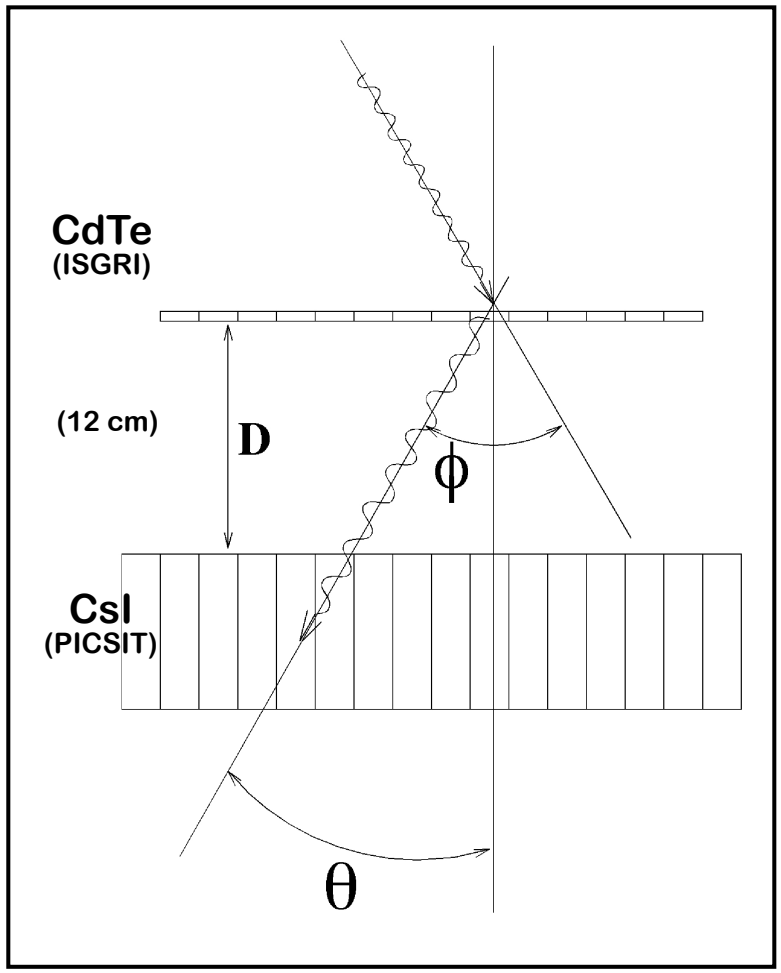
Coincidence events between adjacent Ge detectors define azimuthal distribution.

Lack of spacecraft rotation limits the sampling of scatter angles.

The azimuthal angle distribution is limited to 6 (center to center) angles, if the first interaction site can be identified. (For E < 511 keV, the first interaction generally is that with the smallest energy loss.)

INTEGRAL / IBIS

Lei et al., Proc. 2nd INTEGRAL Workshop, ESA SP-382, p. 643 (1997)
Stephen et al., GAMMA 2001 , AIP Conf. Proc. 587, 816 (2001)

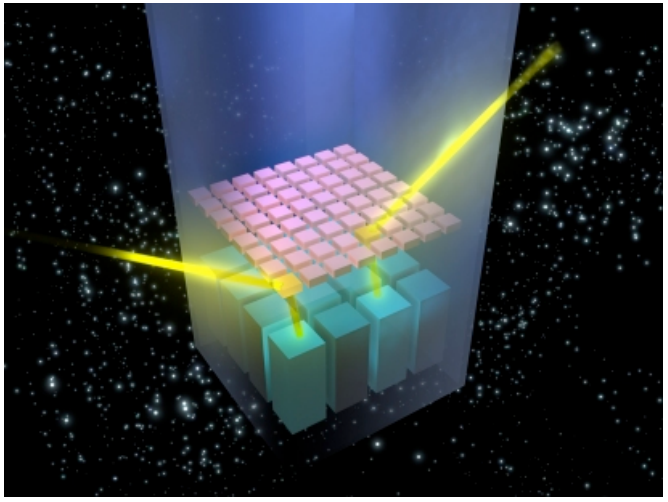


IBIS Compton mode

Events scatter from CdTe to CsI.

Only single interactions in CsI.

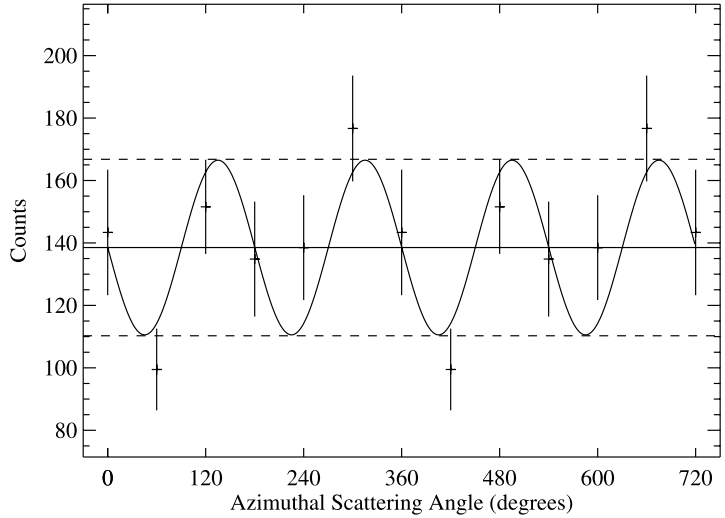
FoV ≈ 9° x 9°



PICsIT = PIxelIlated CsI Telescope
ISGRI = Integral Soft Gamma Ray Imager

INTEGRAL / SPI

GRB 041219a

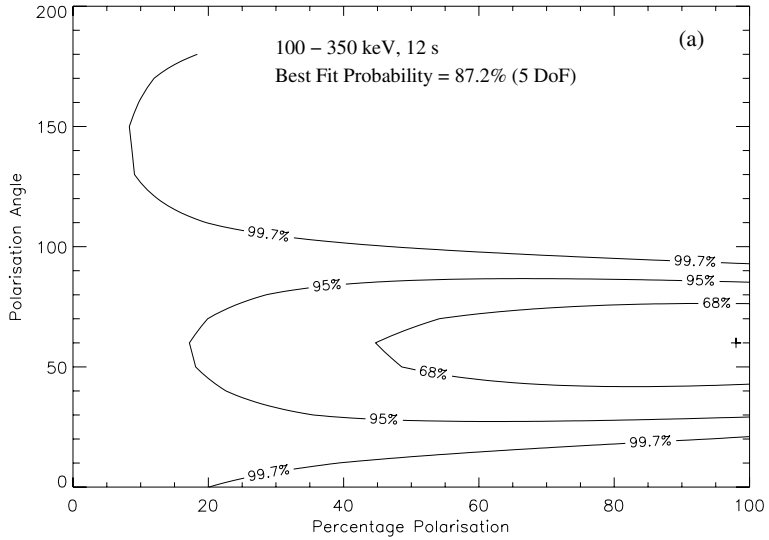


Kalemci et al., ApJ, 169, 75 (2007)

100 - 350 keV

$\Pi = 98\% \pm 33\%$

Count rate was not high enough for statistically significant measurement.



McGlynn et al., A&A, 466, 895 (2007)

100 - 350 keV

$\Pi = 96\% \pm 40\%$

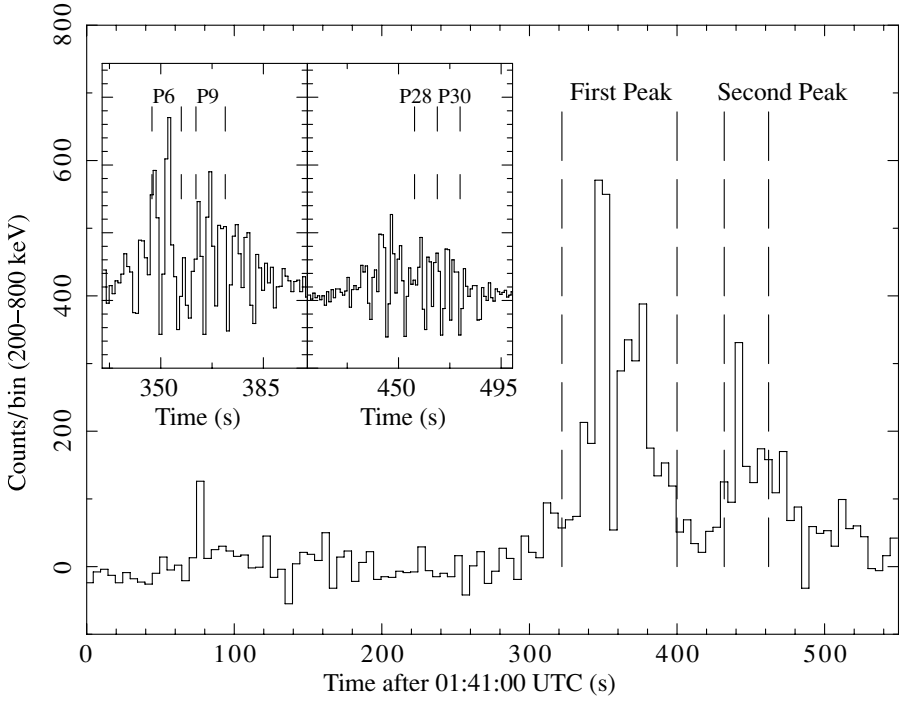
Instrumental systematics may dominate the measured effect.

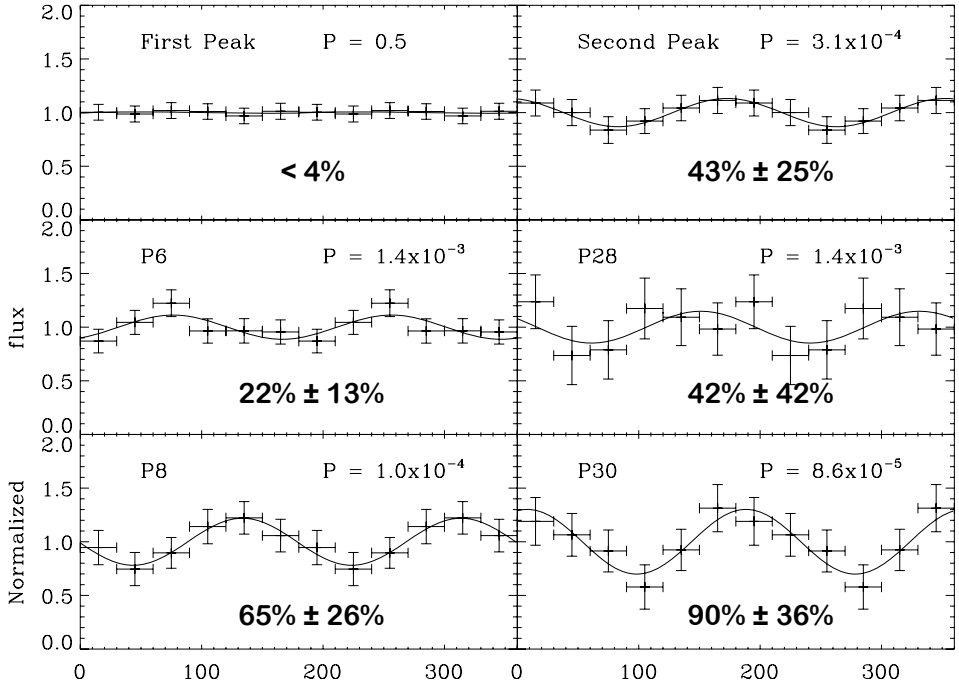
INTEGRAL / IBIS

GRB 041219a

GRB 041219a - Götz et al., ApJ, 695, L208 (2009)

200-800 keV
Evidence for variable levels of polarization.



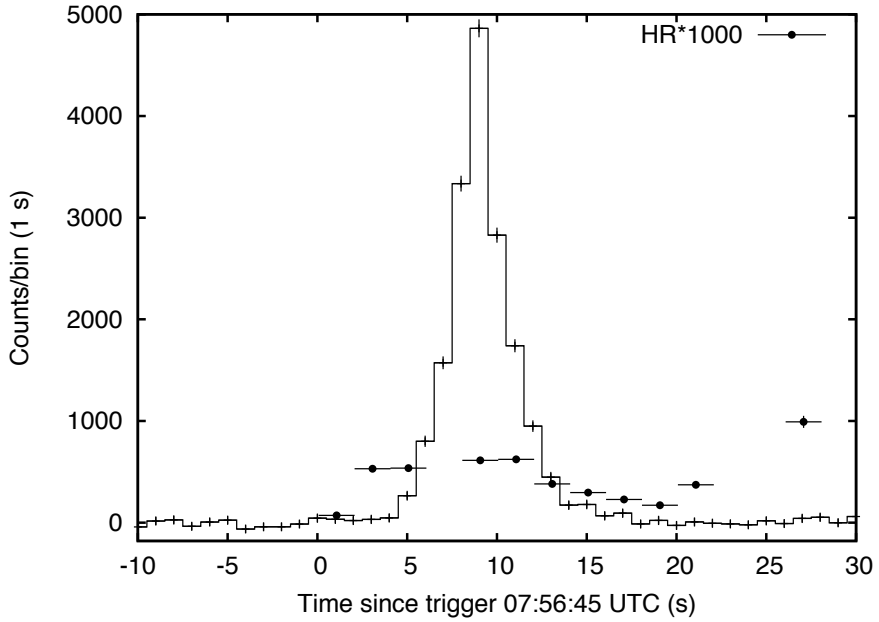


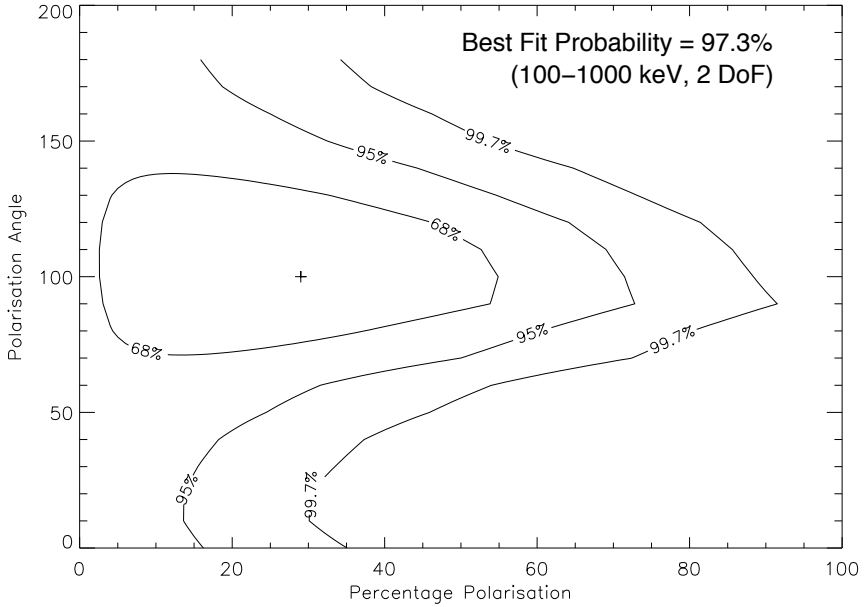
INTEGRAL / SPI

GRB 061122

McGlynn et al., A&A, 499, 465 (2009)

8° off-axis
10 sec duration
Analysis covered 100 keV to 1 MeV
Upper limit on polarizaton of ≈60%.



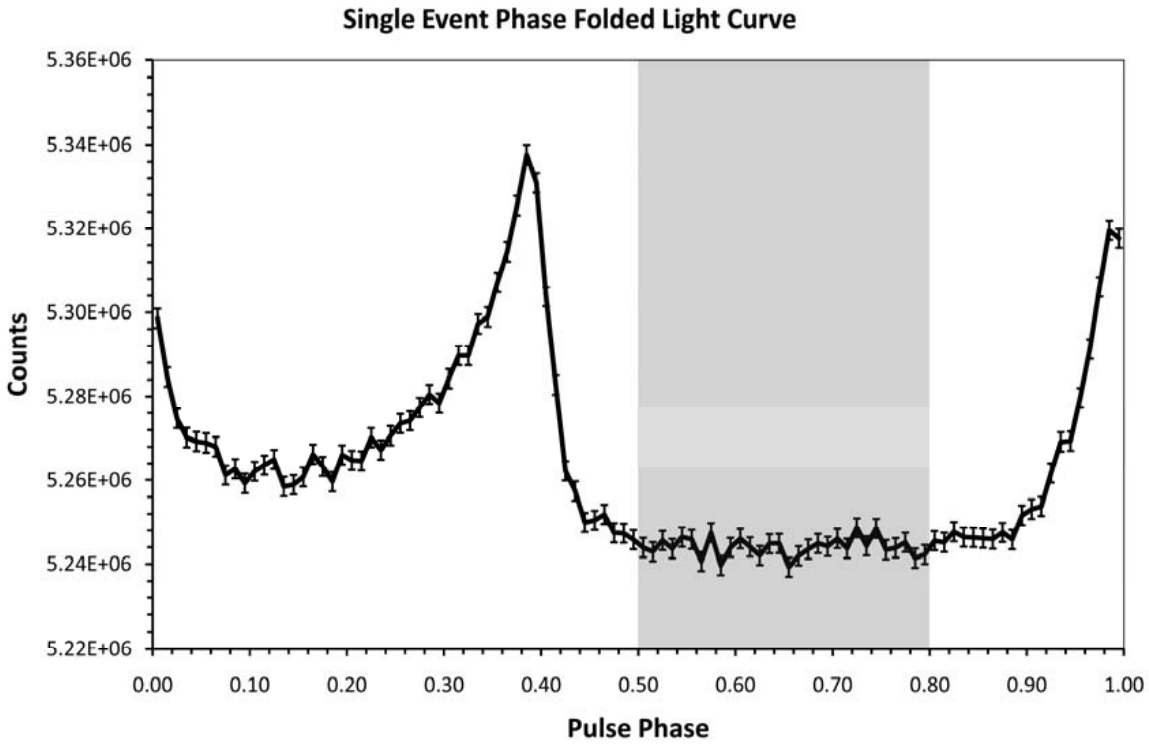


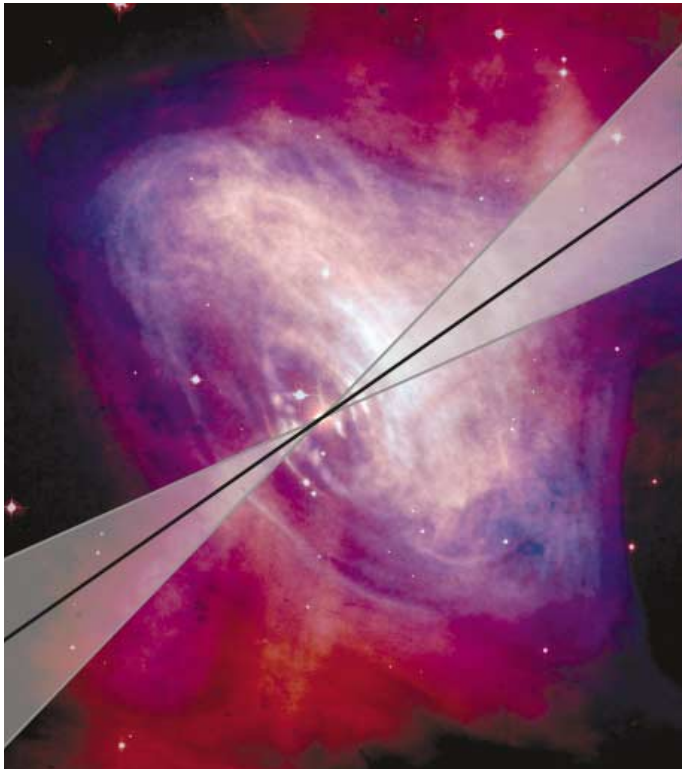
INTEGRAL / SPI

Crab Nebula

Dean et al., Science, 321, 1183 (2008)

Polarization of unpulsed emission.
Data from Feb, 2003 to Apr, 2006
0.1 to 1 MeV, $\Pi = 46 \pm 10\%$, $\psi = 123° \pm 10°$

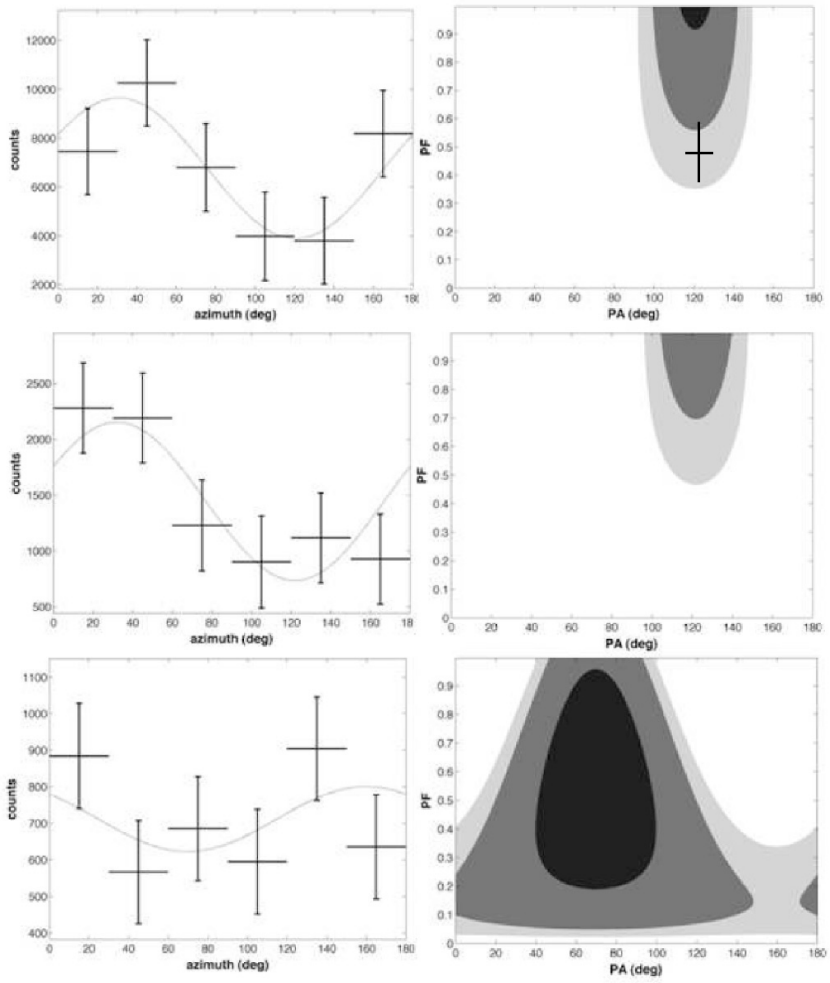




INTEGRAL / IBIS

Crab Nebula and Pulsar

Forot et al., ApJ, 688, L29 (2008)



200 - 800 keV

off-peak

$\Pi > 72\%, \quad \psi = 121° \pm 9°$

off-peak plus bridge

$\Pi > 88\%, \quad \psi = 122° \pm 8°$

two peaks

$\Pi = 42\%$ (+30% / -16%)

$\psi = 70° \pm 20°$