Gamma-ray Large Area Space Telescope

GLAST

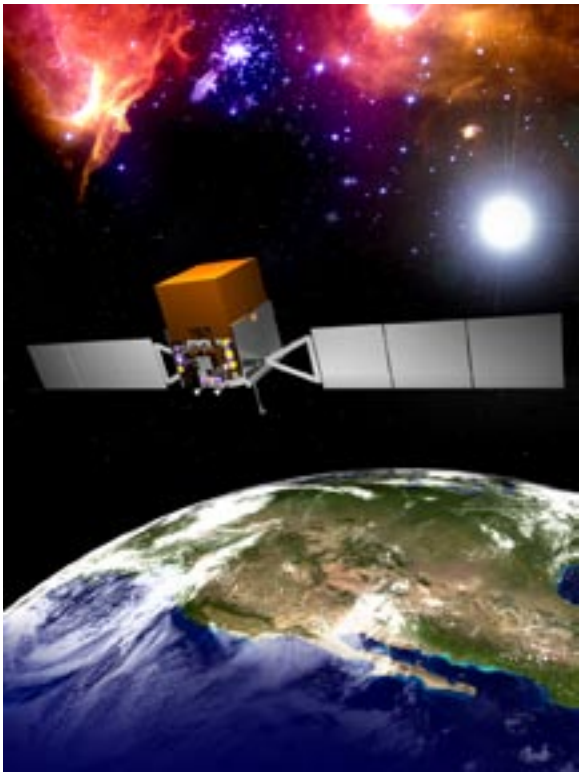
The Gamma-ray Large Area Space Telescope (GLAST) is an international and multi-agency space mission that will study the cosmos in the energy range 10 keV to > 300 GeV. The main instrument, the Large Area Telescope (LAT), will have superior area, angular resolution, field of view, and deadtime that together will provide a factor of 30 or more advance in sensitivity relative to the EGRET instrument on the Compton Observatory, as well as provide capability for study of transient phenomena. The GLAST Burst Monitor (GBM) will have a field of view several times larger than the LAT and will provide spectral coverage of gamma-ray bursts that extends from the lower limit of the LAT down to 8 keV. With the LAT and GBM, GLAST will be a flexible observatory for investigating the great range of astrophysical phenomena best studied in high-energy gamma rays.

The anticipated advances in astronomy and physics with GLAST are among the central subjects of NASA's Beyond Einstein program and the Department of Energy's particle physics research program. The GLAST mission is also supported by the physics and astrophysics programs in the partner countries of France, Germany, Italy, Japan, and Sweden. The mission will be supported by a vigorous, multi-disciplinary guest investigator program to maximize the discovery potential. The launch is scheduled for early 2008.

The Whole Sky: With its very large field of view, the LAT sees ~20% of the sky at any time. In sky survey mode, which is the primary observing mode, the LAT will cover the entire sky every three hours. The observatory can also be pointed as needed and can slew autonomously when sufficiently bright gamma-ray bursts are detected onboard by either instrument.

Guest Investigator Program: The Guest Investigator and GLAST Fellows Program are planned to start in 2007. For further information, see http://glast.gsfc.nasa.gov/ssc/. Information about the GLAST Users Group can be found at: http://glast.gsfc.nasa.gov/ssc/resources/gug/.

With its large leap in capabilities, GLAST will address many important science topics including: Active Galactic Nuclei and their jets, Gamma-ray bursts, pulsars, the origin of cosmic rays, probing the era of galaxy formation and the optical-UV Extragalactic Background Light (EBL), searches for signals of new phenomena, including particle dark matter annihilations and other topics in particle astrophysics, EGRET unidentified gamma-ray sources, and solar flares. We expect that, with its capabilities, GLAST will also yield important unanticipated findings.



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International Partners:
France, Germany, Italy, Japan, and Sweden

GLAST Science Support Center:
Goddard Space Flight Center

GLAST Users Group:
Chair: Josh Grindlay, Harvard

Education and Outreach:
Lynn Cominsky, Sonoma State University

Spacecraft Contractor:
General Dynamics C4 Systems

For More Information:
Mission: http://glast.gsfc.nasa.gov/
LAT: http://glast.stanford.edu/
GBM: http://gammaray.nsstc.nasa.gov/gbm/
GSSC: http://glast.gsfc.nasa.gov/ssc/
EPO: http://glast.sonoma.edu/

Gamma-ray Large Area Space Telescope

	Large Area Telescope (LAT) Requirements*	EGRET
Energy Range	20 MeV to > 300 GeV	20 MeV to 30 GeV
Peak Effective Area[1]	> 8000 cm^2	1500 cm^2
Field of View	> 2 sr	0.5 sr
Angular Resolution[2]	< 3.5° (100 MeV) < 0.15° (> 10 GeV)	5.8° (100 MeV)
Energy Resolution[3]	< 10%	10%
Deadtime per Event	< 100 μs	100 ms
Source Location Determination[4]	< 0.5'	15'
Point source Sensitivity[5]	< 6 x 10^{-9} cm^{-2} s^{-1}	~ 10^{-7} cm^{-2} s^{-1}

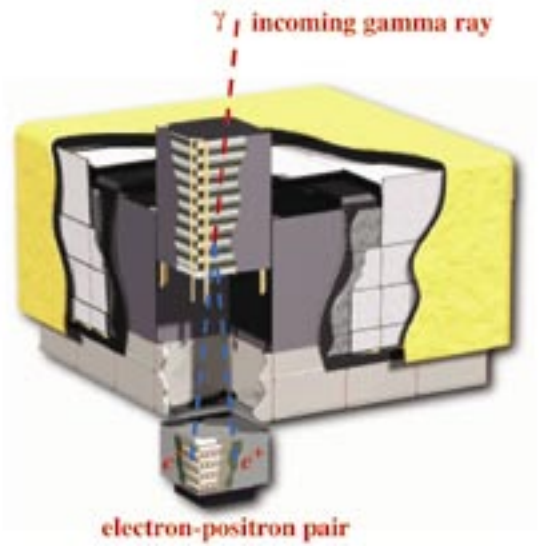
* For more info see: http://www-glast.slac.stanford.edu/software/IS/glast_lat_performance.htm
[1] After background rejection and all selections, on-axis, 1 - 10 GeV
[2] Single photon, 68% containment, on-axis
[3] 1σ, on-axis, 100 MeV - 10 GeV
[4] 1σ radius, flux 10^{-7} cm^{-2} s^{-1}, > 100 MeV, high $|b|$, 1-year all sky survey, photon spectral index -2
[5] > 100 MeV, high $|b|$, 1-year all sky survey, photon spectral index -2, 5σ detection

	GLAST Burst Monitor (GBM) Requirements	BATSE
Energy Range	8 keV to > 25 MeV	25 keV to 10 MeV
Field of View	> 8 sr	
Energy Resolution[1]	< 10%	< 10%
Deadtime per Event	< 10 μs	
Burst Sensitivity[2]	< 0.5 cm^{-2} s^{-1}	0.2 cm^{-2} s^{-1}
Alert GRB Location[3]	~15° (goal)	~ 25°
Burst Sensitivity On-board Trigger[4]	< 1.0 cm^{-2} s^{-1}	0.3 cm^{-2} s^{-1}

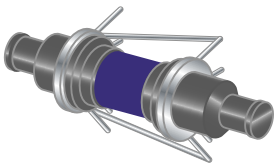
[1] 1σ, 0.1 - 1 MeV
[2] 50 - 300 keV, 5σ detection, ground analysis
[3] Calculated on-board; > 1 sec burst of 10 photons cm^{-2} s^{-1} , 50 - 300 keV
[4] 50% efficiency level for bursts within GBM FOV, excluding observational inefficiencies (e.g., SAA and Earth occultations), 50 - 300 keV

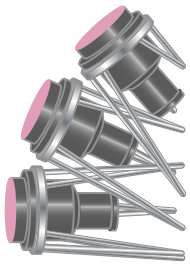
Instrument Design

The instruments on the GLAST mission are the Large Area Telescope (LAT) and the GLAST Burst Monitor (GBM). The LAT has four subsystems: a solid state detector (silicon strip) pair conversion tracker for gamma-ray detection and direction measurement, a CsI calorimeter for measurement of the energies, a plastic scintillator anticoincidence system to provide rejection of the intense background of charged particles, and a flexible trigger and dataflow system. The LAT is modular, consisting of a 4 × 4 array of identical towers with 880,000 silicon-strip detector channels. The GBM has 12 NaI scintillators and two BGO scintillators mounted on the sides of the spacecraft. The GBM will view the entire sky not occulted by Earth, with energy coverage from a few keV to 30 MeV, overlapping with the lower energy limit of the LAT and with the range of GRB detectors on previous missions.



LAT


GBM - HE BGO (1 of 2)


GBM - LE NaI (3 of 12)

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