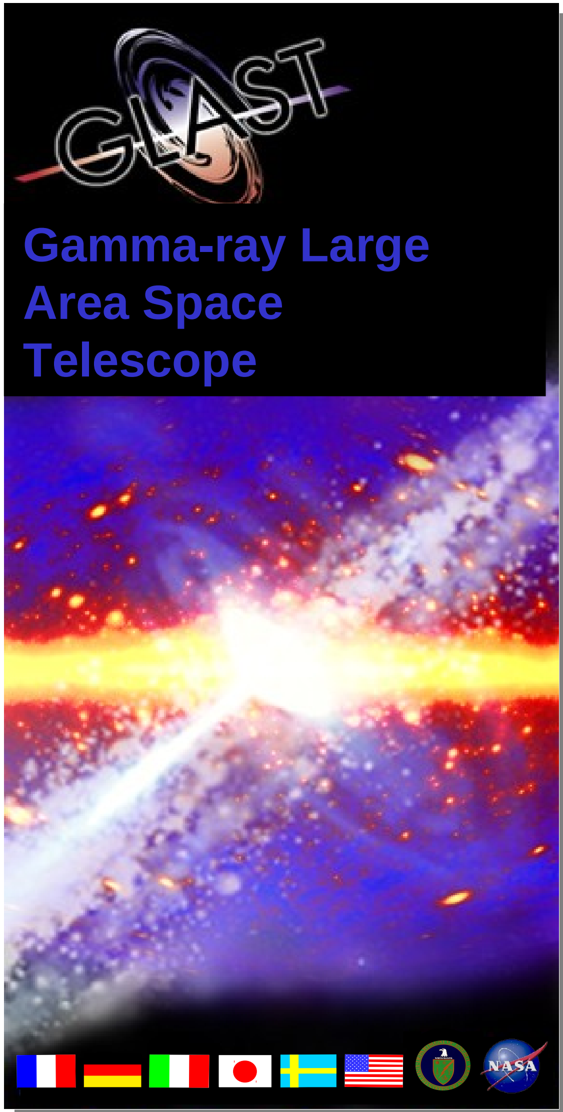


GLAST

The Gamma-ray Large Area Space Telescope

Welcome and Introductions

GLAST Pre-launch Media Telecon
May 27, 2008

Lynn Cominsky
GLAST Press Officer and E/PO Lead
lynnc@universe.sonoma.edu

for the GLAST Mission Team

http://www.nasa.gov/glast

GLAST is…..

- The Gamma-ray Large Area Space Telescope (to be renamed after launch)
- NASA's next generation gamma-ray mission
  - Explore the most extreme environments in the Universe, where nature harnesses energies far beyond anything possible on Earth.
  - Search for signs of new laws of physics and what composes the mysterious Dark Matter.
  - Explain how black holes accelerate immense jets of material to nearly light speed.
  - Help crack the mysteries of the stupendously powerful explosions known as gamma-ray bursts.
  - Answer long-standing questions across a broad range of topics, including solar flares, pulsars and the origin of cosmic rays.
- An astrophysics and particle physics partnership
  - NASA, Department of Energy and contributions from institutions and agencies in France, Germany, Italy, Japan and Sweden and the U.S.

Available Reference Materials

- GLAST Science Writer's Guide
- GLAST Science Fact Sheet
- GLAST schematic
- GLAST Public Fact Sheet
- GLAST Lithograph

- The Main NASA GLAST web site:
  - http://www.nasa.gov/glast
- The GLAST E/PO site – has Multimedia, images, print materials:
  - http://glast.sonoma.edu

GLAST Public Affairs Team Leads

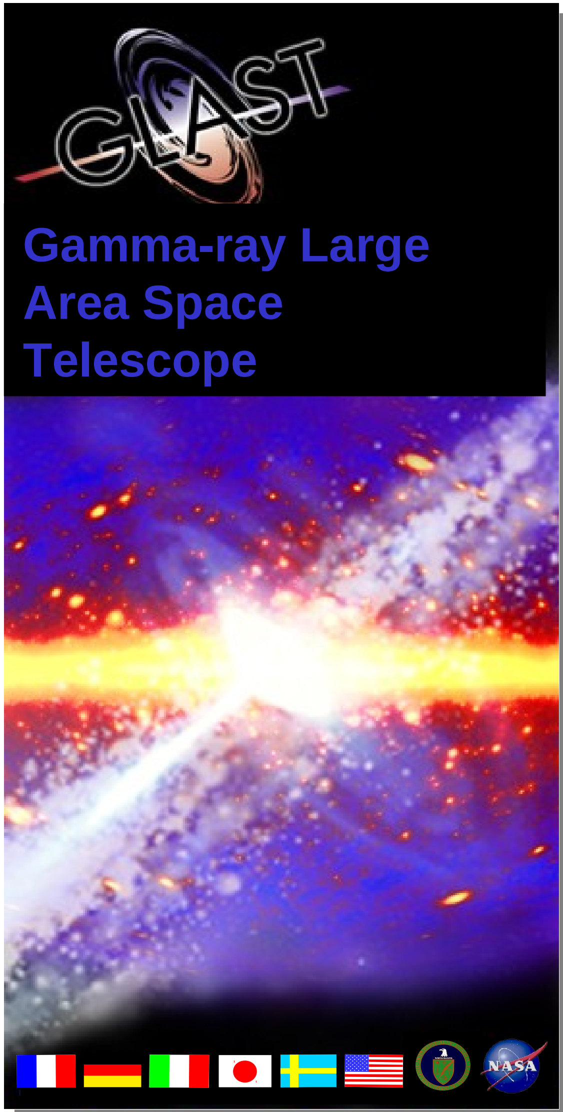
- Lynn Cominsky, GLAST Press Officer and Education and Public Outreach Lead, Sonoma State University
  lynnc@universe.sonoma.edu
- Rob Gutro, NASA/GSFC Public Affairs Officer
  Robert.J.Gutro@nasa.gov
- Dee Kekesi, NASA/GSFC Video producer
  Dee.Kekesi@nasa.gov

GLAST Telecon Participants

- **Dr. Steve Ritz, NASA/GSFC, GLAST Project Scientist**
- **Dr. Dave Thompson, NASA/GSFC, GLAST Deputy Project Scientist and Large Area Telescope Multiwavelength Coordinator**
- **Prof. Peter Michelson, Stanford University, Large Area Telescope Principal Investigator**
- **Dr. Charles “Chip” Meegan, Marshall Space Flight Center, GLAST Burst Monitor Principal Investigator**

GLAST Videos - Available on www.nasa.gov/glast

- GLAST launch and deployment
  - the Delta rocket launch, carrying the satellite into orbit, followed by deployment of the satellite into its final configuration
- GLAST's new window on the Universe
  - an over-shoulder view from the spacecraft, revealing the gamma-ray sky that GLAST will see.
- 360 degree view of the spacecraft in orbit
- GLAST spacecraft in orbit
  - begins with the earth in full view and pans to reveal the spacecraft
- GLAST Simulated Sky Map based on modeled data
- How a pair conversion telescope works
  - a gamma ray (purple) entering a corner tower of the Tracker. After the electron (red) and positron (blue) cascade down the tower, their incoming paths (red/blue) combine to the show the original path (purple) of the gamma ray that created them



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Exploring the Extreme Universe

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Dave Thompson
GLAST Deputy Project Scientist
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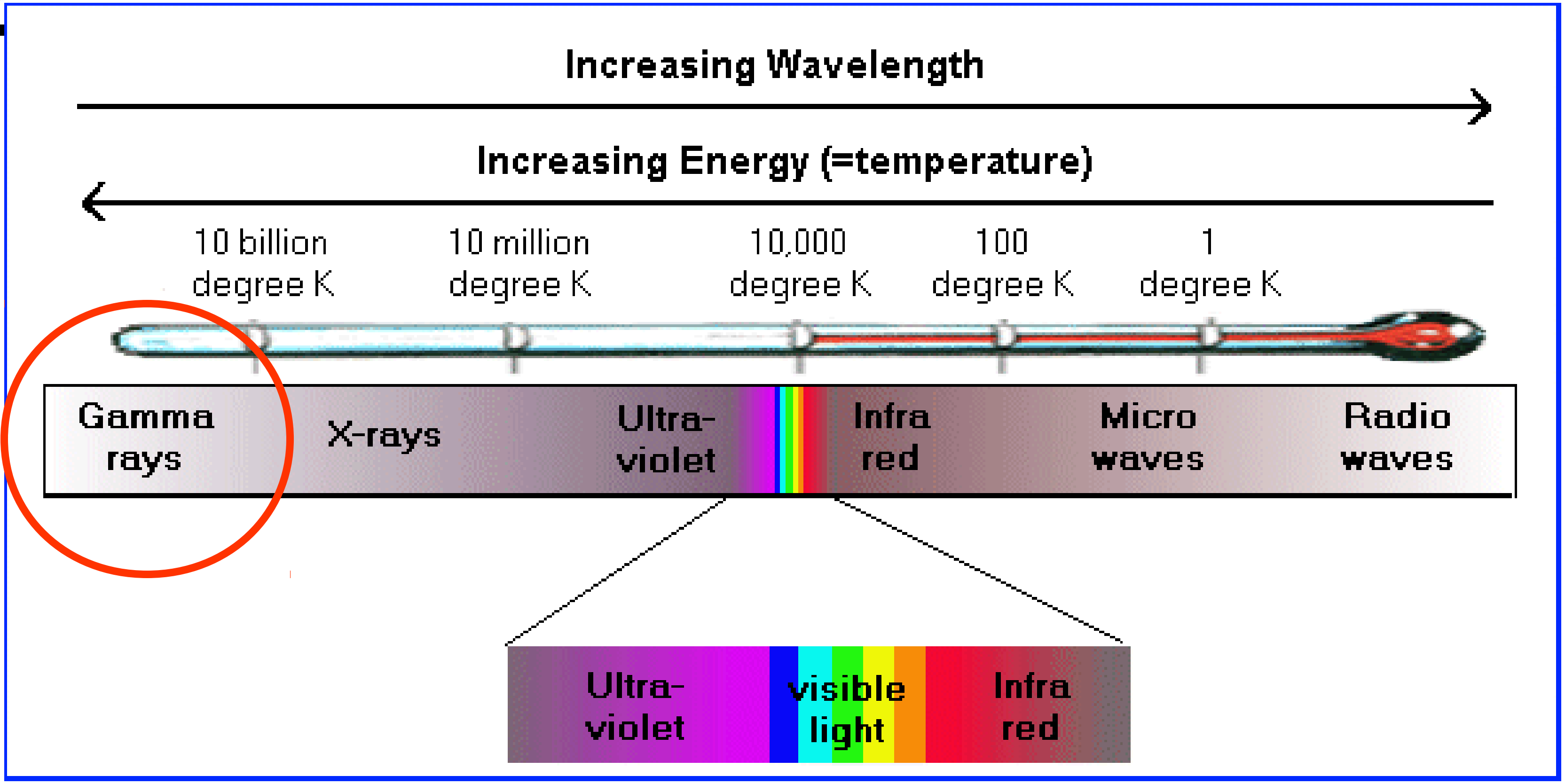
David.J.Thompson@nasa.gov

for the GLAST Mission Team

see http://www.nasa.gov/glast

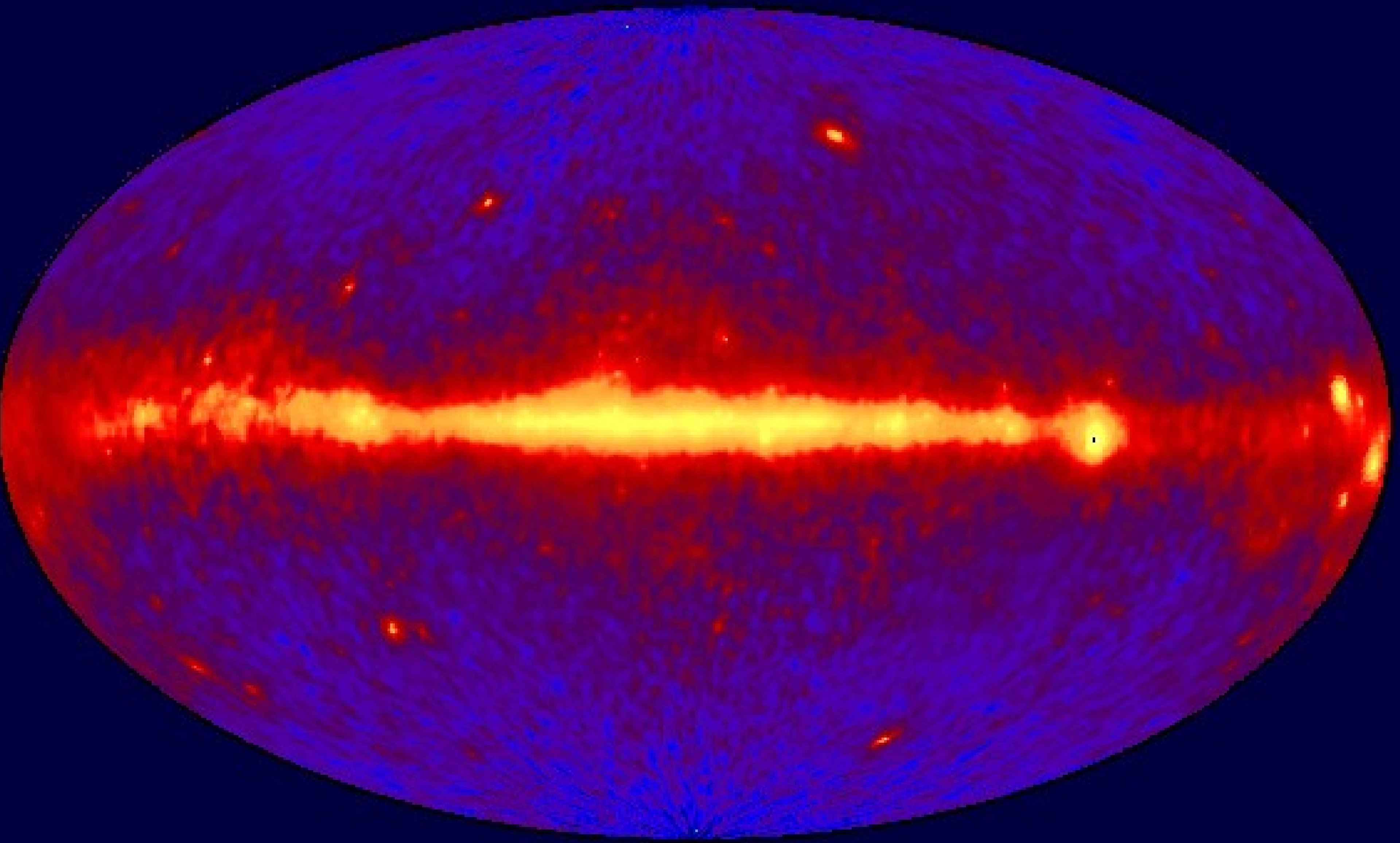
The Electromagnetic Spectrum



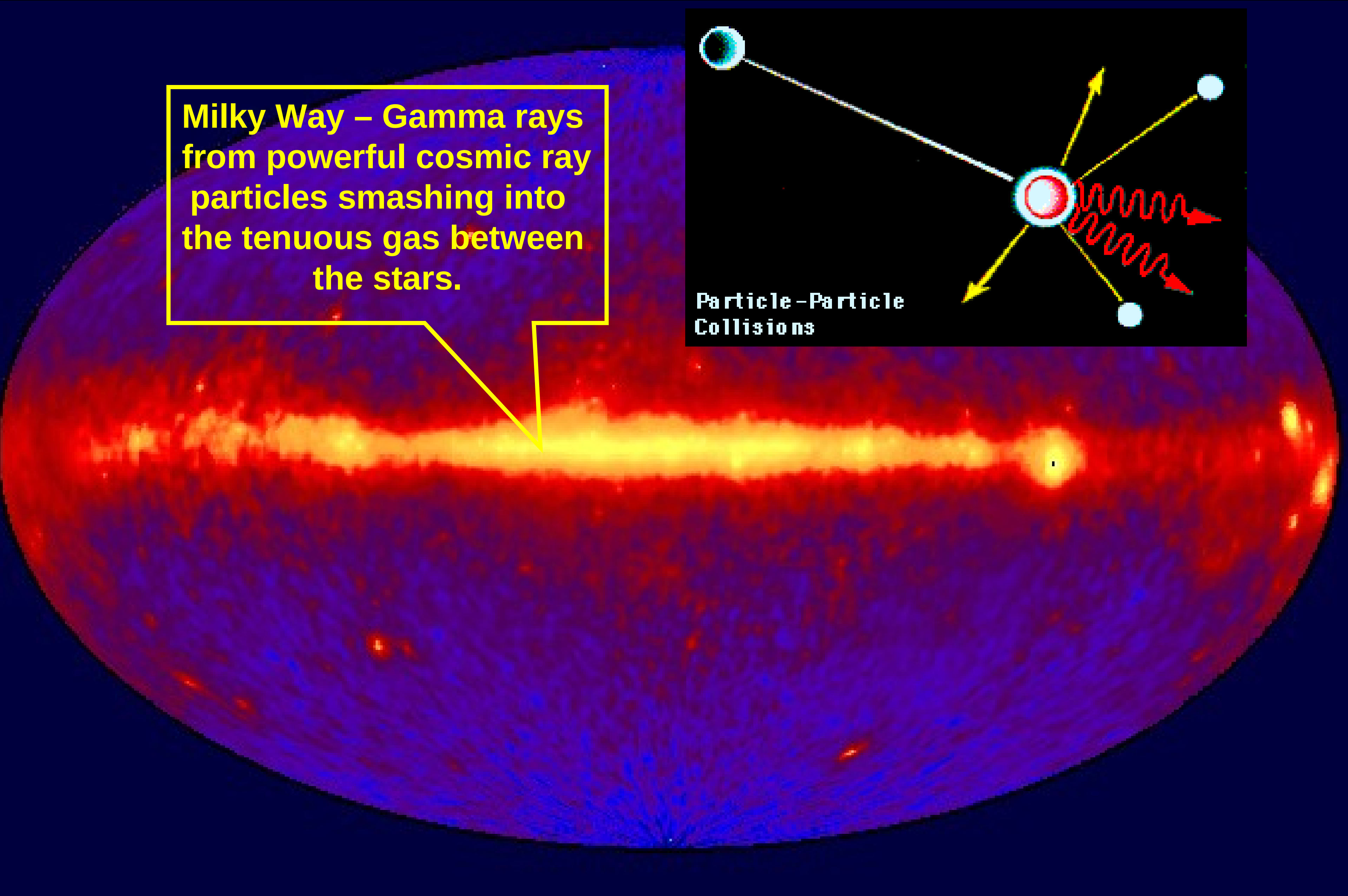
Each part of the spectrum carries different information.

Gamma rays, the highest-energy photons, tell us about the most energetic processes in the Universe.

The Gamma-ray Sky in False Color – from EGRET/Compton Gamma Ray Observatory



The Gamma-ray Sky in False Color – from EGRET/Compton Gamma Ray Observatory



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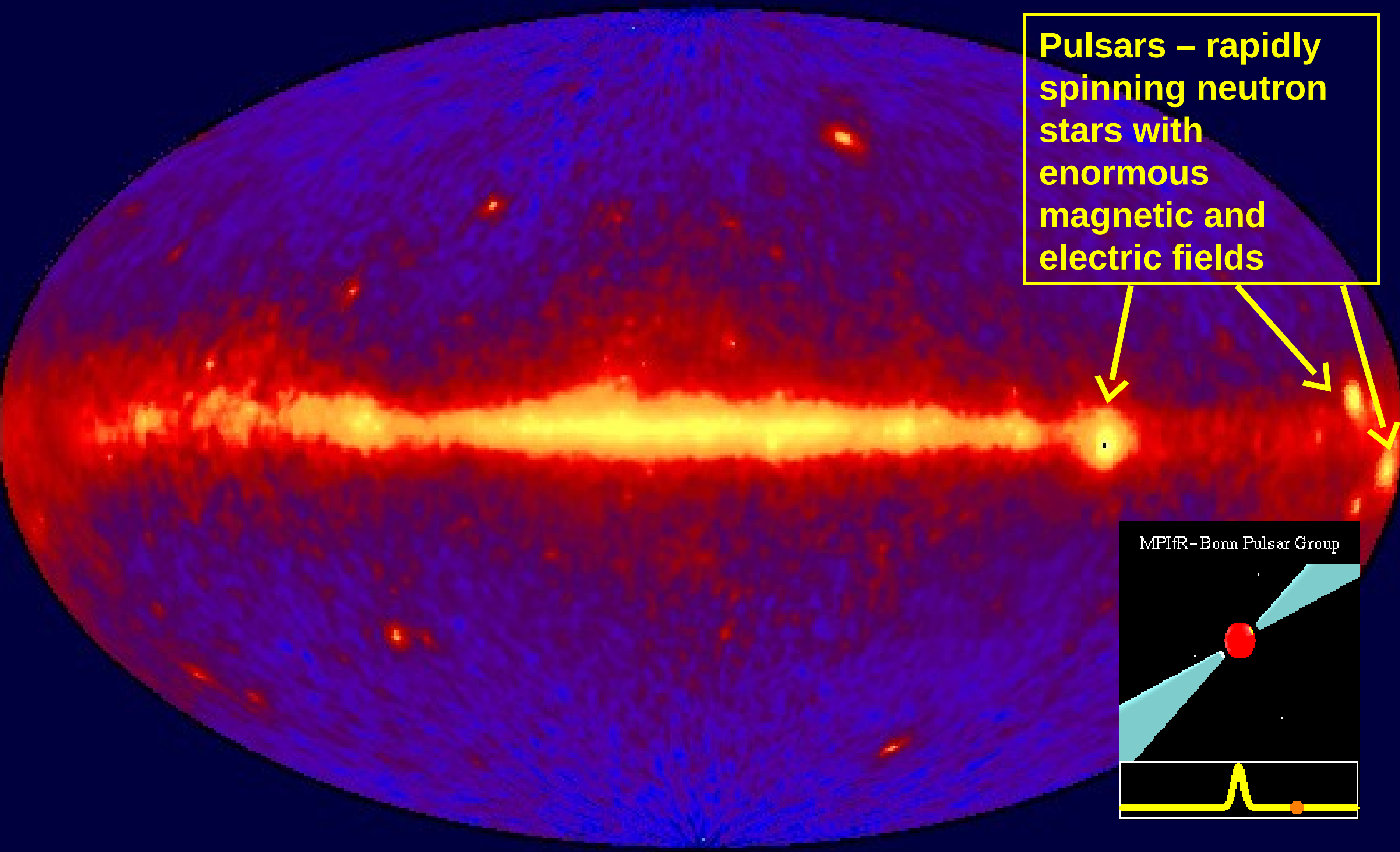
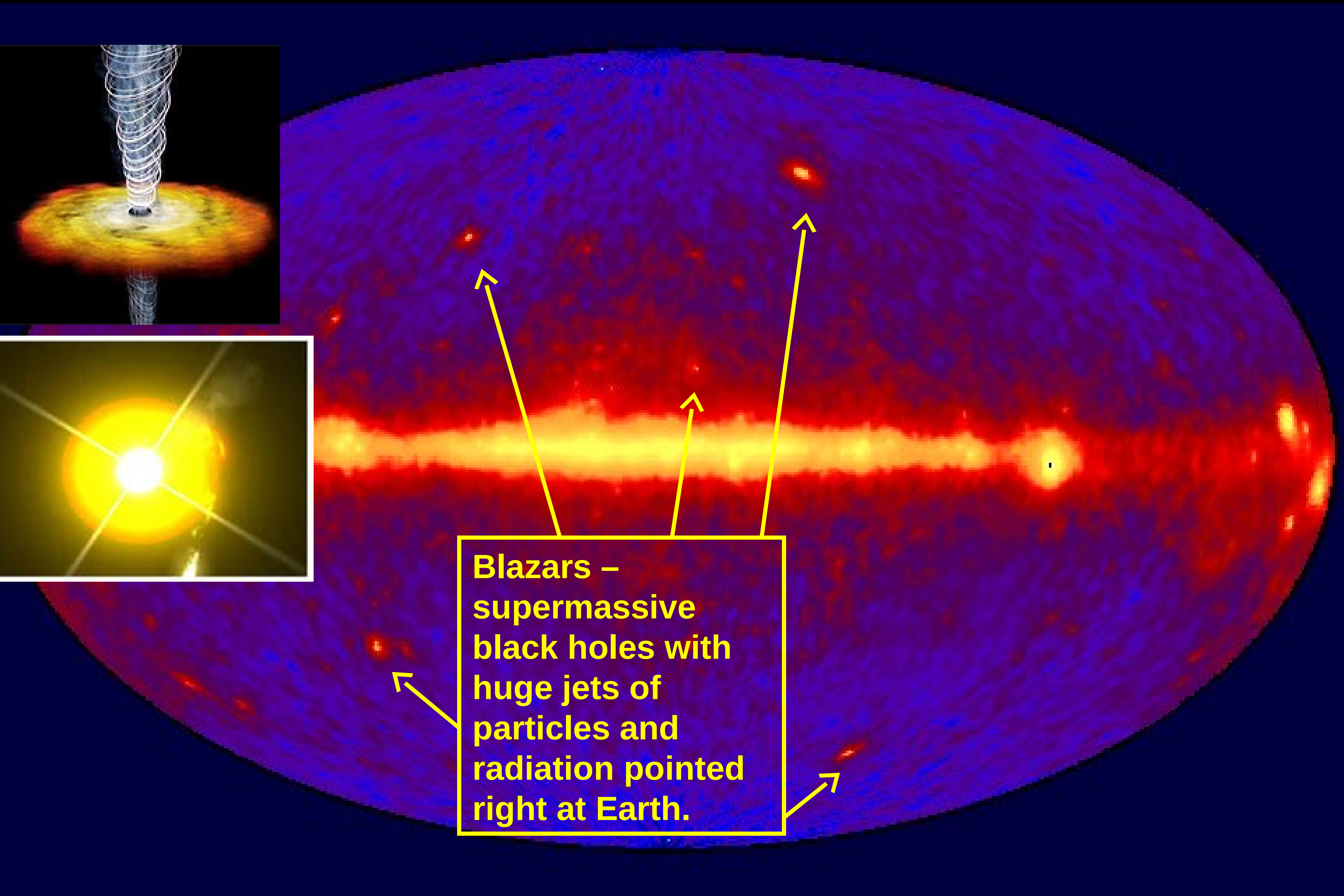


Pulsars – rapidly spinning neutron stars with enormous magnetic and electric fields

The Gamma-ray Sky in False Color – from EGRET/Compton Gamma Ray Observatory



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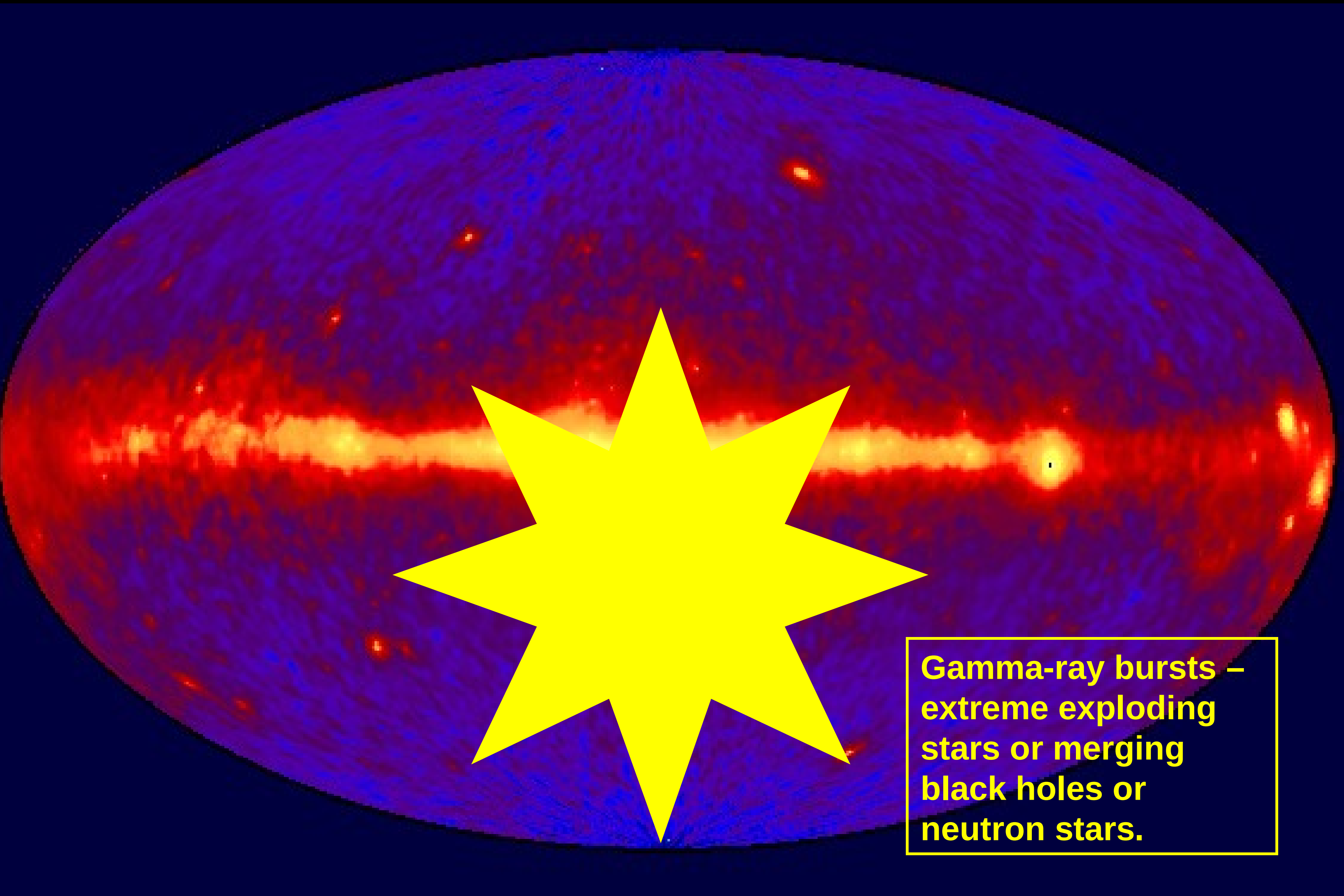

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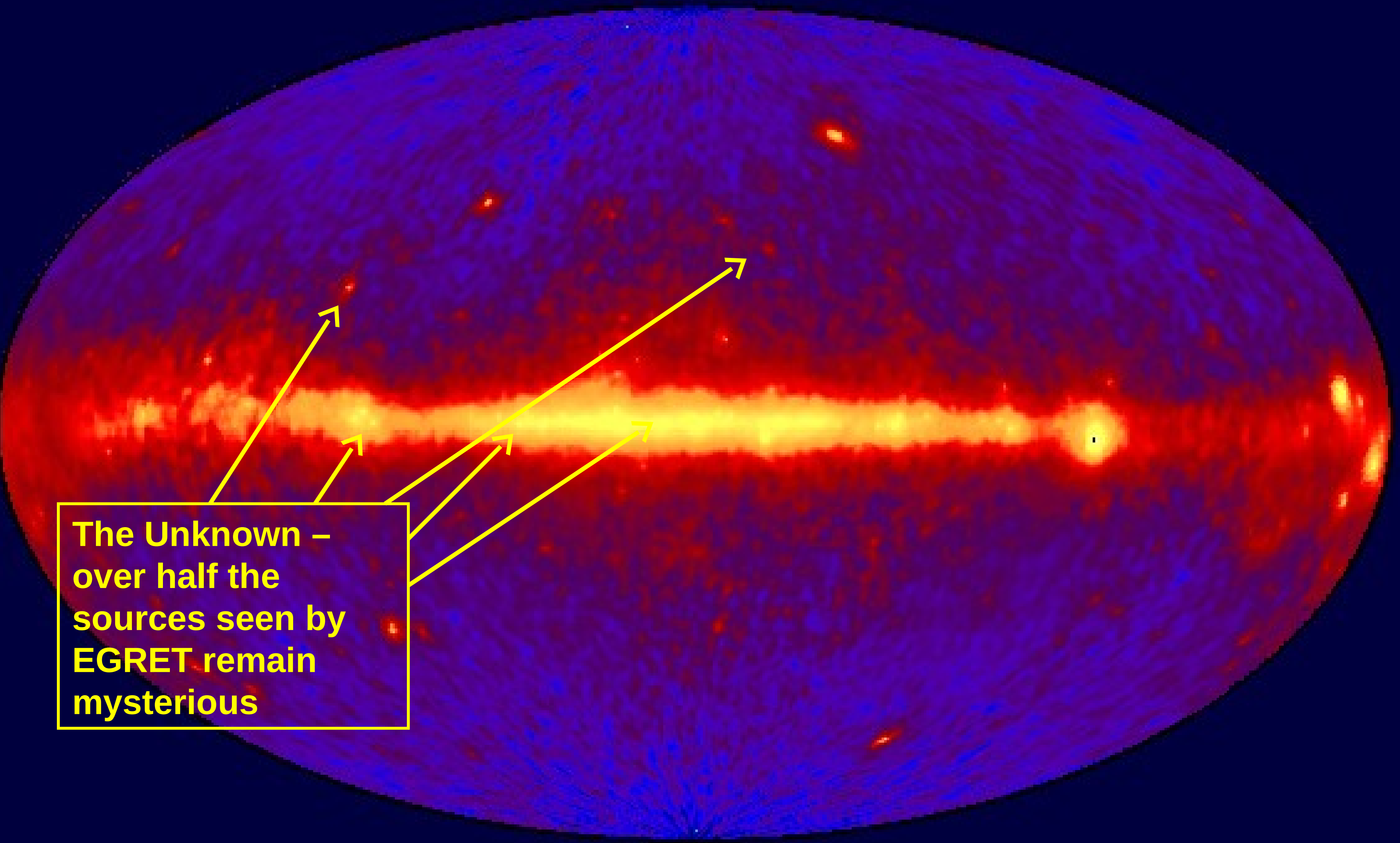

The Gamma-ray Sky – An Overview

We know some of the "what," "when," and "where" – the Universe is populated with powerful, exotic objects and processes that produce gamma rays. Many are variable, and some of these are at cosmological distances.

We have only scratched the surface of "how" and "why" for these gamma-ray phenomena. We have much to learn about how they work and affect the

GLAST

The Gamma-ray Large Area Space Telescope

Mission Science Overview

GLAST PreLaunch Media Telecon
May 27, 2008

Steve Ritz
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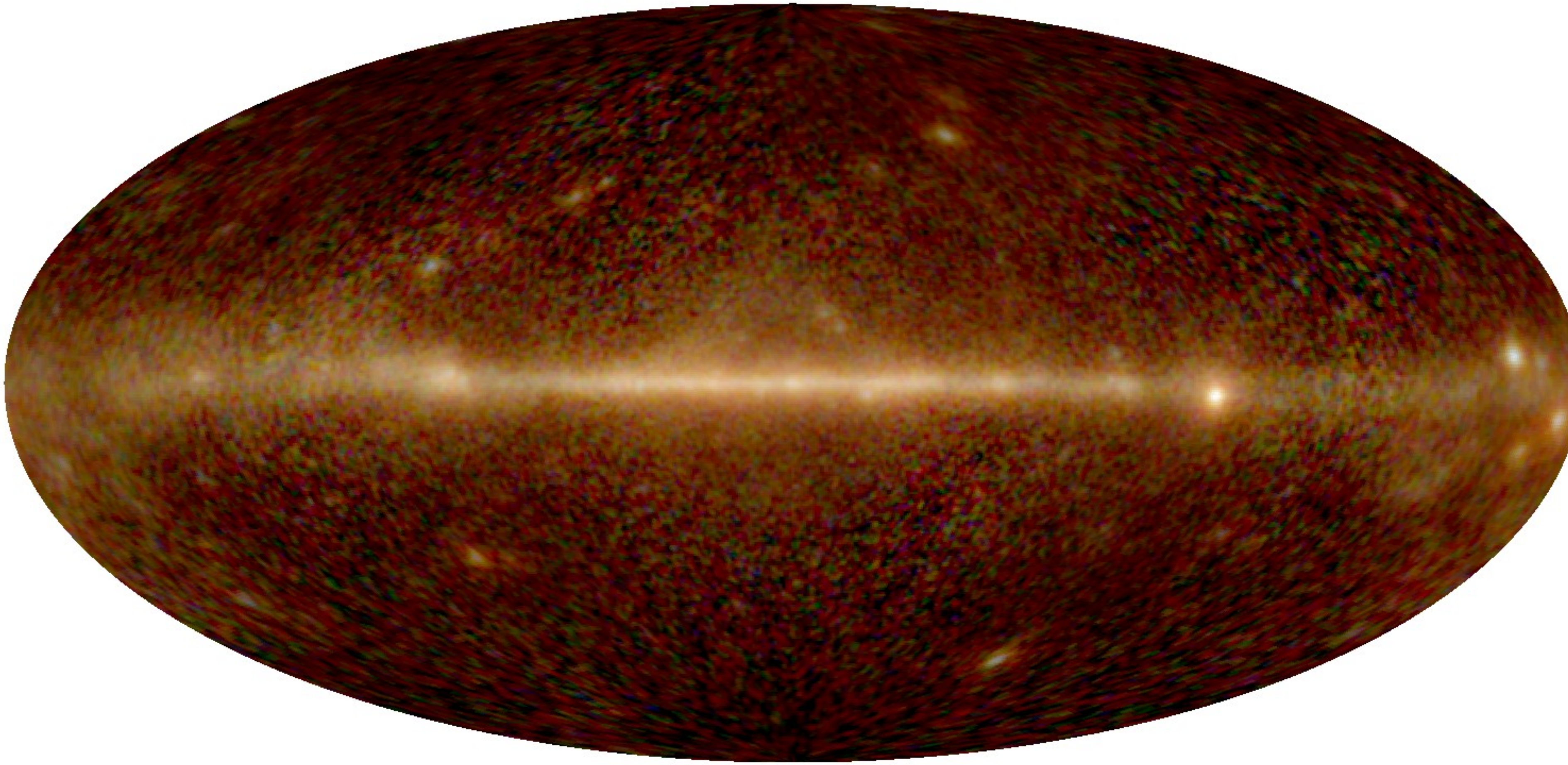
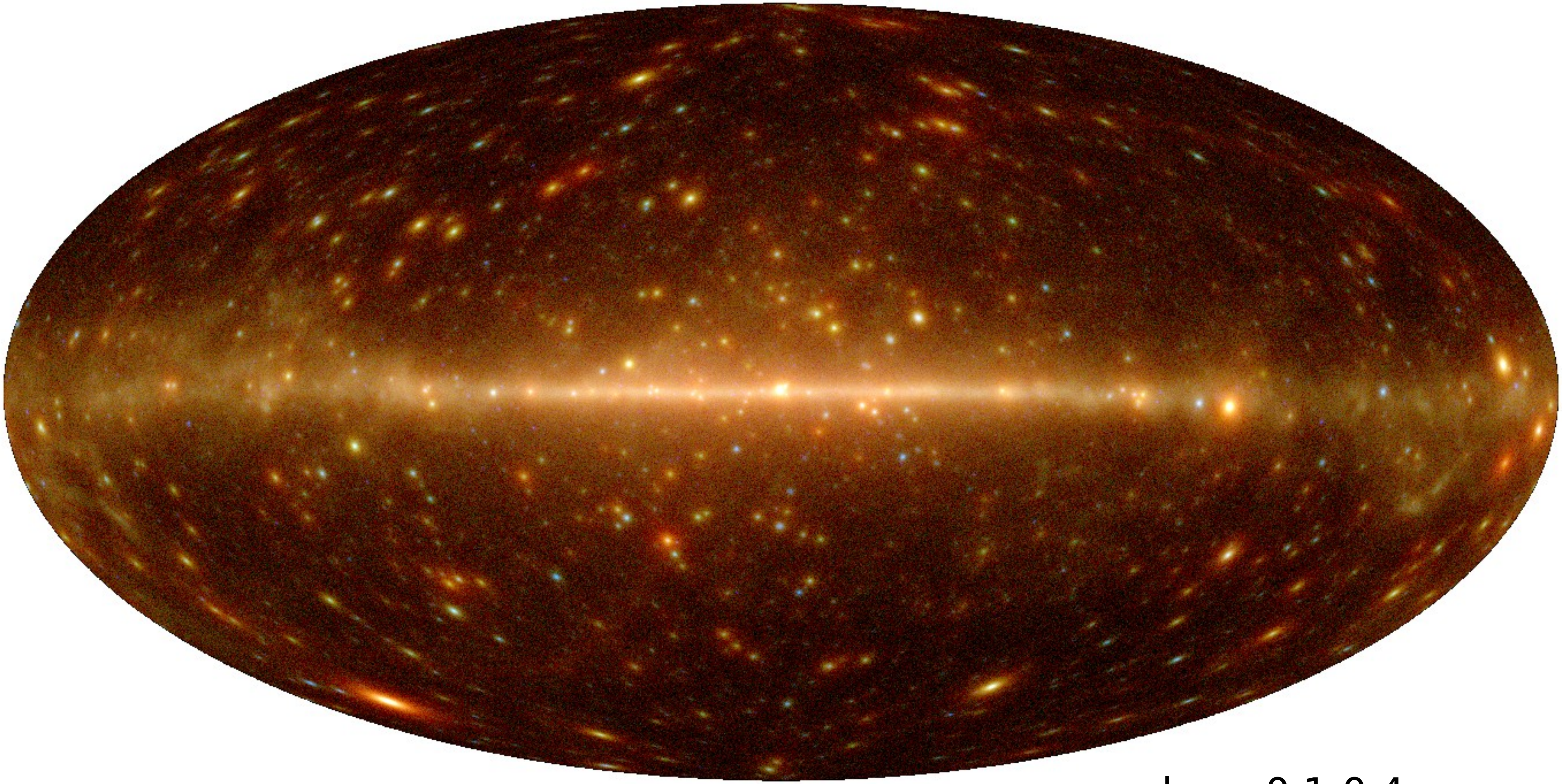
for the GLAST Mission Team

see http://www.nasa.gov/glast

EGRET



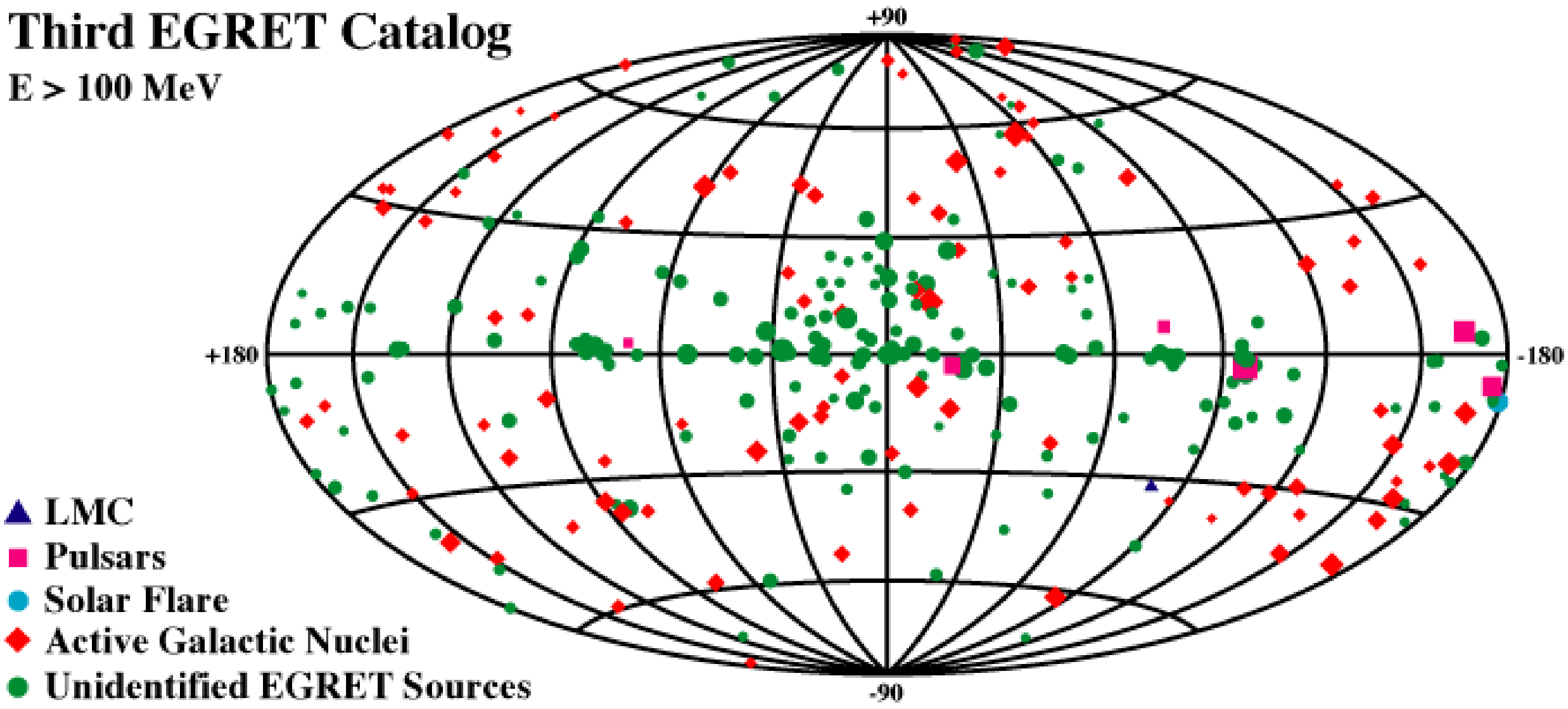
GLAST One-year Simulation



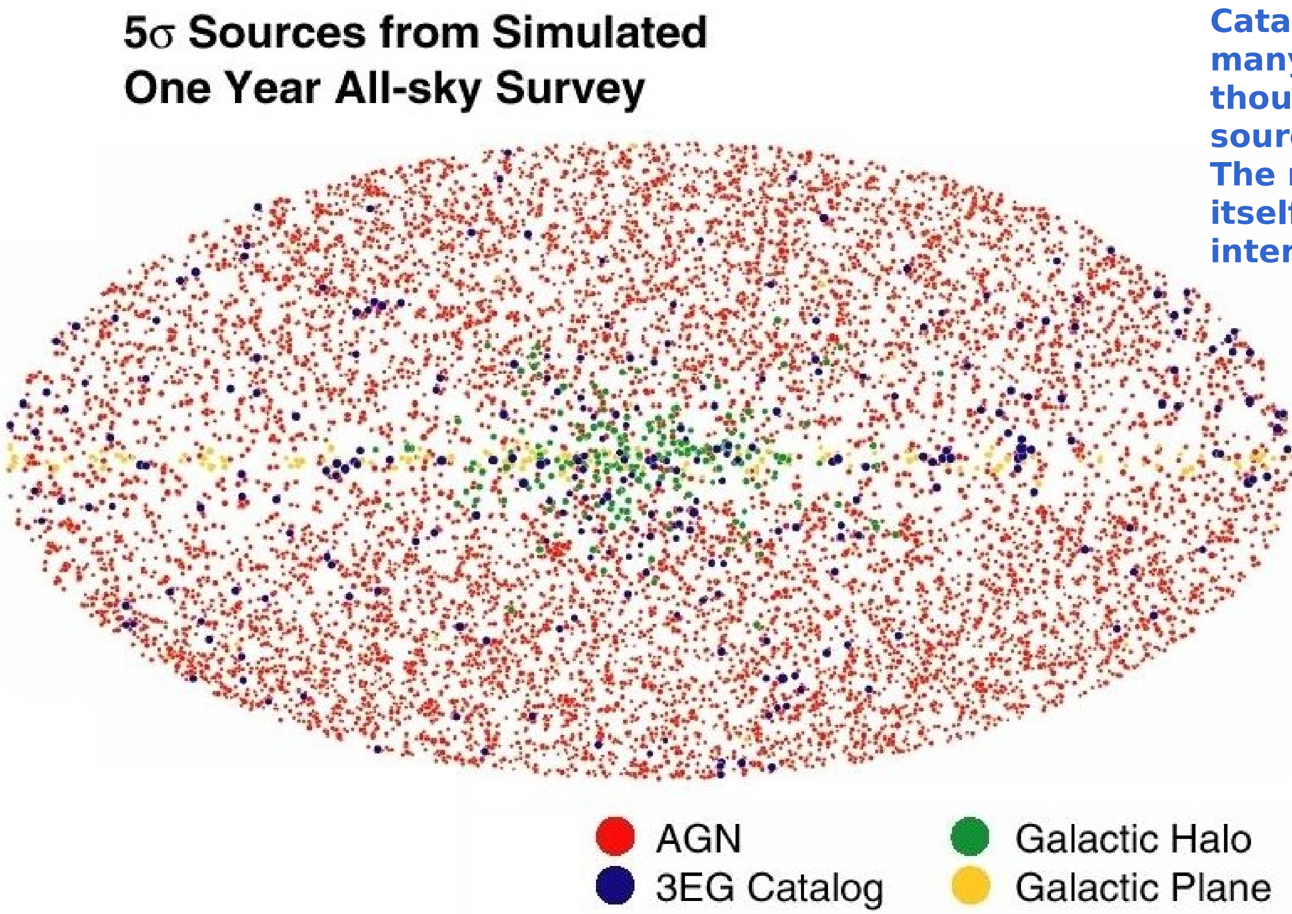
red: 0.1-0.4 GeV
green: 0.4-1.6 GeV

Sources

EGRET 3rd Catalog: 271 sources



Sources



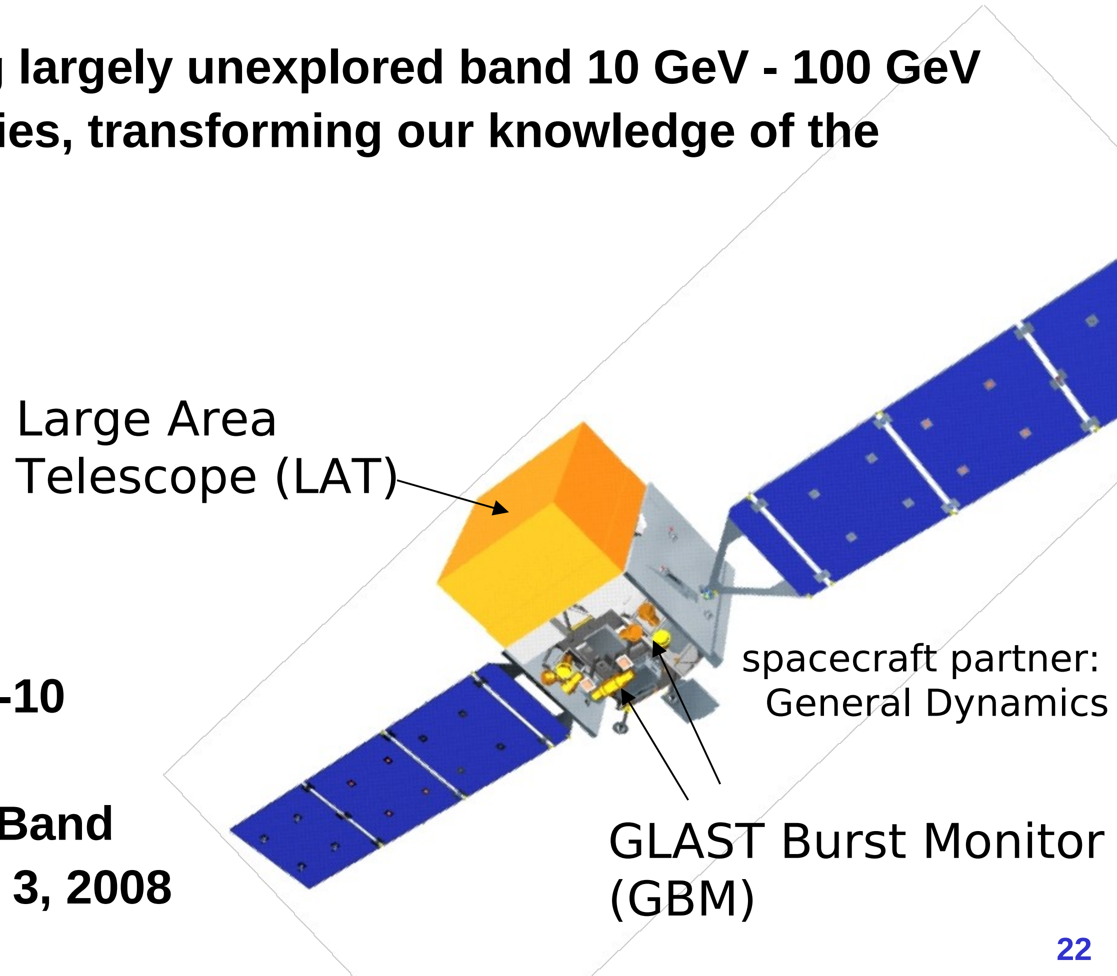
LAT 1st Catalog: many thousands of sources likely. The number itself is interesting!

GLAST Key Features

- Huge field of view
  - LAT: 20% of the sky at any instant; in sky survey mode, expose all parts of sky for ~30 minutes every 3 hours. GBM: whole unocculted sky at any time.
- Huge energy range, including largely unexplored band 10 GeV - 100 GeV
- Large leap in all key capabilities, transforming our knowledge of the gamma-ray universe.

- Two GLAST instruments:
  - LAT: 20 MeV – >300 GeV
  - GBM: 10 keV – 25 MeV

- 565 km, circular orbit
- 5-year mission (10-year goal)
- Launch Vehicle: Delta 7920H-10
- Launch Site: CCAS
- Telemetry: S-Band, Ku-Band
- Launch Readiness Date: June 3, 2008



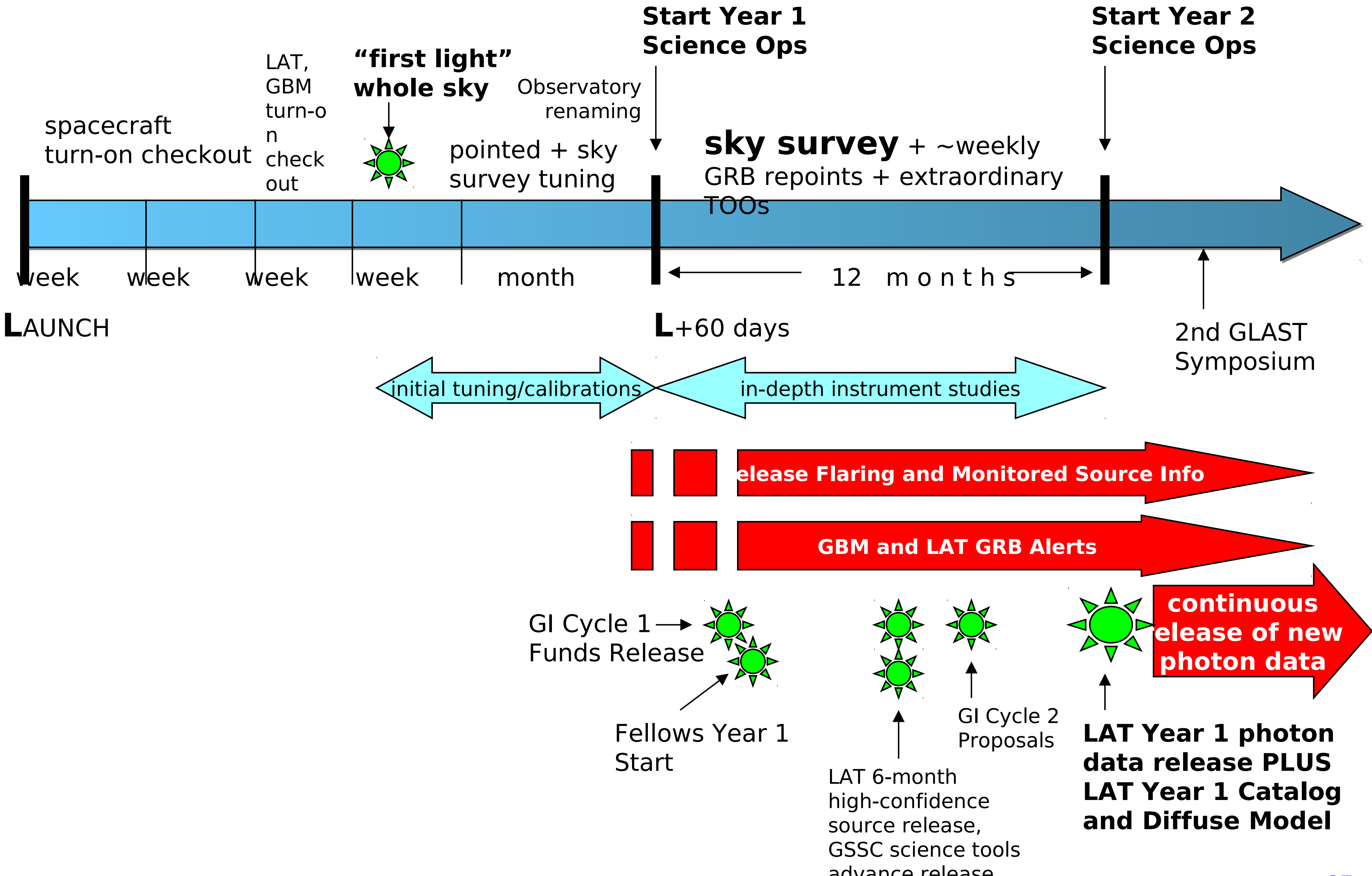
GLAST in the Clean Room at GD

Science Summary

- GLAST will have a big impact on many important questions:
  - How do super massive black holes in Active Galactic Nuclei create powerful jets of material moving at nearly light speed? What are the jets made of?
  - What are the mechanisms that produce Gamma-Ray Burst (GRB) explosions? What is the energy budget?
  - What is the origin of the cosmic rays that pervade the galaxy?
  - How does the Sun generate high-energy gamma rays in flares?
  - How has the amount of starlight in the Universe changed over cosmic time?
  - What are the unidentified gamma-ray sources found by EGRET?
  - What is the mysterious dark matter?

- Huge leap in key capabilities enables large menu of known exciting science and <u>large discovery potential</u>.

Year 1 Science Operations Timeline Overview



GLAST

The Gamma-ray Large Area Space Telescope

The Large Area Telescope (LAT)

GLAST PreLaunch Media Telecon
May 5, 2008

Peter F. Michelson
LAT Principal Investigator
peterm@stanford.edu

for the GLAST Mission Team

see http://www.nasa.gov/glast

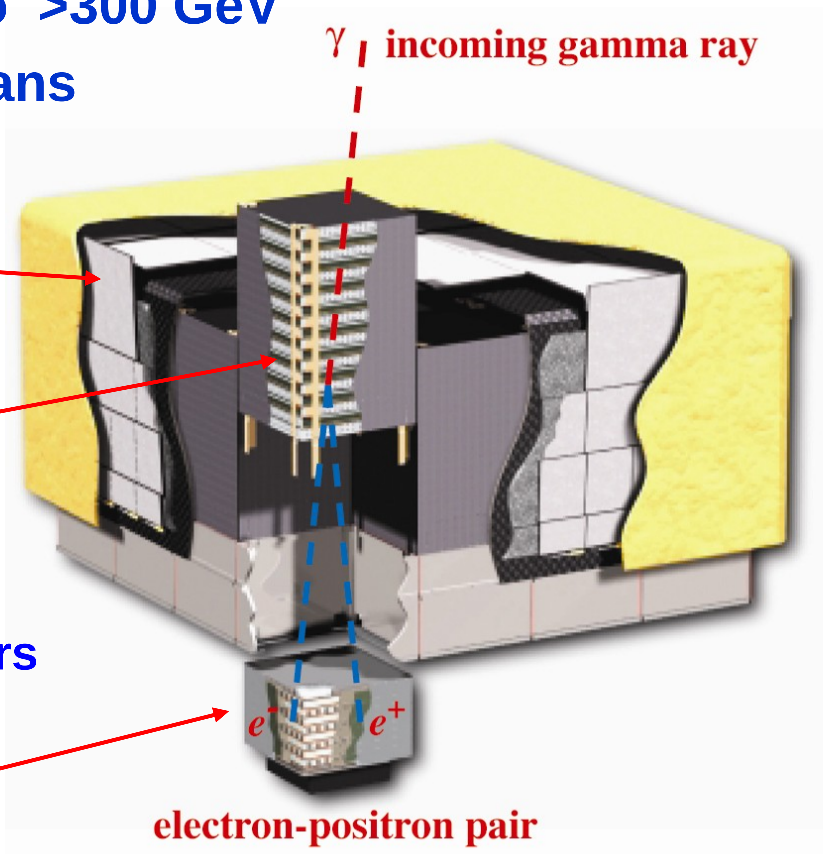
Gamma Rays Are So Energetic That…

$$E=mc^2$$

matters!

The Large Area Telescope

- Principal instrument on the GLAST observatory
  - pair-conversion telescope
  - large energy range: 20 MeV to >300 GeV
  - large field-of-view: 2.4 steradians

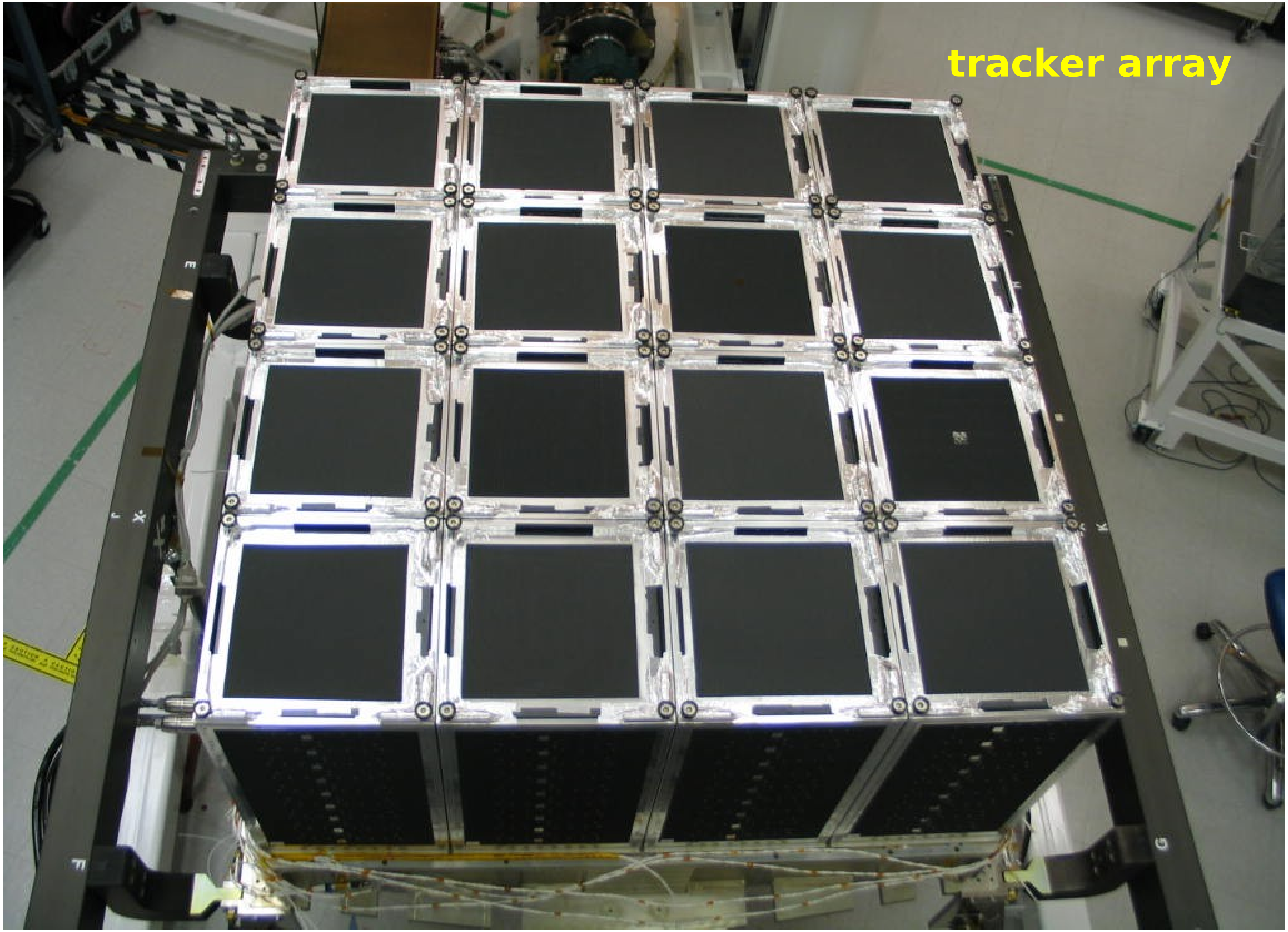


Anti-coincidence Detector:
- array of plastic scintillator tiles
- vetos CR background

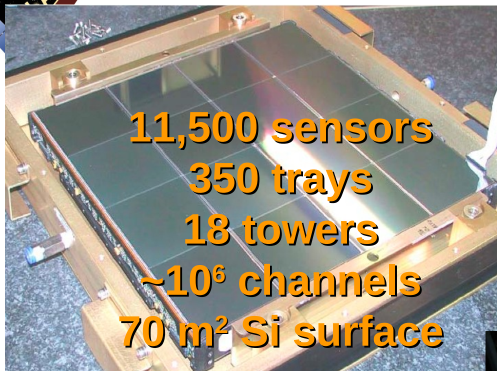
Tracker (16 towers):
- tungsten conversion foils
- measures e^-/e^+ tracks
  → 18 layers of silicon strip detectors
  → 70 m^2 of Si detectors

Calorimeter (16 modules):
- measures photon energy
  → 1536 CsI crystals

The Large Area Telescope

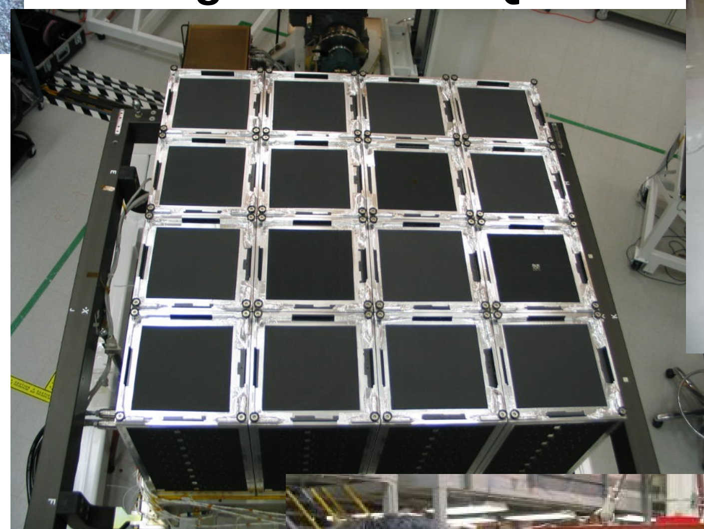


LAT Construction: An International Effort

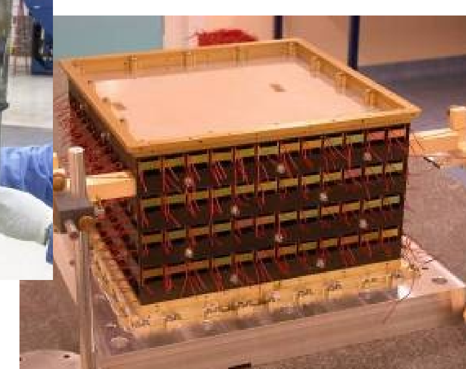


Tracker: US, Italy, Japan

Integration & DAQ: US



ACD: US



Calorimeter: US, France, Sweden

GLAST LAT Collaboration

- France
  - IN2P3, CEA/Saclay
- Italy
  - INFN, ASI, INAF
- Japan
  - Hiroshima University
  - ISAS
  - RIKEN
  - Tokyo Institute of Science & Technology
- Sweden
  - Royal Institute of Technology (KTH)
  - Stockholm University
- United States
  - Stanford University (SLAC and HEPL/Physics)
  - University of California at Santa Cruz - Santa Cruz Institute of Particle Physics
  - Goddard Space Flight Center – Laboratory for High Energy Astrophysics
  - Naval Research Laboratory
  - Sonoma State University
  - Ohio State University
  - University of Washington

Principal Investigator:
Peter Michelson (Stanford University)

~270 Members
(~90 Affiliated Scientists, 37 Postdocs, and 48 Graduate Students)

Cooperation between NASA and DOE, with key international contributions from France, Italy, Japan and Sweden.

construction managed by
Stanford Linear Accelerator Center (SLAC), Stanford University

GLAST

The Gamma-ray Large Area Space Telescope

GLAST BURST MONITOR

GLAST Pre-Launch Media Telecon
May 5, 2008

Charles Meegan
Principal Investigator, GBM
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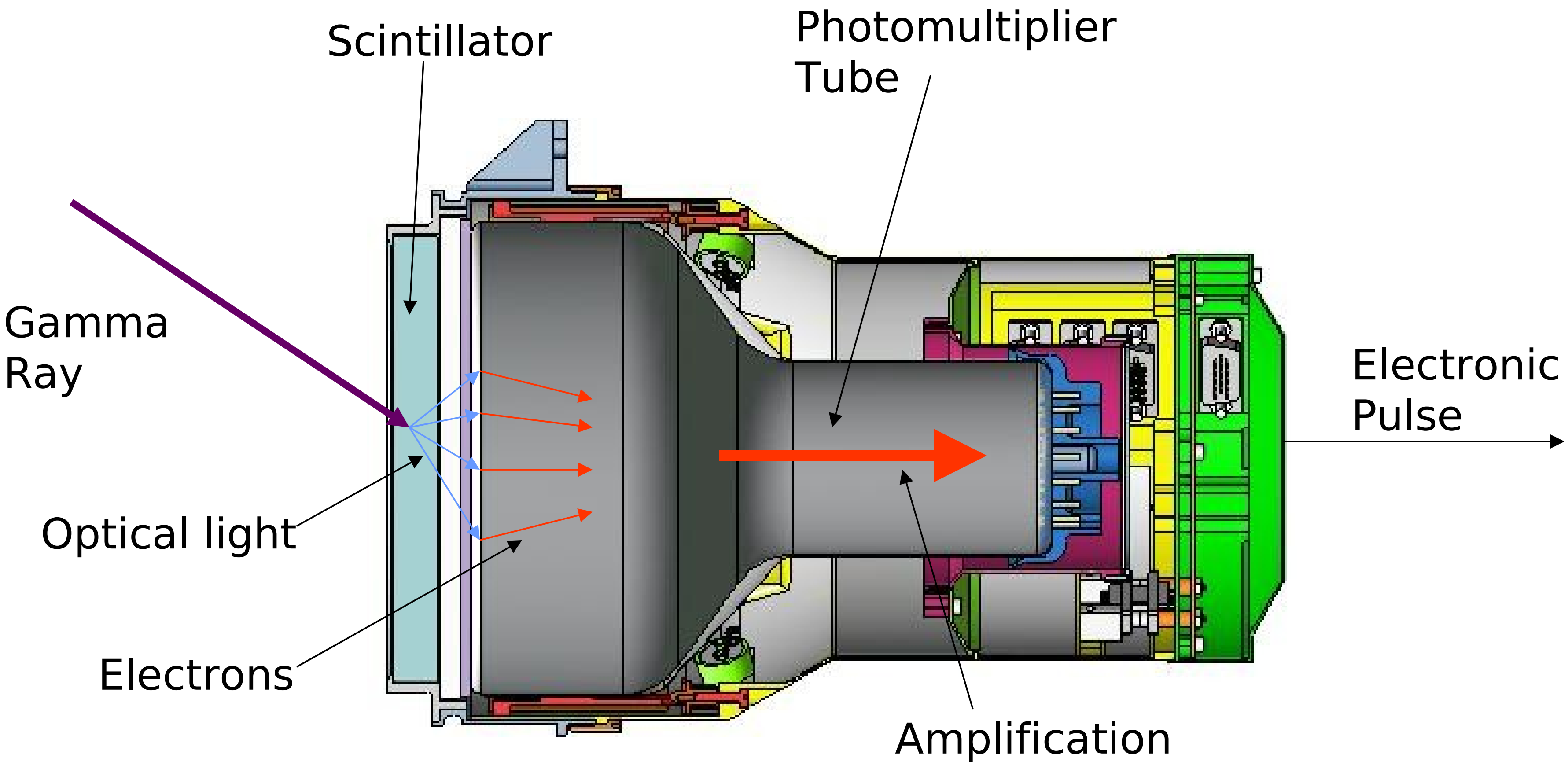
for the GLAST Mission Team

see http://www.nasa.gov/glast

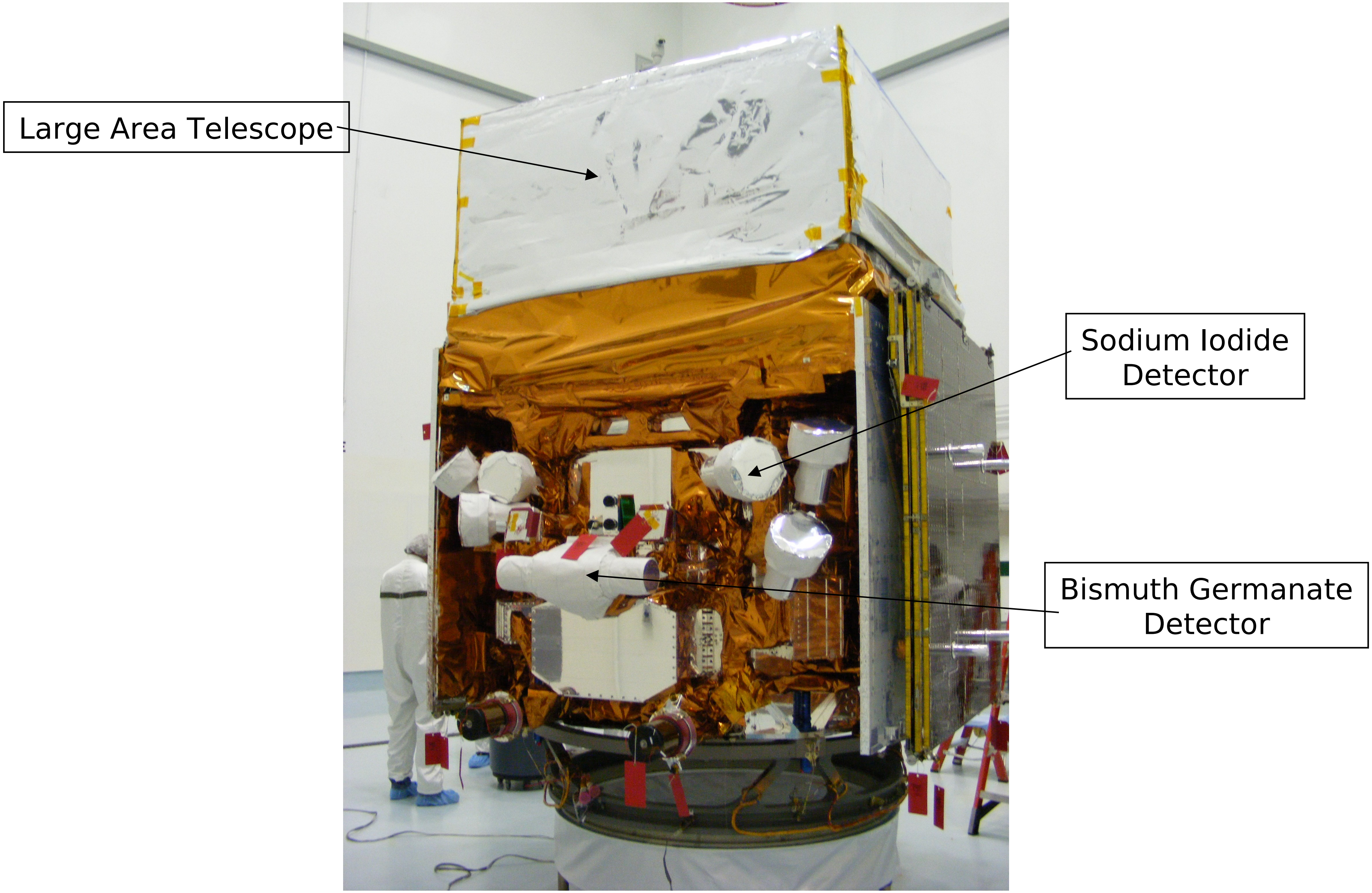
Why GBM?

- Gamma ray bursts radiate primarily at energies below the LAT range
  - GBM is sensitive over this range up to LAT energies
- Gamma ray bursts appear unpredictably from anywhere in the sky
  - GBM observes the whole sky
- Gamma ray bursts may have delayed high energy emission
  - GBM determines locations on-board so LAT can be pointed at interesting bursts.

How GBM Detects Gamma Rays



GBM Detectors on the Observatory



The GBM Team

- Marshall Space Flight Center
  - Project management
  - Engineering support
  - Flight Data Processing Unit
- University of Alabama, Huntsville
  - Science support
  - Software
  - Operations
- Max Planck Institute for Extraterrestrial Physics
  - Science support
  - Flight detectors
  - Flight Power Supply
- Los Alamos National Laboratory
  - Detector response calculations

GLAST

The Gamma-ray Large Area Space Telescope

Program Status

GLAST PreLaunch Media Telecon
May 27, 2008

Kevin Grady & Steve Ritz
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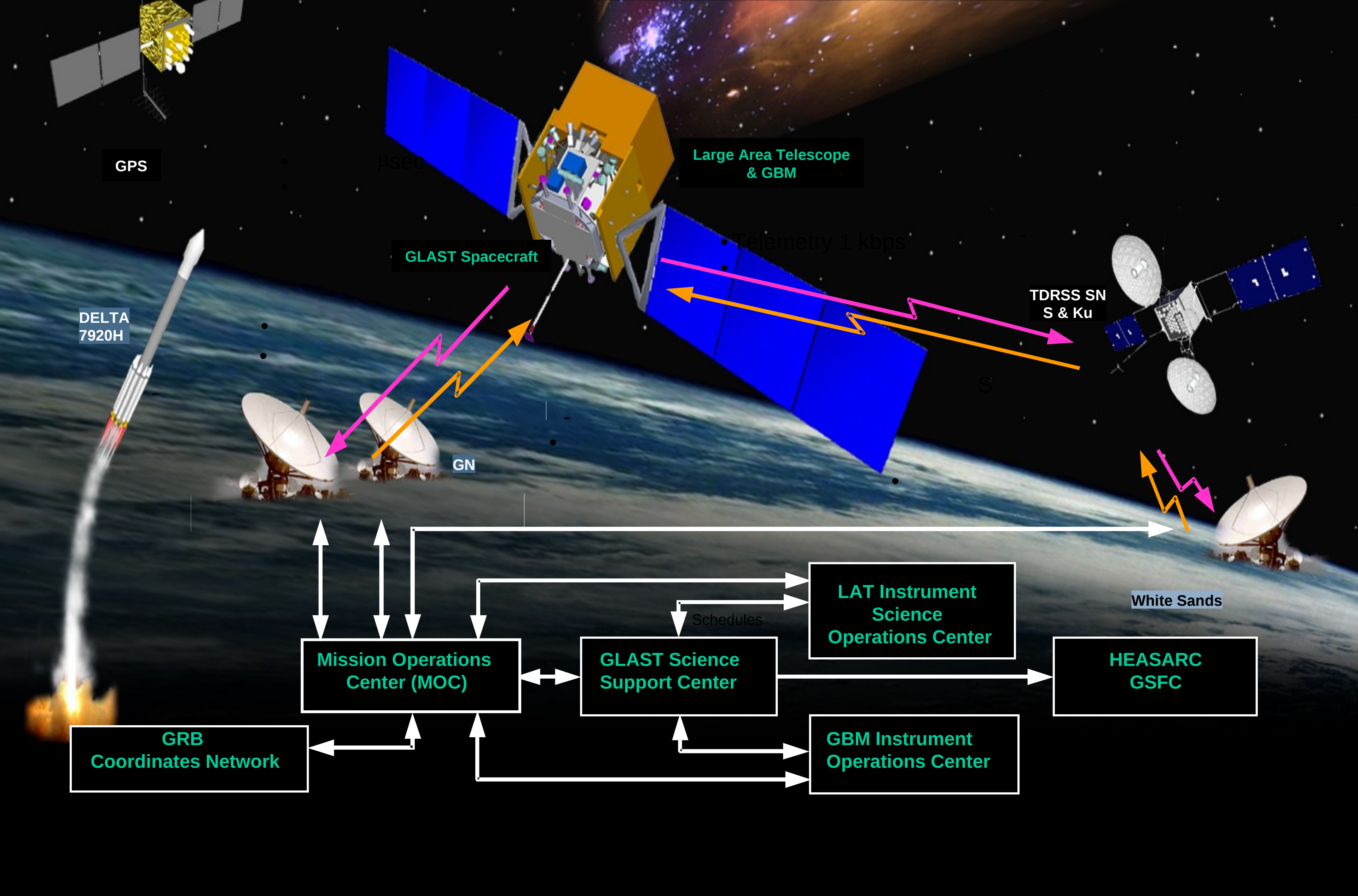
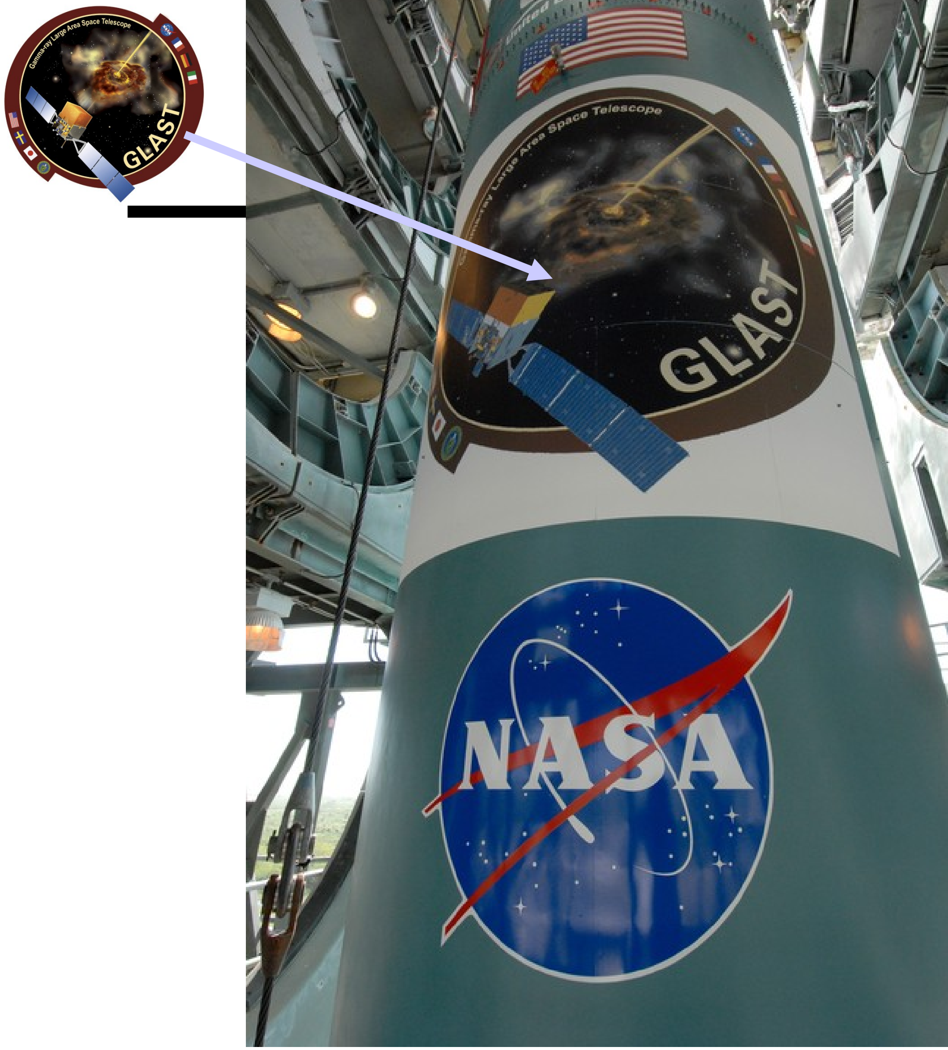
for the GLAST Mission Team

see http://www.nasa.gov/glast

GLAST MISSION ELEMENTS



GLAST Observatory, May 15, Before Moving to the Launch Pad


Gamma-ray Large Area Space Telescope
GLAST
NASA

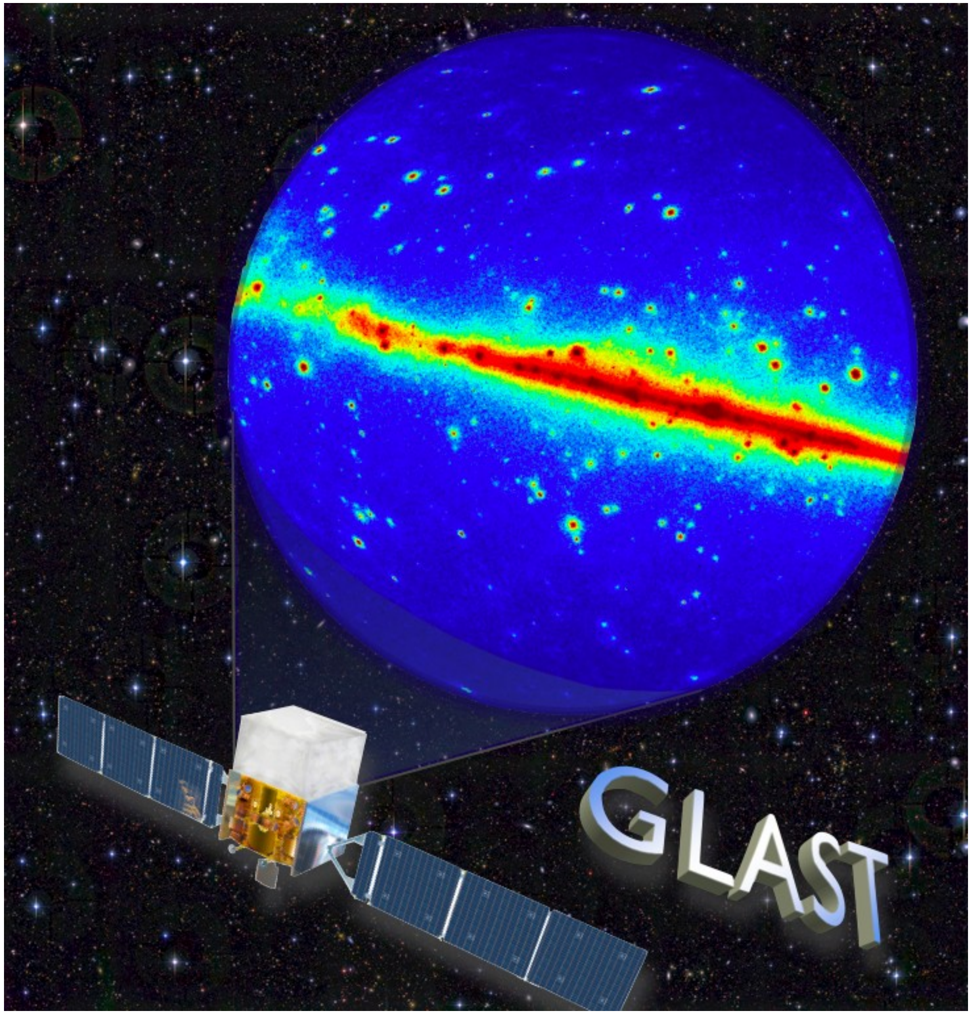
GLAST Status

- GLAST observatory now mated to the launch vehicle.
- Observatory testing is complete. Ready to go!
- Launch vehicle undergoing final testing, in preparation for June 3 readiness date.

Launch and Deployment

EVENT	TIME
Tower Roll Back	~ L-11 Hours
Power on Spacecraft	L - 390 to L-360 Minutes
Cryo Tanking	L- 100 Minutes
Battery to Internal Power	L - 8 Minutes
Launch	15:45:00 GMT
MECO	L + 263 seconds
Fairing Jettison	15:51:00 GMT
GLAST Transmitter On	15:56:30 GMT
Spacecraft Separation	17:00:00 GMT
Start Solar Array Deployment	17:08:02 GMT (SA#1) 17:10:11 (SA#2)
Start Sun Capture	17:12:51 GMT

Looking Forward to Launch and All The New Results!



http://www.nasa.gov/glast