STIX

The Spectrometer Telescope for Imaging X-rays

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Instrument description and scientific goals of its observation. Possible synergy with METIS.

STIX

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and the STIX team







STIX tungsten grids



STIX Moiré Pattern



Moiré pattern is changing depending on direction of incidence photons







maximum at center

maximum shifted

position of maximum measures source location in 1 dimension

Moiré pattern disappears for extended sources 10 different pitches probe 10 different source sizes

point source extended source

even larger source

10 different grid pitches

*			grid pitches in mm	Corresponding resolution
			0.038	7"
			0.054	10"
			0.078	14"
			0.111	20"
			0.159	28"
			0.228	40"
			0.325	56"
\checkmark			0.465	80"
^	Ť	1	0.666	112"
$\langle \rangle \rangle \langle \rangle \rangle$	\sim		0.953	180"
$\overset{\vee \vee \vee}{\longrightarrow}$	smeared out constan		fine grids measure smaller sources	

STIX imaging

- Each sub-collimator measures one Fourier component of the source distribution.
- 10 different pitches measure 10 different size scales
- 3 grids with the same pitch, but with ۰ orientation rotated by 120°
- r (arcsec) Data from 30 subcollimators are combined on the ground to form image (Techniques are highly developed from radio interferometry, Yohkoh/HXT and RHESSI).
- System acts like a telescope with a • well-defined Point-Spread-Functions.

STIX Point-Spread-Function



Quicklook

- Time profiles (similar to GOES + hard X-rays)
- Flare temperatures & emission measure
- non-thermal component (intensity and slope)
- Flare location (~1 arcmin accuracy)





Solar flare X-ray Imaging

thermal:

From flare loop, often arcades of loops

non-thermal:

From chromospheric footpoints of flare loops.

Energy deposition at footpoints:

- Heating chromopshere
- Radiation mainly in optical and UV
- Expansion of heated plasma into corona ('evaporation')









STIX on-board flare locator

- One sub-collimator has a simple mask with a double cross shape
- Makes X-ray shadow on pixelized detectors
- Pixel ratios give unique flare location (<1 arcmin)
- To be used by other SO instruments to select sub-images at high cadence.

Prompt impulsive electron event

