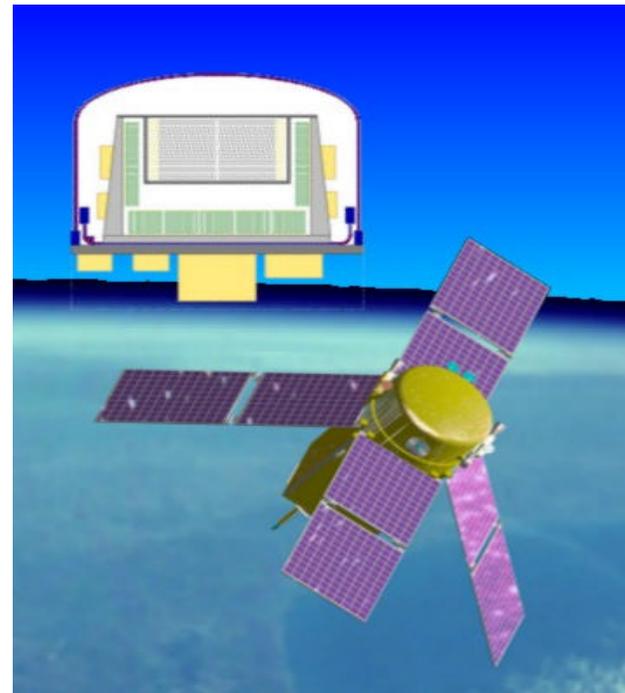


Medium Energy Gamma-Ray Astronomy *MEGA* Program Status and Plans

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Activities in the MPE Gamma Group:

since ~1980: COMPTEL and EGRET on CGRO

since ~1993: SPI on INTEGRAL, launch 2002

since ~2000: GBM and LAT on GLAST, launch 2005

1995-1997: Micro-MEGA:

10 layers single 4x4 cm² double sided Si-strip detectors,

5x5 pixel array CsI detectors, electronics development

since 1997: Prototype MEGA:

10 layers 3x3 SSD arrays (9x6x6 cm² = 324 cm²)

2-D and 3-D Calorimeters (pixelated CsI arrays)

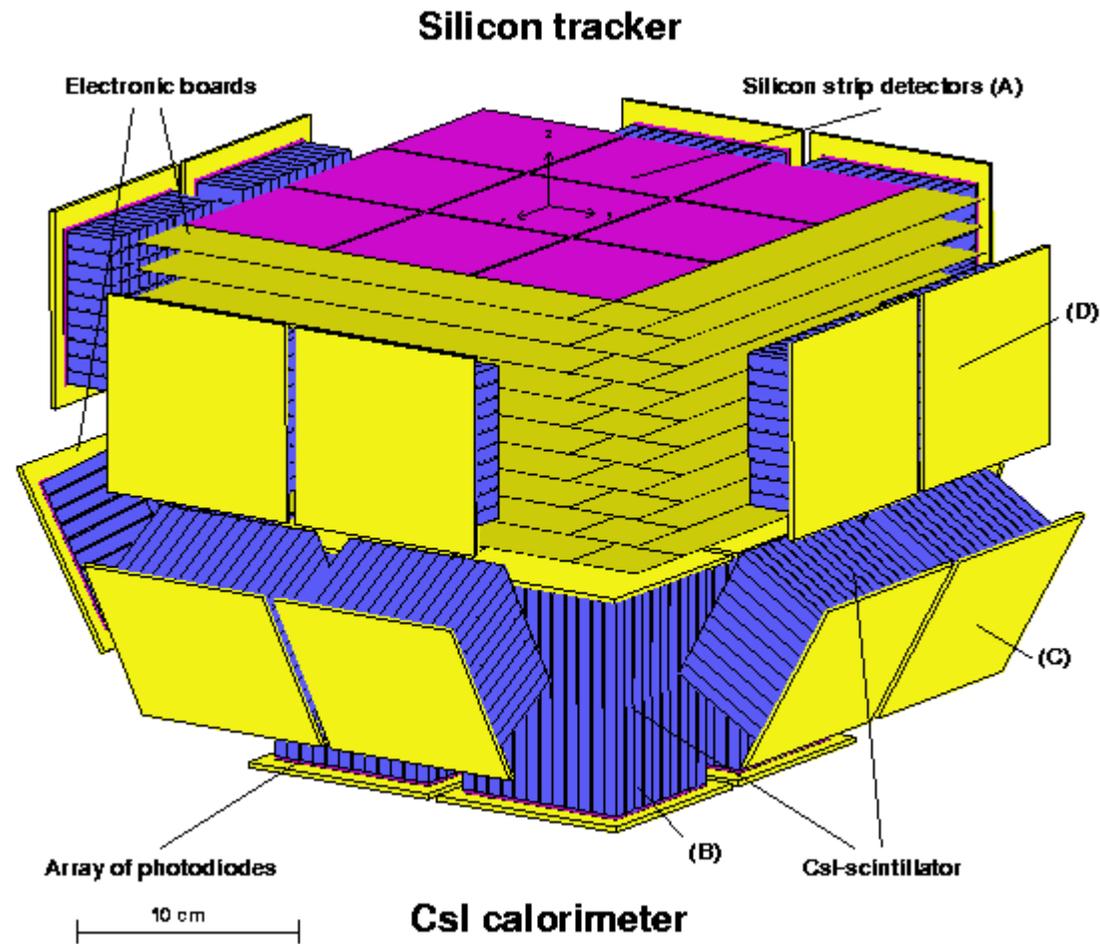
present study: Satellite MEGA:

30 layers SSD arrays, area ~1300 cm²

Side and Bottom full coverage calorimeter

Anticoincidence

Prototype MEGA:

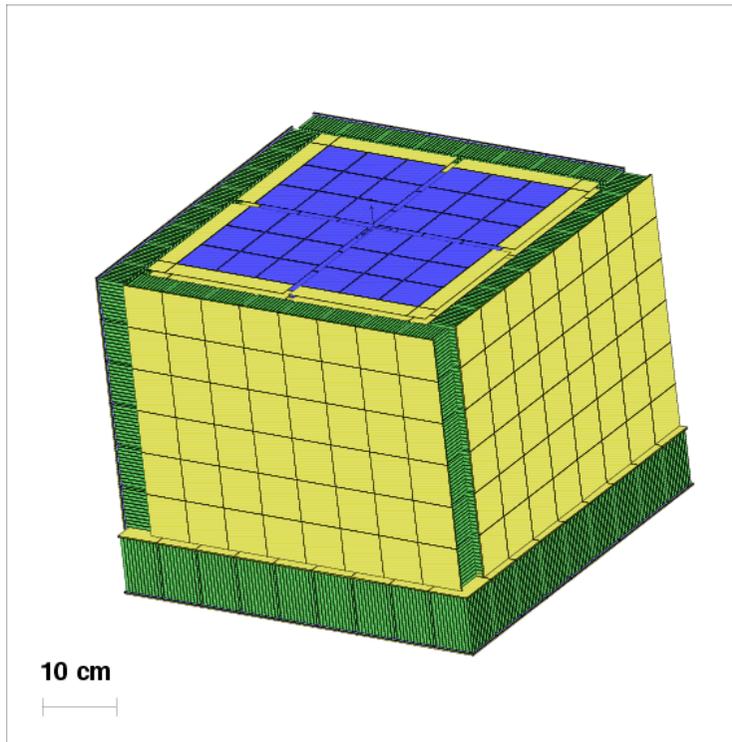


Satellite MEGA:

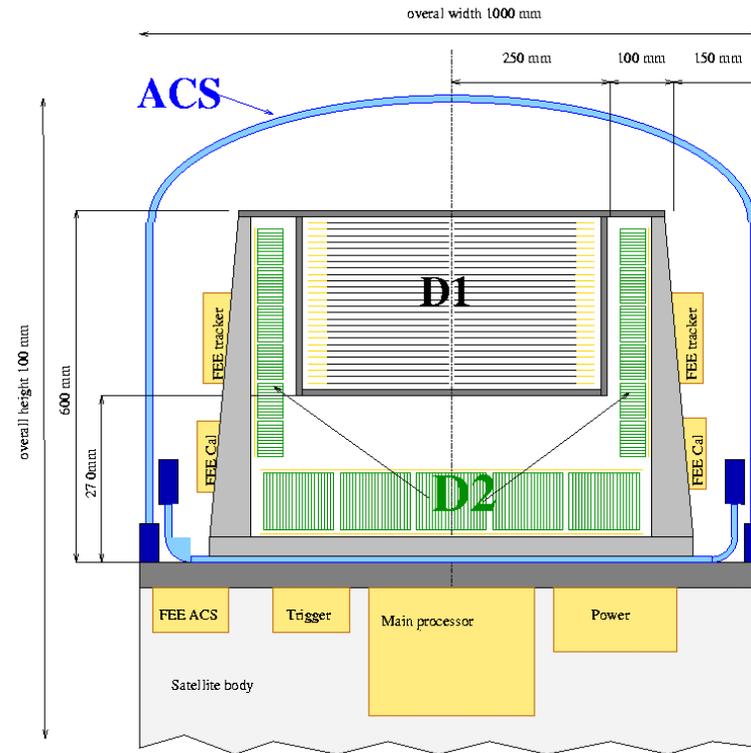
D1: 4 towers of Prototype MEGA, 30 layers deep

D2: bottom: 8cm CsI; sides: 4cm CsI, pixel bars 5mm x 5mm

GEANT Model



Schematic X-section

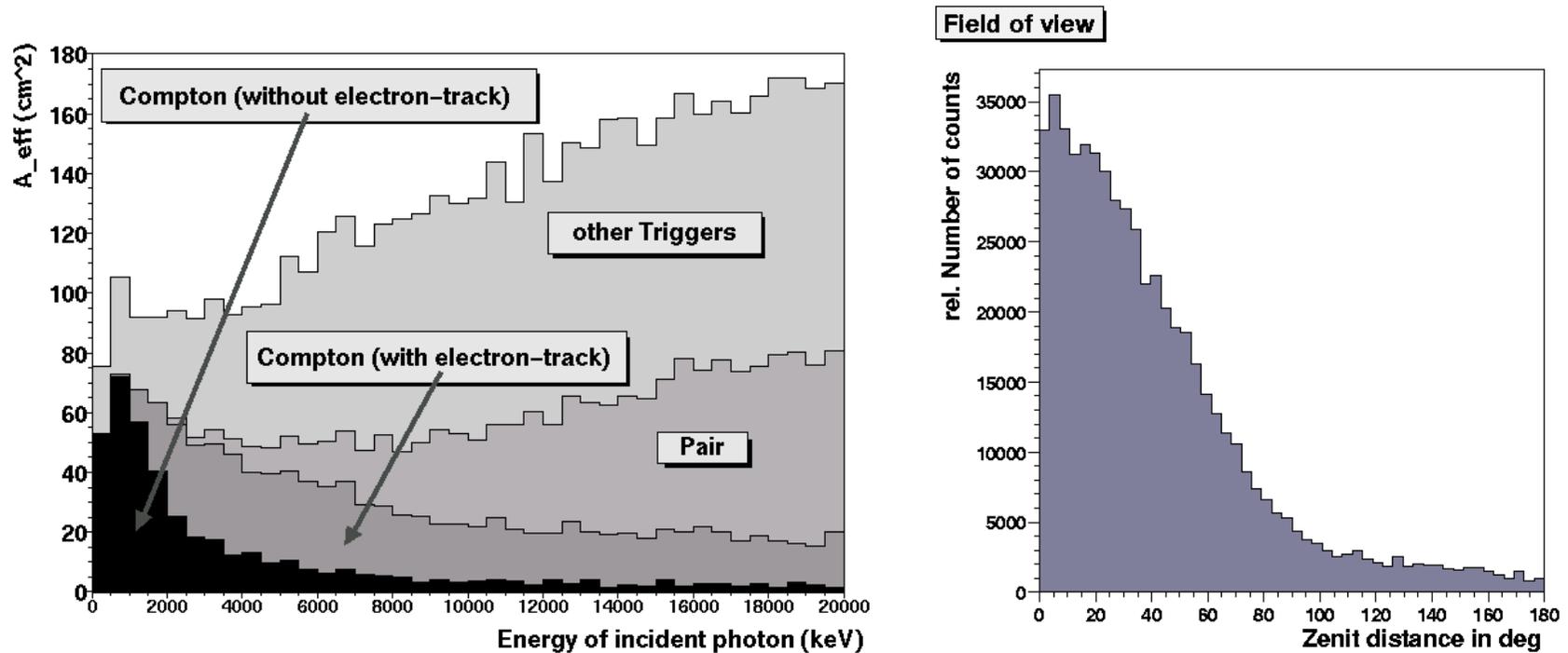


Effective Area and Sensitivity:

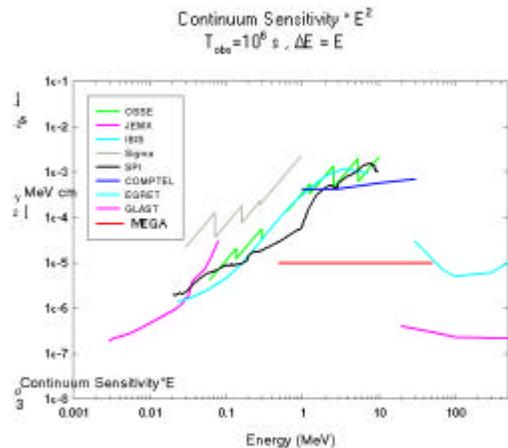
Estimate: Incidence of $E_\gamma \sim 2 \text{ MeV}$ on 15 mm Si $\rightarrow \sim 14\%$ interaction probability

$A_{\text{geometric}} \sim 1300 \text{ cm}^2 \rightarrow A_{\text{eff}} \sim 180 \text{ cm}^2$ - Losses of scattered photons

GEANT Modelling: $A_{\text{eff}} \sim 100 \text{ cm}^2$; Field of View $\sim 125^\circ$ FWHM



Sensitivity:



Comparison MEGA/COMPTEL

	MEGA	COMPTEL	
A _{eff}	100	25-30	cm ²
E:	0.5-50	1-30	MeV
F.o.V.	4	1	sr
ang.res.	~2°	3.5°	FWHM
En.res.	~3%	8%	@ 1.8 MeV

Sensitivity Gain Factor:

A_{eff}: 3
 Resolution Element: 30-90
 (3 from ARM, 10-30 from e-tracking)

overall: 10-15

Mission Scenario:

MEGA should operate in a low-inclination LEO (height ~ 500 km)

The telescope with its large field-of-view is best used in a zenith-pointing scan mode to continuously monitor a large fraction of the sky for transient sources and to accumulate exposure for galactic and extragalactic sources.

Examples for a 2-year orbital exposure at $i=21.5^\circ$ or 51.5° (ISS):
Exposures ($\text{cm}^2 \text{ s}$) $0.7-1.7 \cdot 10^9$ $0.8-1.2 \cdot 10^9$

Examples for a ~ 22 day orbital exposure ($T_{\text{obs}} \sim 10^6 \text{ s}$)
Exposures ($\text{cm}^2 \text{ s}$) $0.7-2.7 \cdot 10^7$ $1.5-3.2 \cdot 10^7$

Proposals and Plans:

January 2000: Proposal to the ESA call for a F2/F3 mission

Not successful: main points of critique:

1. Advance in performance not clearly stated
2. Radiation hardness of tracker is of concern
3. Size of Collaboration small -
is there too little interest in the larger community?

June 20, 2000: German ,Kleinsatellit‘ Program Proposal due