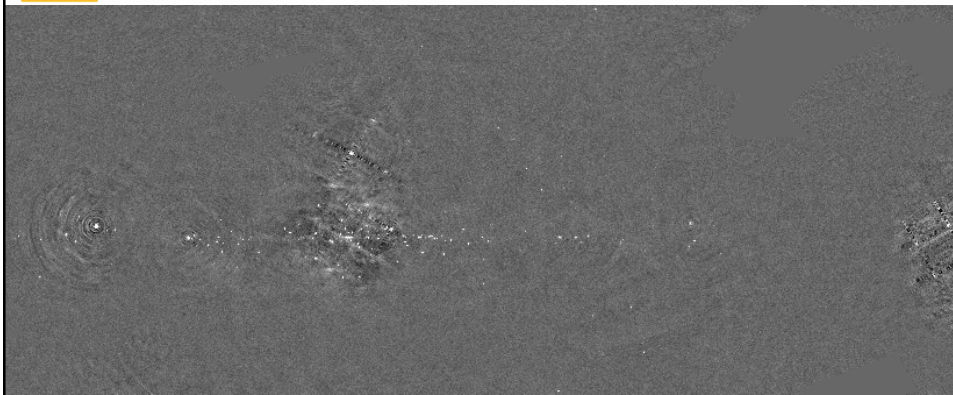


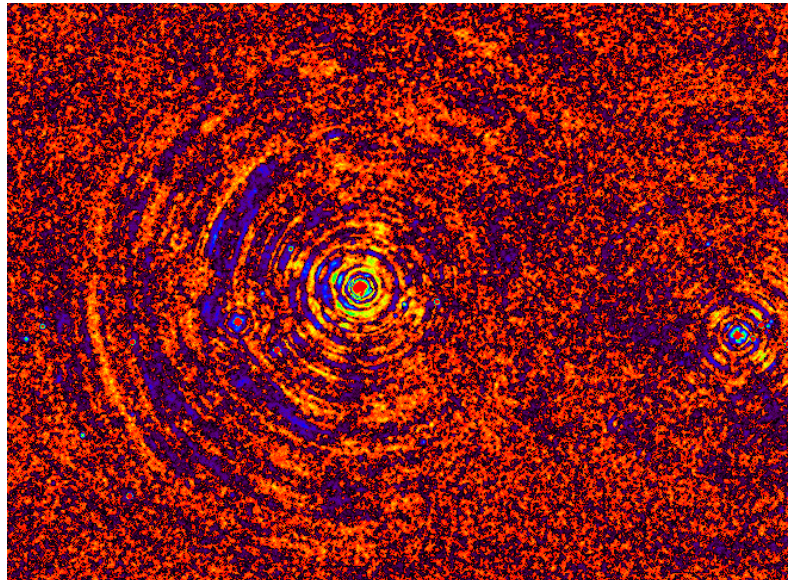
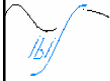
# INTEGRAL observing strategy to reduce ISGRI BKG and ghost residuals

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## ISGRI Galactic map (20-50 keV)



### Cygnus region (rotation)

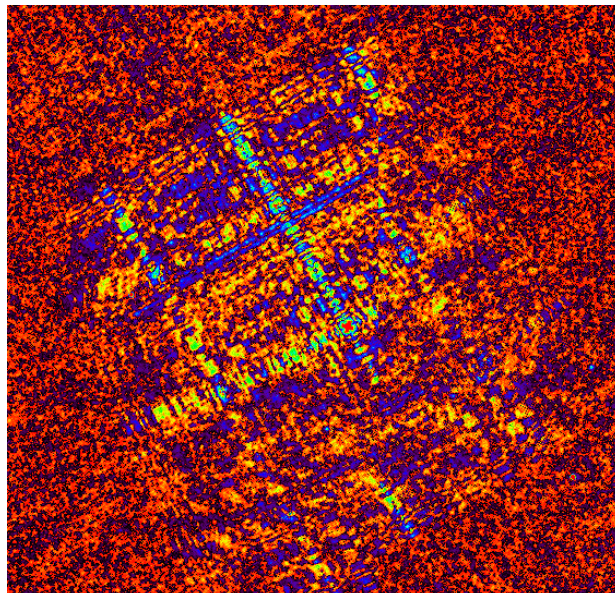


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### Crab region (translation)



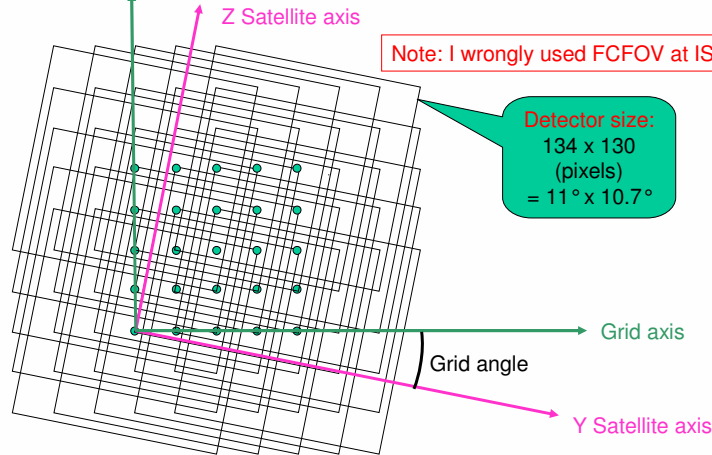
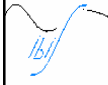
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**Grid angle:  $\text{Arctg}(1/5)=11.3^\circ$ , step size= $2.17^\circ$**

Since most of the defects seem linked to detector edges (lines) we propose a grid angle that spread them uniformly with a 5x5 grid, this angle is  $\text{Arctg}(1/5)=11.3^\circ$ , the ideal step size is  $\text{det. size}/5 = 10.85/5 = 2.17^\circ$



Note: I wrongly used FCFOV at ISWT 33

**Effect of Dithering and grid inclination**

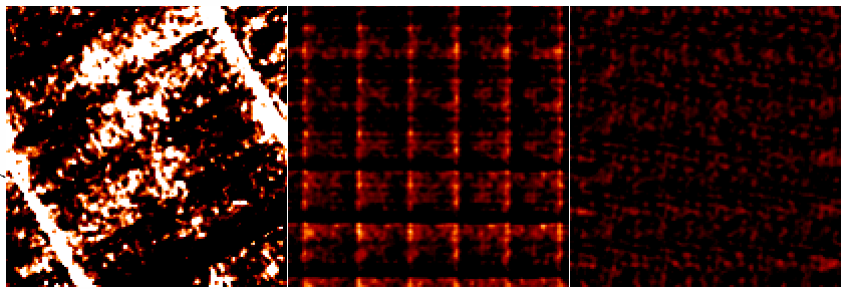
ISGRI sky image of an empty field (Rev 38, 100-200 keV)  
(No background correction)

Staring

Simulated  
5 x 5 dithering

Grid angle:  $\sim 0^\circ$   
Step:  $2.17^\circ$

Grid angle:  $11.3^\circ$   
Step:  $2.17^\circ$



$\sigma = 7.68 \text{ s}^{-1}$

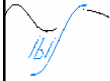
$\sigma = 2.15 \text{ s}^{-1}$

$\sigma = 1.29 \text{ s}^{-1}$

## Effect of translation and rotation on IBIS BKG structures



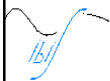
- A rotation of the satellite around the X axis induce a rotation of the residual BKG pattern around the X axis.
- A translation of the X axis induce a translation of the residual BKG pattern.



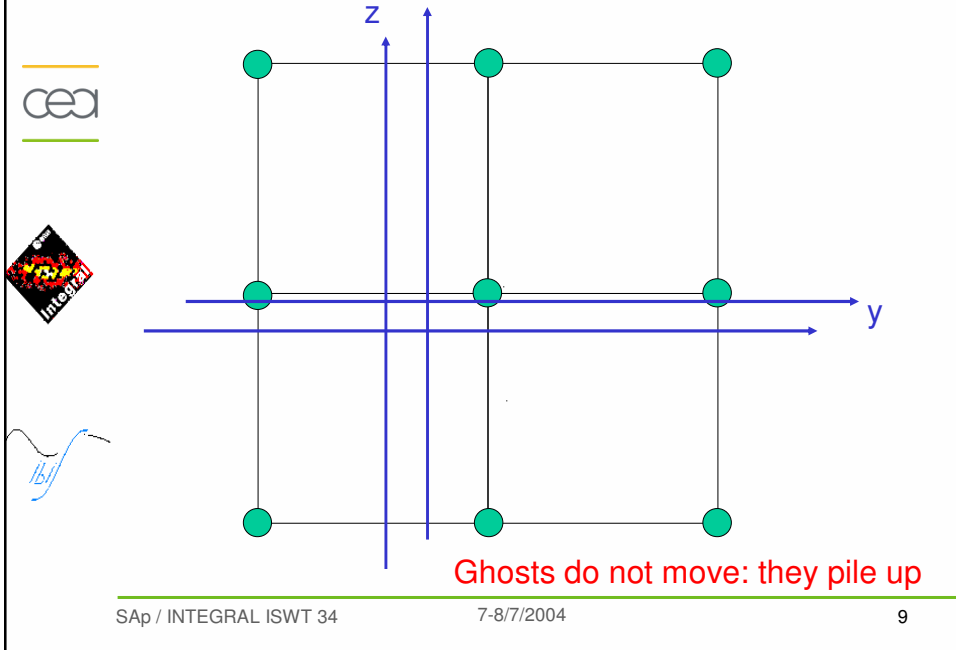
## The ghost problem



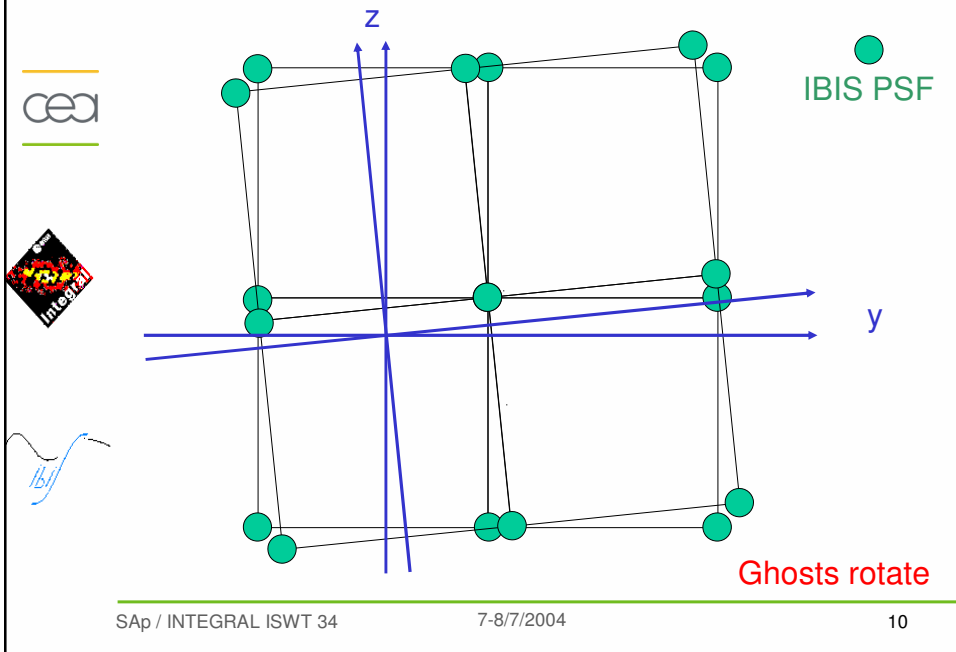
- A 5x5 grid requires usually  $\sim 50$  ks
- The ISGRI sensitivity ( $3\sigma$ ) in 50 ks is  $\sim 2$  mCrab
- Ghost residuals are  $\leq 1\% \sim 10$  mCrab
- Crab Ghost residuals  $\sim 15$  sigma
- A 5 Ms observation = 100 grids
- If ghost residuals pile up: Crab ghost residuals  $\sim 150$  sigma



## Effect of translation on ghosts



## Effect of rotation on ghosts



## A way out



- What we need

- For a 5 x 5 grid: an  $11.3^\circ$  angle between the grid axis and the instrument axis
- A rotation to spread the ghosts residuals



- A solution: Rotate the instrument **and the grid axis** by  $\delta\theta$  at the beginning of every new grid to keep the  $11.3^\circ$  angle between them

- $N_{\text{grids}} = t_{\text{obs}} / 50 \text{ ks}$
- $\Delta\theta = \pm 3^\circ \delta\theta \rightarrow 6^\circ / (N_{\text{grids}} - 1)$

