

XENIA: Wide Field Monitor

The *Wide-Field Monitor* will monitor a ~ 3 sr solid angle and will localize GRBs with a fluence greater than 10^{-6} erg cm^{-2} (15-150 keV), with a positional uncertainty $< 4'$. It will locate a sufficient number of GRBs with afterglows bright enough to determine the absorption from the WHIM and to measure the cosmic history of metals at GRB sites. The WFM low energy threshold goal of 5 keV allows a factor of ~ 2 increase in the detection of X-ray flashes (XRFs) and high- z GRBs, thus increasing the number of bright afterglows useful for the WHIM and metallicity studies.

The design is based on two standard coded mask instruments with CdZnTe detectors with good efficiency between 6 and 200 keV (2 mm thick). By tilting these instruments 28° with respect to the optical axes of the WFI and WFS, the sensitivity of the cameras can be optimized and is consistent with the 2.5 sr coverage, as is shown in the figure below. For bursts as bright as $2 \cdot 10^{-6}$ erg cm^{-2} , the WFM field of view (FoV) increases to 3.7 sr. With a distance to the mask of 40.5 cm and a pixel size of 2.7 mm, a location accuracy of $4'$ is achieved for sources detected with a $S/N > 10$. This is sufficient to trigger fast repointing and to locate the source in the $6' \times 6'$ FoV of the high count rate section of the Wide Field Spectrometer. The on-board trigger will be based on sampling count rates with different integration times, and includes an imaging trigger based on an on-board catalogue of known sources. This procedure is standard in satellites like Swift and AGILE. Following the repointing, the data of the Wide Field Imager can be used to tune the pointing to within $1'$ (or better). The sensitivity of the camera is sufficient to detect and localize about 80 bursts with a prompt fluence of $> 10^{-6}$ erg cm^{-2} per year and is comparable to the INTEGRAL/IBIS instrument. Similar detectors have been produced (INTEGRAL/IBIS, Swift/BAT) or are currently under development with our partners (Italy, Denmark and France).

WFM requirements, baseline, and goals

Parameter (2 units)	Requirement	Baseline	Goal
E/ ΔE @100 keV [FWHM, %]	5	3	3
FoV [sr]	2.5	2.6	3
Low threshold [keV]	8	8	5
High threshold [keV]	200	200	250
On-axis A_{eff} 10-100 keV [cm^2] ¹	1000	1100	1200
Ang. res.(HPD) (')	35	34	18
Loc. accuracy (')	4	4	2
Time resn [μs]	10	10	2
Max rate [cnts/s/unit]	5000	5000	5000
Software processing time ² [s]	20	20	10
Continuum sens.(1s) [ph/ cm^2/s]	0.5	0.4	0.4

¹⁾ required average area over the FoV is 300 cm^2 ²⁾ Depends on S/N

Effective area of the WFM (2 units) indicating the limiting sensitivity for bursts at different fluences. The fluence limit corresponds to the required sensitivity.

