First results of the Fermi Gamma-ray Space Telescope

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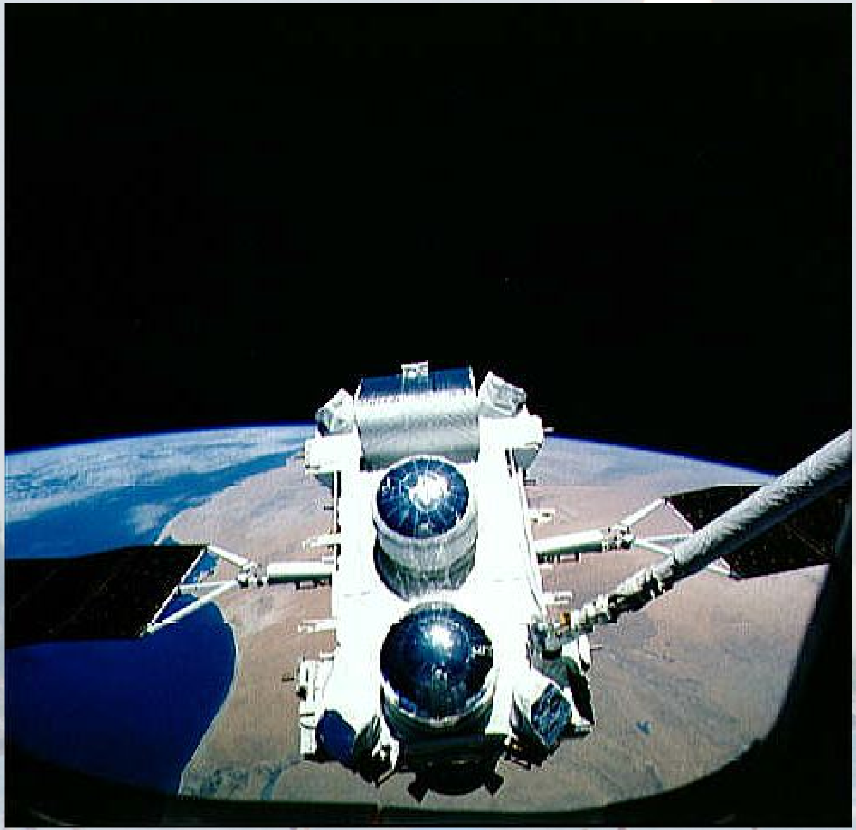
Act I:

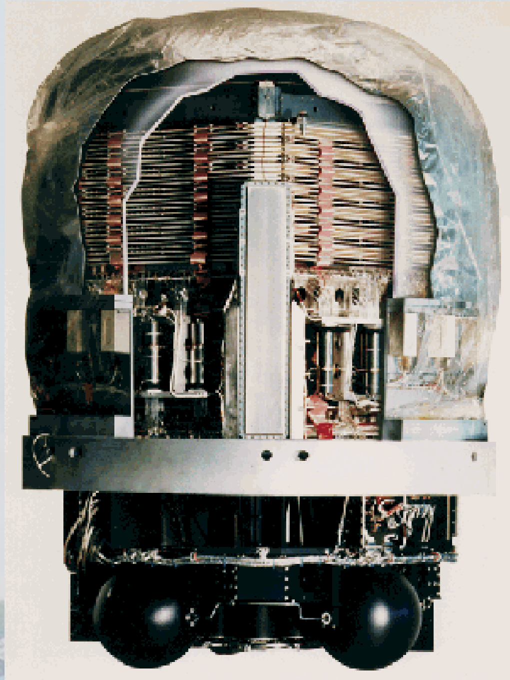
The beginning of the fairy tale

G GENERAL AUDIENCES
All Ages Admitted ®

There was once a great satellite known as the Compton Gamma-Ray Observatory, and aboard it lived EGRET, the GeV gamma-ray telescope.



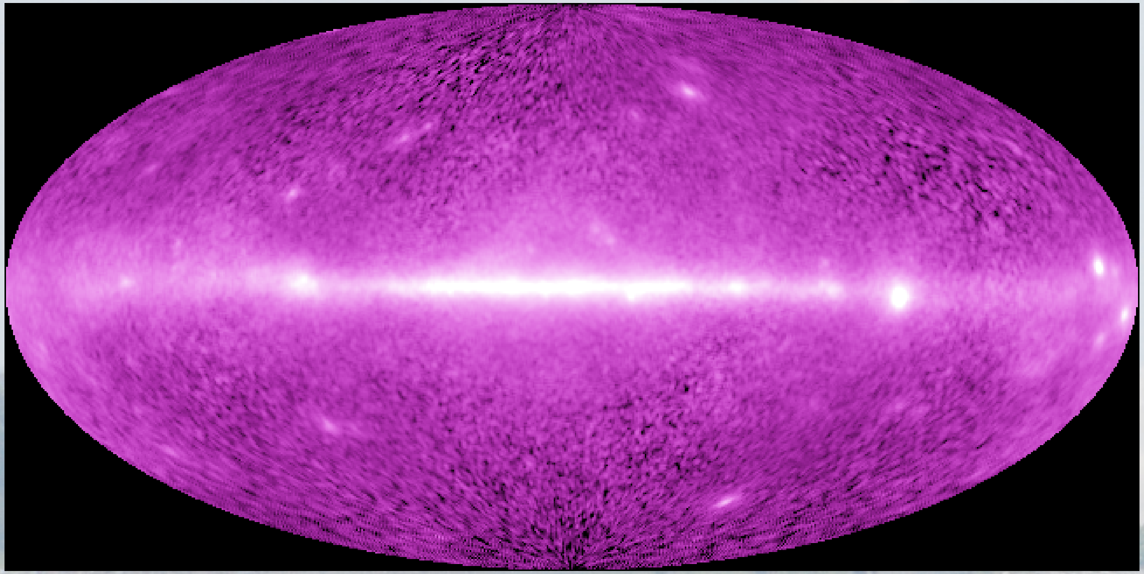
CGRO Credit: NASA



EGRET Credit: NASA

EGRET (1991-2000) observed the sky for almost 10 years and made many important discoveries.

Since 2000, no other experiments looked at the gamma-ray sky in this energy band.



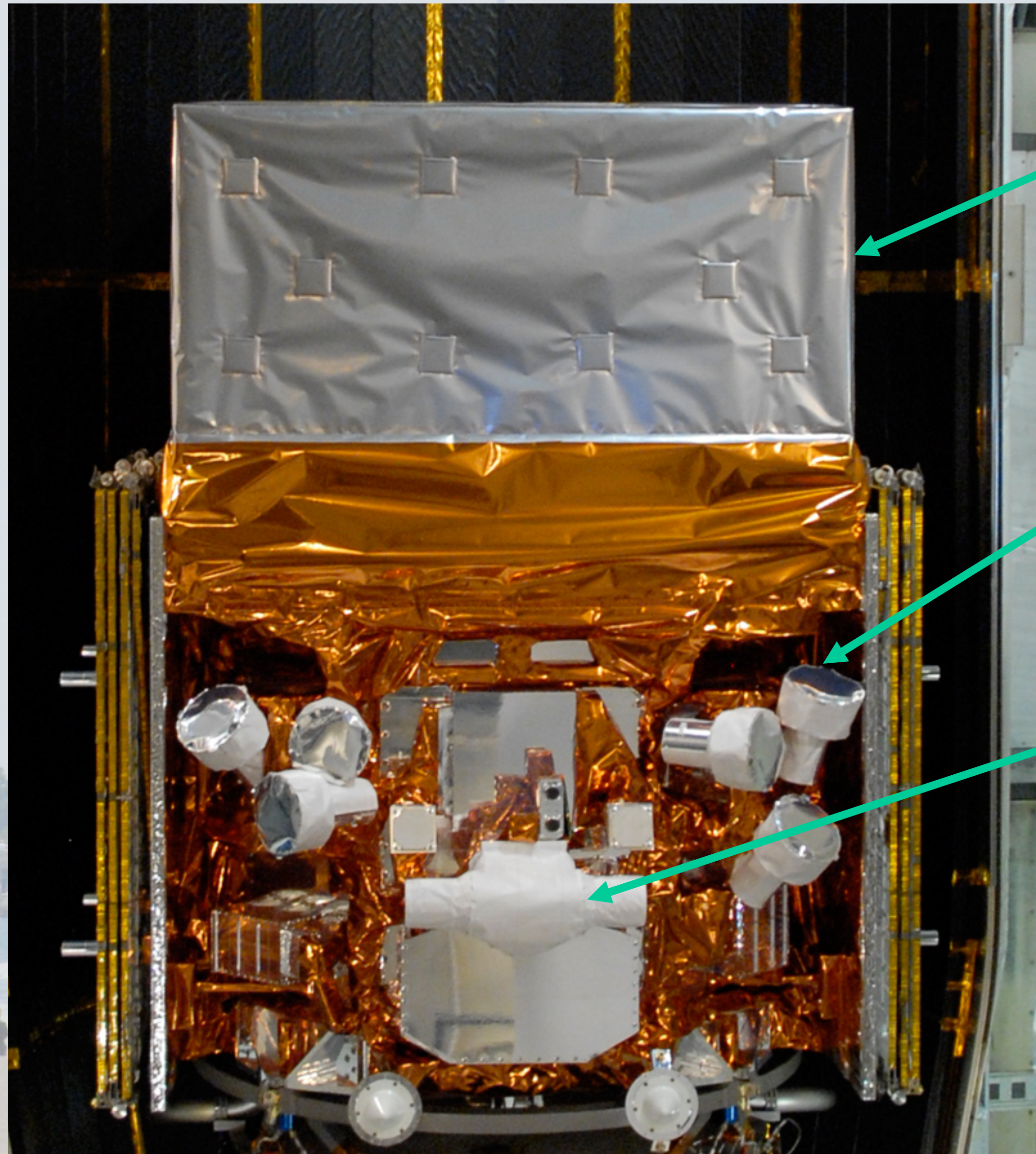
- 271 sources detected
- 172 sources unidentified
- 7 pulsars
- Few GRBs
- No SNRs clearly identified

The GeV Sky: all EGRET events with Energies > 100 MeV
Galactic Coordinates

Credit: S. Digel

Fermi Gamma-ray Space Telescope

The GLAST Observatory



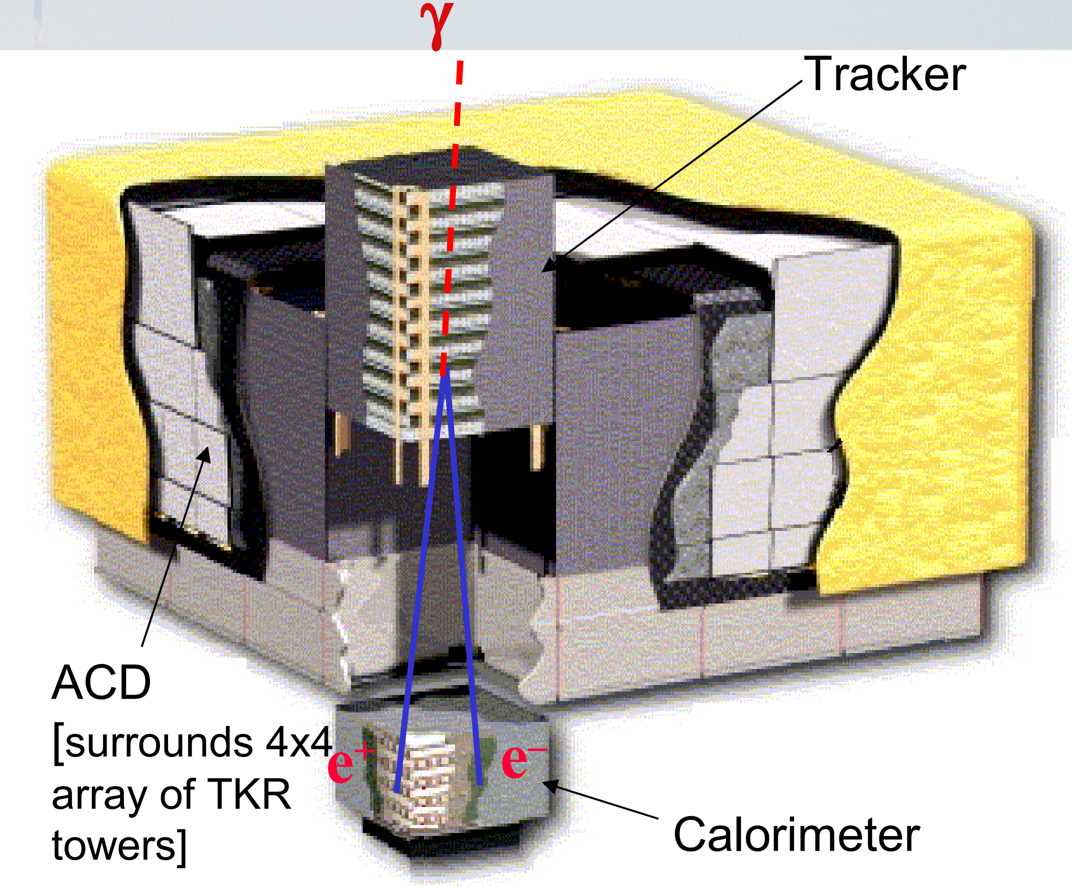
LAT
20 MeV – 300 GeV

GBM
Sodium Iodide Detector
8 keV – 1 MeV

GBM
Bismuth Germanate Detector
150 keV – 30 MeV

Overview of LAT

- **Precision Si-strip Tracker (TKR)** 18 XY tracking planes. Single-sided silicon strip detectors (228 µm pitch) Measure the photon direction; gamma ID.
- **Hodoscopic CsI Calorimeter(CAL)** Array of 1536 CsI(Tl) crystals in 8 layers. Measure the photon energy; image the shower.
- **Segmented Anticoincidence Detector (ACD)** 89 plastic scintillator tiles. Reject background of charged cosmic rays; segmentation removes self-veto effects at high energy.
- **Electronics System** Includes flexible, robust hardware trigger and software filters.

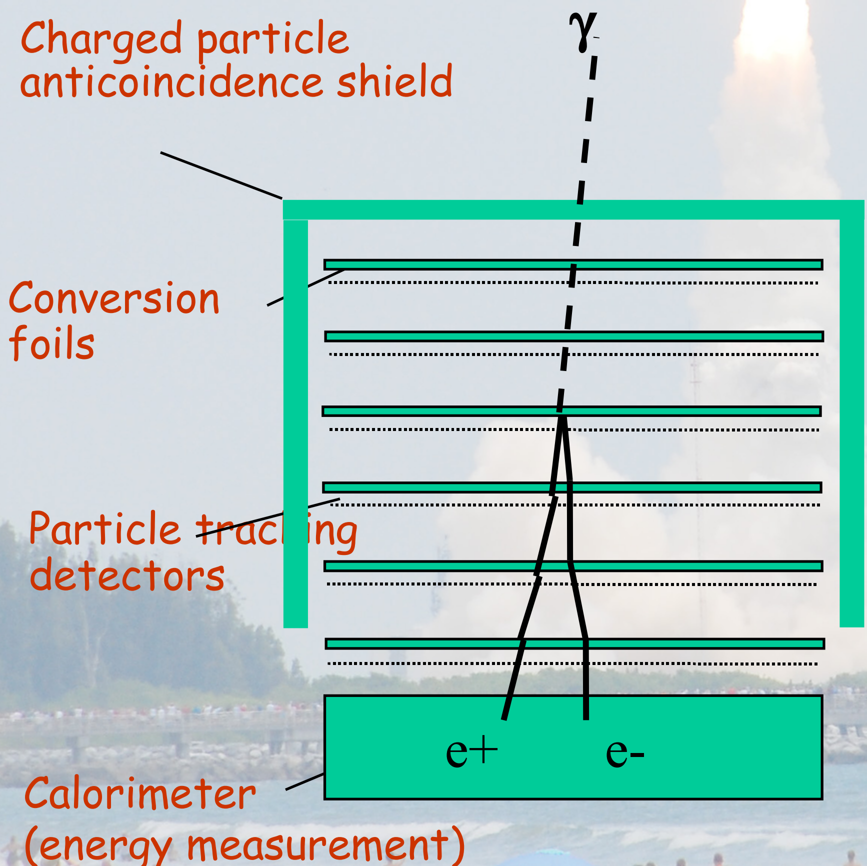


Systems work together to identify and measure the flux of cosmic gamma rays with energy 20 MeV - >300 GeV.

Detection Technique

Pair production is the dominant photon interaction above 10MeV:

$$E_\gamma \rightarrow m_{e+}c^2 + m_{e-}c^2$$

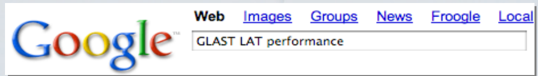


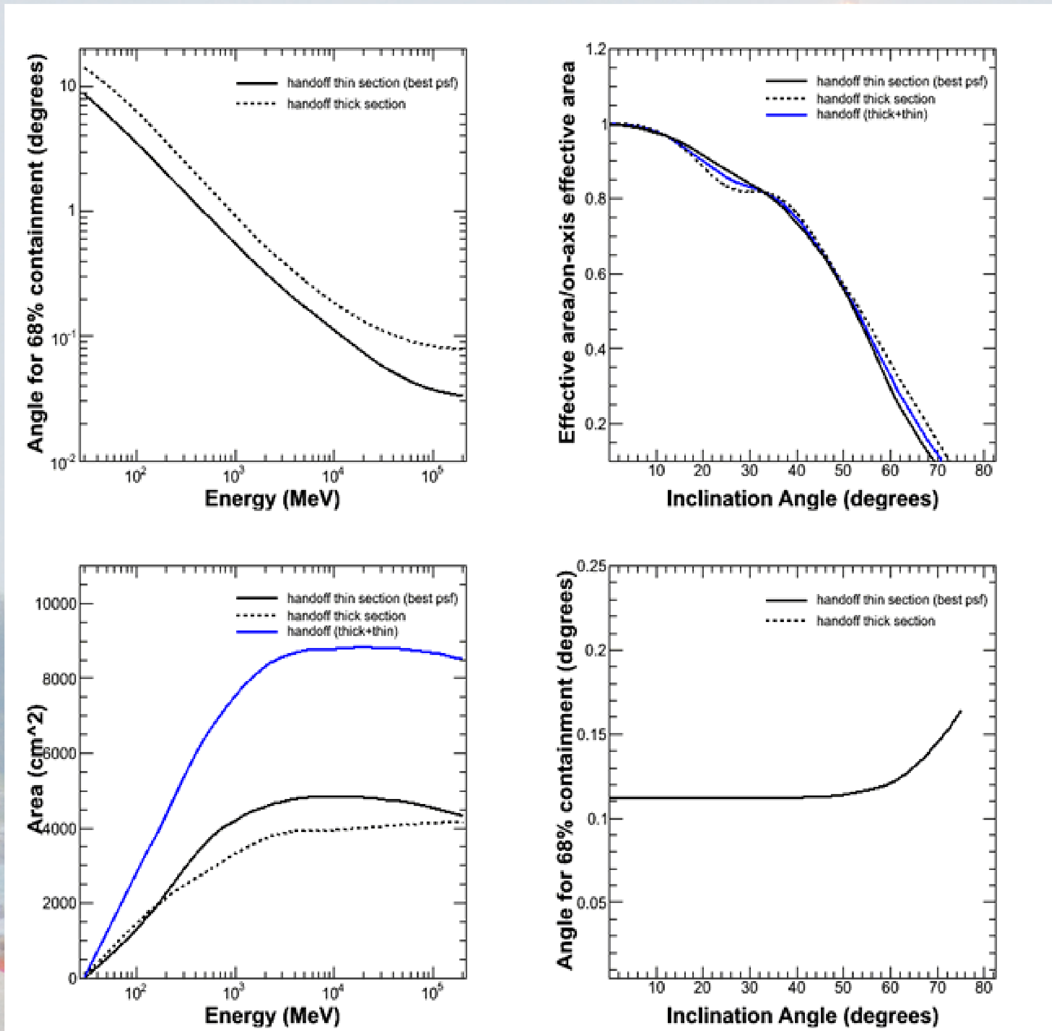
GLAST Concept

- Low profile for wide f.o.v.
- Segmented anti-shield to minimize self-veto at high E.
- Finely segment calorimeter for enhanced background rejection and shower leakage correction.
- High-efficiency, precise track detectors located close to the conversion foils to minimize multiple-scattering errors.
- Modular, redundant design.
- No consumables.
- Low power consumption (580 W)

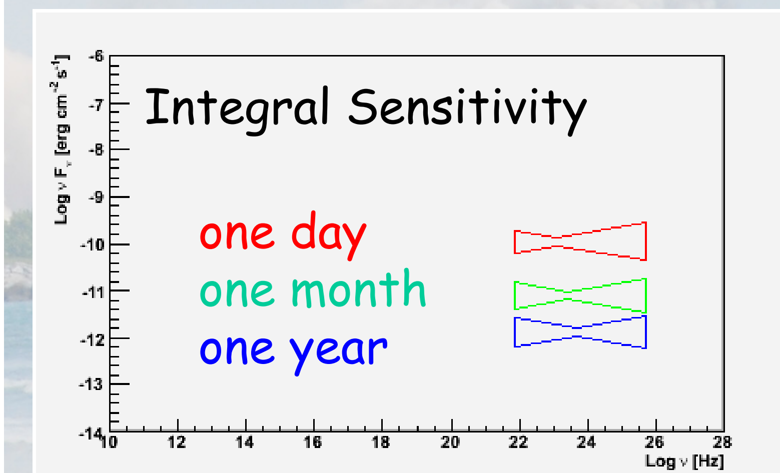
LAT Science Performance

http://www-glast.slac.stanford.edu/software/IS/glast_lat_performance.htm

or simply: 



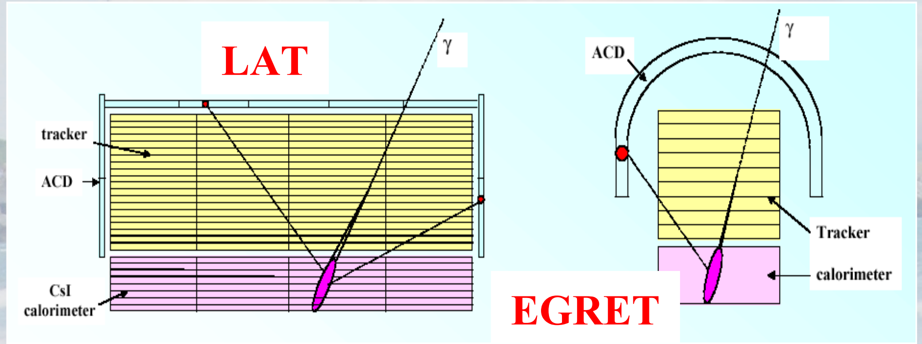
- **The LAT Field of view is huge! (>55 deg half angle)**
  - **Superb for "catching" transients**
- **Angular resolution improves rapidly with energy**
  - **Localization strongly dependent on spectrum (i.e. on number/fraction of high energy photons)**



after 1 year, pt src sensitivity <4×10^{-9} $cm^{-2}s^{-1}$ (E>100 MeV, high latitude)

LAT Performance - I

- **Huge field of view:** >x4 better than EGRET
  - See 20% of the sky at any given time
  - Scan the complete sky every 3h
- **Excellent Angular Resolution (PSF):** >x3 better than EGRET
  - 170/271 of EGRET sources not firmly identified
- **Huge effective area!** >5x larger than EGRET
  - $>8000\ cm^2$
- **Four orders of magnitude in energy:**
  - 20 MeV - >300 GeV
  - EGRET could not go much beyond 10 GeV:
    - Self-Veto effect – monolithic ACD
  - 10-100 GeV range largely unexplored!

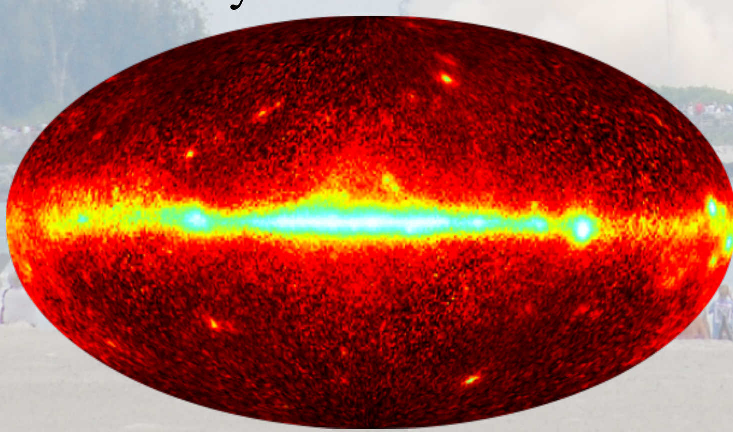


Factor 30 improvement in sensitivity!
Factor >100 above 10 GeV!

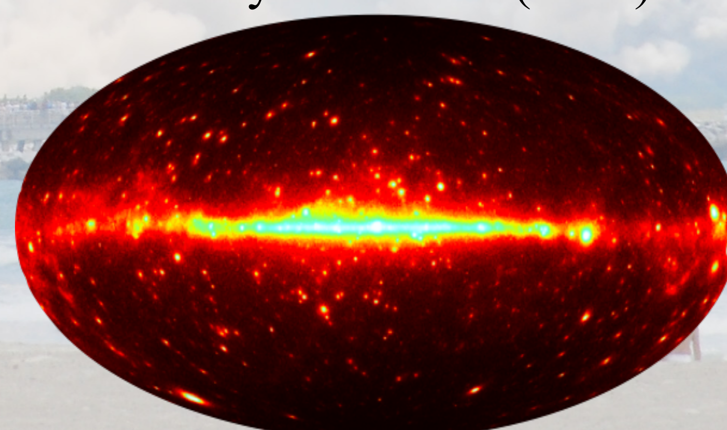
LAT Performance - II

- Low readout deadtime: x4000 smaller than EGRET
  - 26.5 μs
  - Essential for rapid transients like Gamma-Ray Bursts:
    - Thousands of photons arriving within a few seconds
    - LAT can read them out without significant deadtime!
- Excellent absolute time precision:
  - Better than 1 μs:
    - LAT uses a GPS based timing system
  - Essential for Pulsar studies:
    - Enables LAT to study pulsars for (sub)structures

EGRET:
5 years of data



Fermi:
1 year of data (simu)



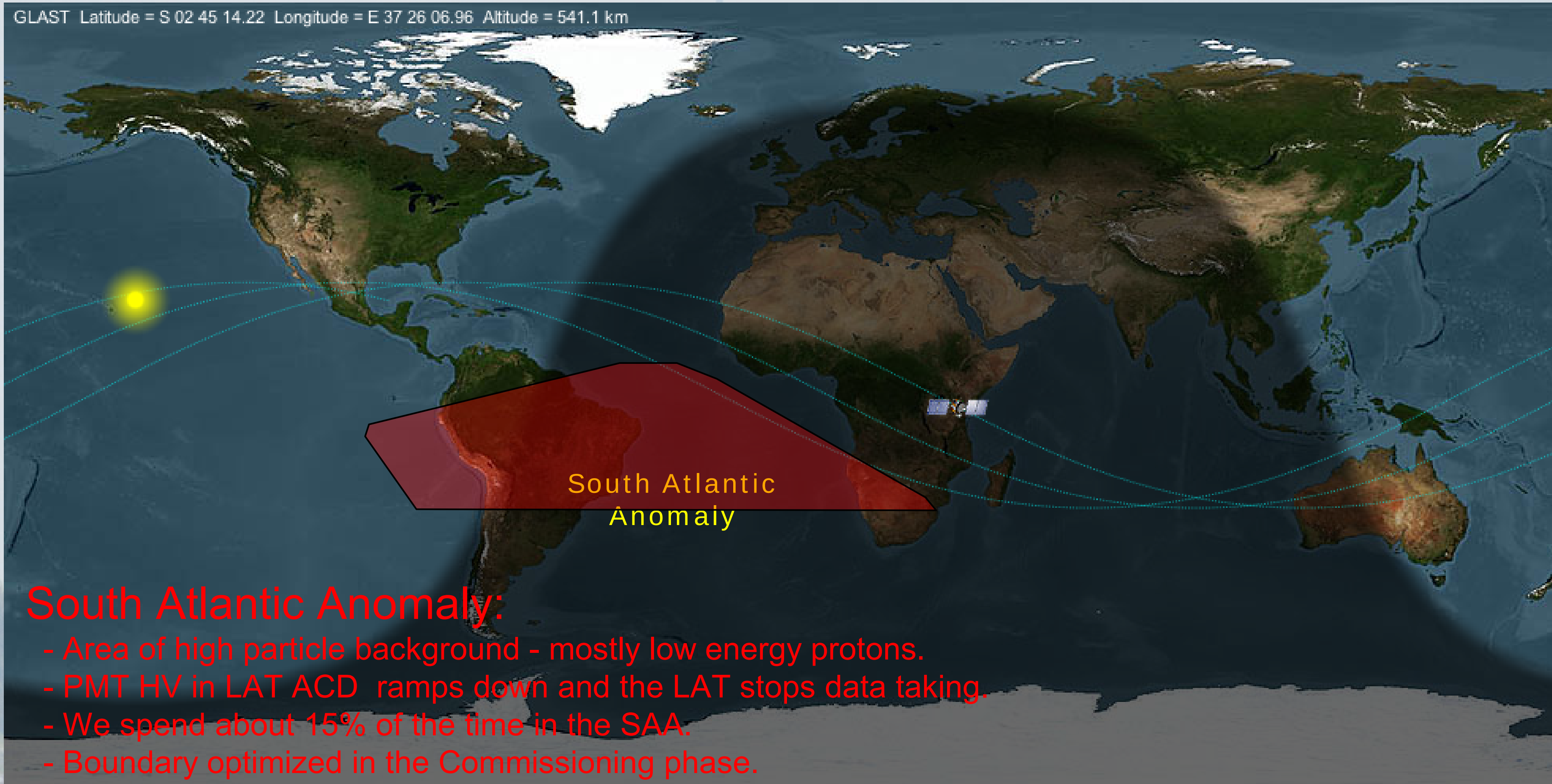
Fermi
Gamma-ray
Space Telescope

GLAST Launch

Launched from
Cape Canaveral
on a Delta IIH,
11 June 2008

GLAST was renamed the
Fermi Gamma-Ray Space Telescope
on August 26, 2008

Fermi in Orbit



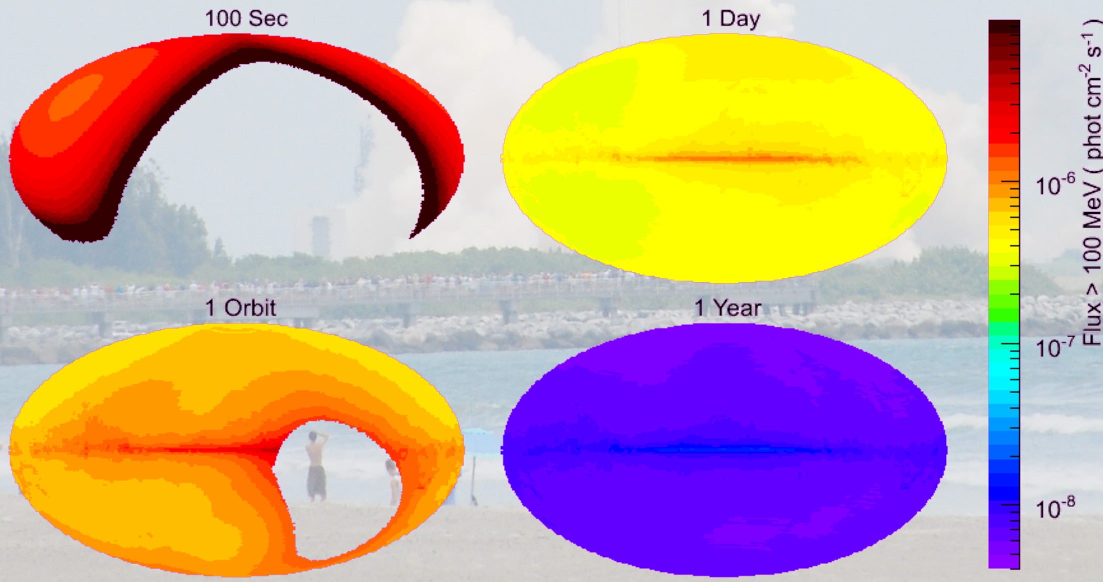
South Atlantic Anomaly:

- Area of high particle background - mostly low energy protons.
- PMT HV in LAT ACD ramps down and the LAT stops data taking.
- We spend about 15% of the time in the SAA.
- Boundary optimized in the Commissioning phase.

Circular orbit, 565 km altitude (96 min period), 25.6 deg inclination

Fermi Operating Modes

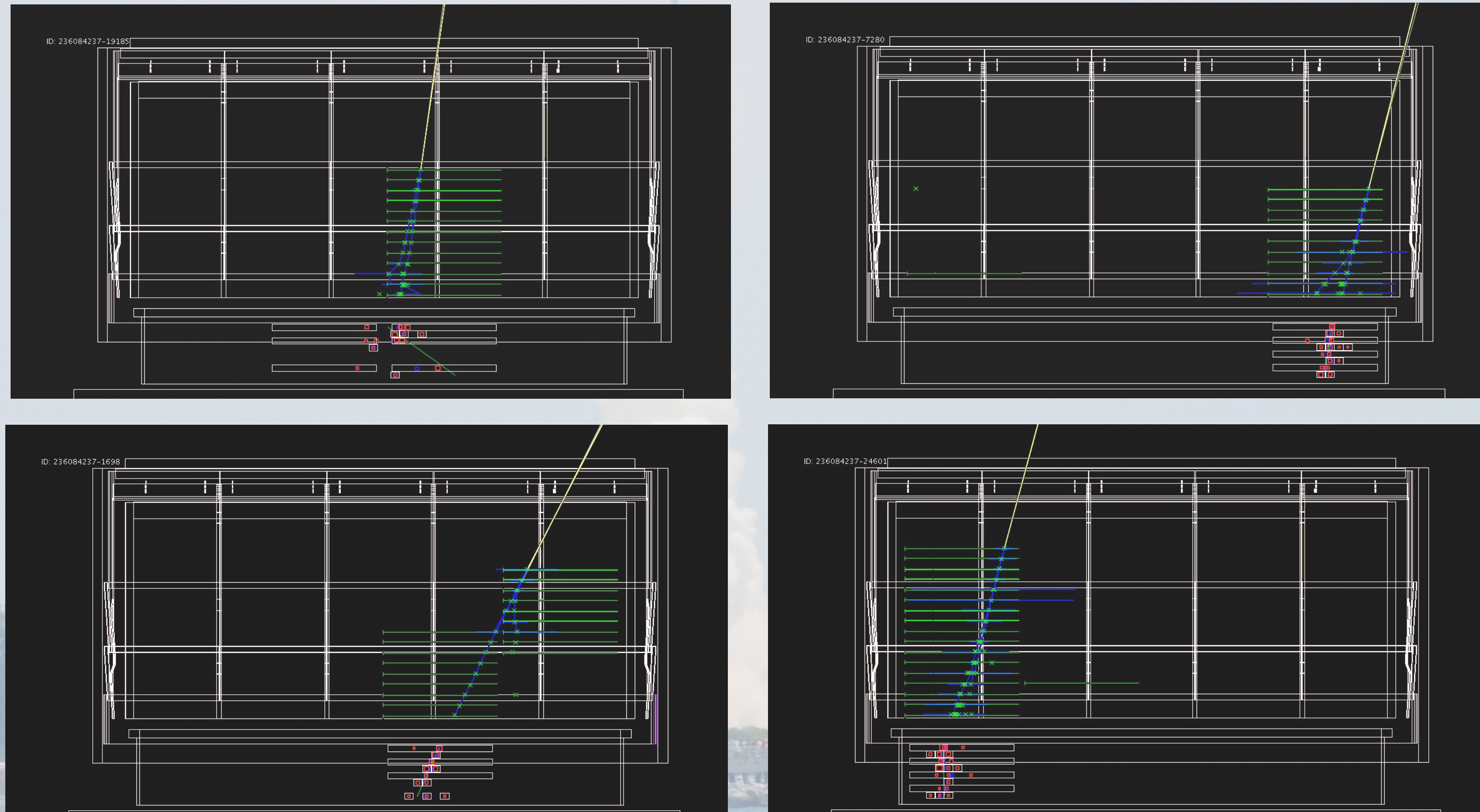
- LAT sees 20% of the sky at any moment:
  - Covers the whole sky every 3h!
- Every point in the sky receives ~30 minutes of exposure every 3h.
- Rocking:
  - Space craft rocks LAT ±35 degrees about the zenith direction every orbit.
- Uniform exposure:
  - Achieved within a day!
  - Less need for Pointed Observations:
    - » Can be done for interesting targets



LAT sensitivity on 4 different timescales: 100 s, 1 orbit (96 mins), 1 day, and 1 year

Fermi Gamma-ray Space Telescope

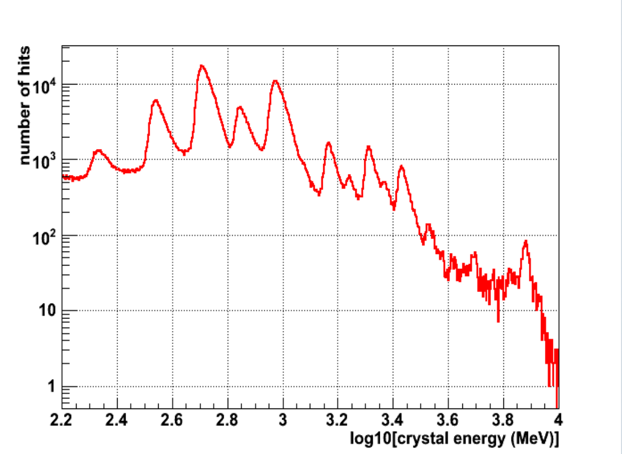
In Orbit: Single Events in the LAT



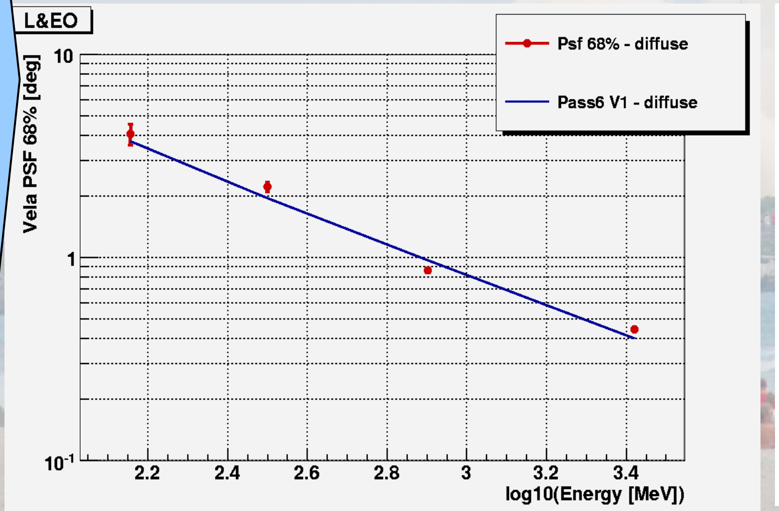
The green crosses show the detected positions of the charged particles, the blue lines show the reconstructed track trajectories, and the yellow line shows the candidate gamma-ray estimated direction. The red crosses show the detected energy depositions in the calorimeter.

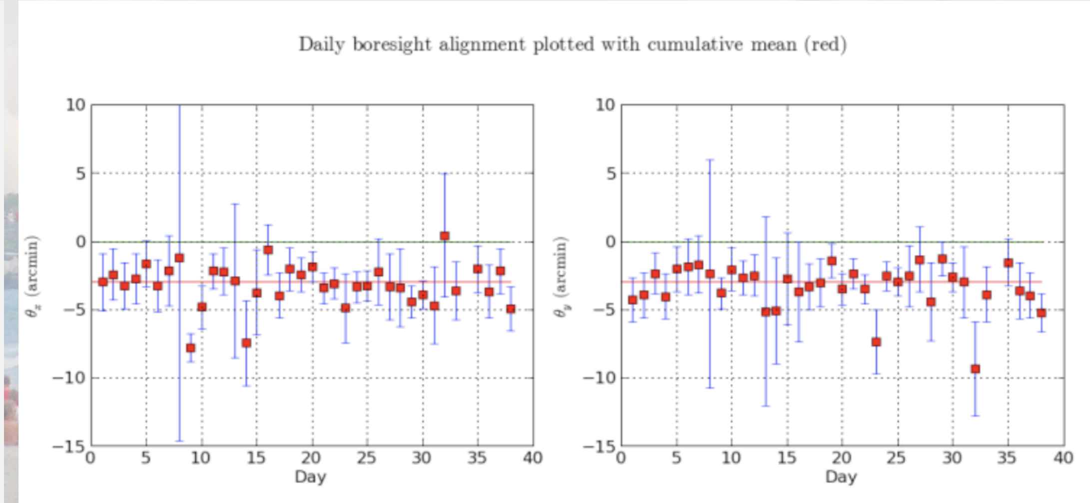
LAT working very well on-orbit

- **On-orbit calorimeter calibration stable**
  - Use cosmic-ray heavy ions

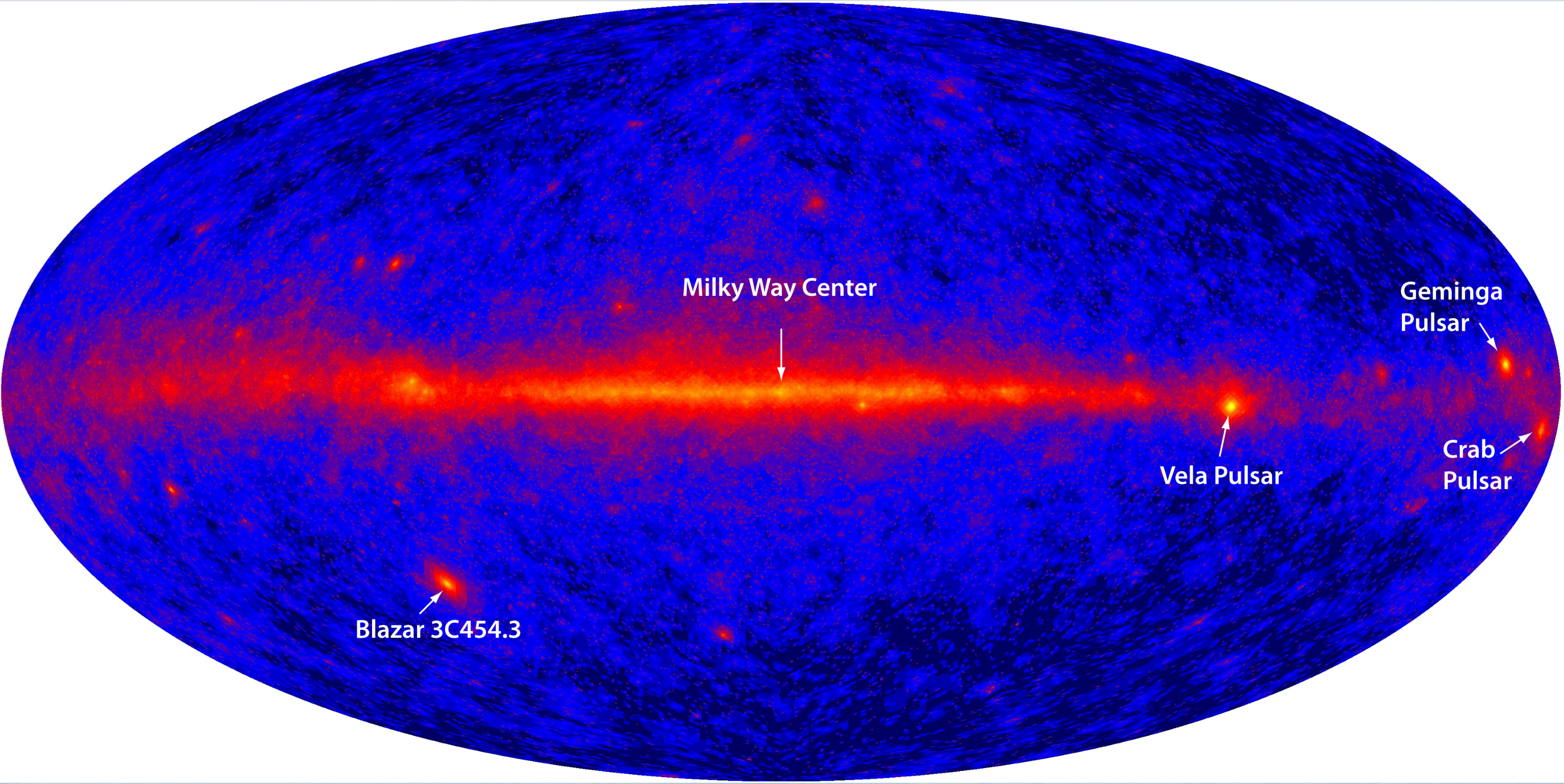


- **PSF on orbit as expected**
  - Verify using photons from Vela Pulsar photons, compared with detailed MC simulation
- **Absolute position obtained from 2 star trackers**
  - Alignment between star tracker and LAT is stable
  - Alignment knowledge is not limiting source location accuracy





First Light !



Four days of all-sky survey engineering data.

Fermi Gamma-ray Space Telescope

Success Is Not A Coincidence

- LAT completed an extensive testing program before launch:
  - Thermal-vacuum, vibration, acoustic, ...
- Each component tested individually:
  - Then tested at each step of integration:
    - LAT integration and Observatory integration
- Alltogether, we had >3 years of cosmic ray data taking with the LAT:
  - Data quality for every single run was:
    - Formally reviewed, investigated if necessary, signed off!
- One hardware failure during Integration & Test:
  - Lost redundant readout capability in one TKR layer
  - One out of 576 layers!
- No subsequent hardware failures:
  - During launch or on orbit!
- Validation of the LAT MC:
  - Beam tests at CERN and GSI in 2006 with real flight-spare towers
- Successful combination of two cultures!
  - We put a particle physics detector ... in space!
    - NASA End-To-End tests
    - Particle Physics Data Challenges

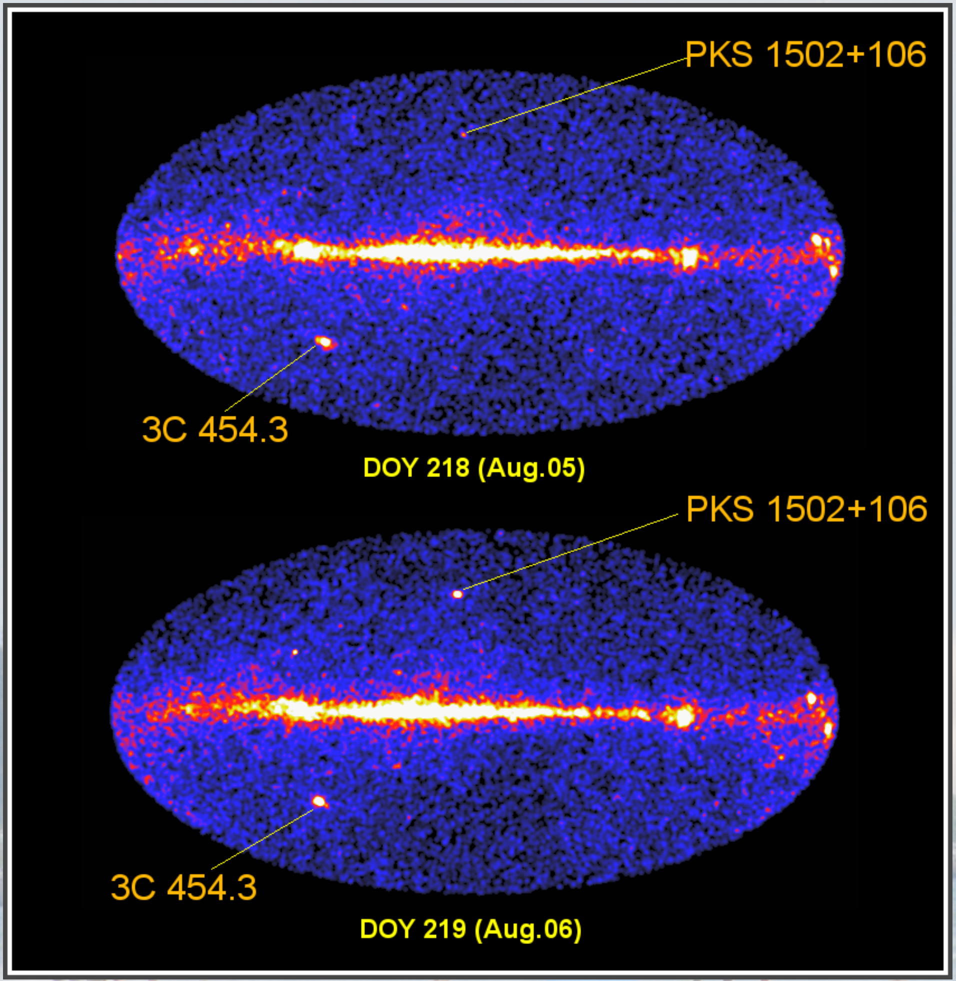
Act II:

The results after 6 months of data taking

R RESTRICTED
UNDER 17 REQUIRES ACCOMPANYING PARENT OR ADULT GUARDIAN

I. Flaring Sources
Blazars, Transients, GRBs

Flaring sources



- Automated search for flaring sources on 6 hour, 1 day and 1 week timescales.
- Several Astronomers telegrams
  - Discovery of new gamma-ray blazars PKS 1502+106, PKS 1454-354
  - Flares from known gamma-ray blazars: 3C454.3, PKS 1510-089,3C273, AO 0235+164, PSK 0208-512, 3C66A, PKS 0537-441
  - Galactic plane transients: J0910-5041, 3EG J0903-3531

Fermi Gamma-ray Space Telescope

Flaring sources: The First Two ATels

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GLAST-LAT detection of extraordinary gamma-ray activity in 3C 454.3

ATel #1628; G. Tosti (Univ/INFN-Perugia) , J. Chiang (SLAC), B. Lott (CENBG/Bordeaux), E. do Couto e Silva (SLAC), J. E. Grove (NRL/Washington), J. G. Thayer (SLAC) on behalf of the GLAST Large Area Telescope Collaboration
on ***24 Jul 2008; 14:25 UT***
Password Certification: Gino Tosti (tosti@pg.infn.it)

Subjects: Gamma Ray, >GeV, AGN, Quasars

The Large Area Telescope (LAT), one of two instruments on the Gamma-ray Large Area Space Telescope (GLAST) (launched June 11, 2008), which is still in its post-launch commissioning and checkout phase has been monitoring extraordinarily high flux from the gamma-ray blazar 3C 454.3 since June 28, 2008. This confirms the bright state of the source reported by AGILE (see ATel #1592) and by the optical-to-radio observers of the GASP-WEBT Project (ATel #1625).

3C 454.3 has been detected on time scales of hours with high significance (> 5 sigma) by the LAT Automatic Science Processing (ASP) pipeline and the daily light curve (E>100 MeV) indicates that the source flux has increased from the initial measurements on June 28. Although in-flight calibration is still ongoing, preliminary analysis indicates that in the period July 10-21, 2008 the source has been in a very high state with a flux (E>100MeV) that is well above all previously published values reported by both EGRET (Hartman et al. 1999, ApJS, 123,79) and AGILE (see e.g. ATel #1592 and Vercellone et al. 2008, ApJ,676,L13).

Because GLAST will continue with calibration activities, regular monitoring of this source cannot be pursued. Monitoring by the LAT is expected to resume in early August. In consideration of the ongoing activity of this source we strongly encourage multiwavelength observations of 3C 454.3.

The GLAST LAT is a pair conversion telescope designed to cover the energy band from 20 MeV to greater than 300 GeV. It is the product of an international collaboration between NASA and DOE in the U.S. and many scientific institutions across France, Italy, Japan and Sweden.

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GLAST LAT detection of a possible new gamma-ray flaring blazar: PKS 1502+106

ATel #1650; S. Ciprini (Univ./INFN Perugia) on behalf of the GLAST Large Area Telescope Collaboration
on ***8 Aug 2008; 0:02 UT***
Password Certification: Stefano Ciprini (stefano.ciprini@pg.infn.it)

Subjects: Gamma Ray, >GeV, AGN, Quasars
Referred to by ATel #: 1661

The Large Area Telescope (LAT), one of two instruments on the Gamma-ray Large Area Space Telescope (GLAST) (launched June 11, 2008), which is still in its post-launch commissioning and checkout phase, has been monitoring high flux from a source positionally consistent with the blazar PKS 1502+106 (R.A.:15h04m24.9797s; Dec.:+10d29m39.198s, also known as OR 103 and S3 1502+10) since August 6, 2008.

Preliminary analysis indicates that the source is in a high state with a gamma-ray flux (E>100MeV) well above pre-defined LAT flaring source reporting threshold of 2x10^-6 photons cm^-2 s^-1.

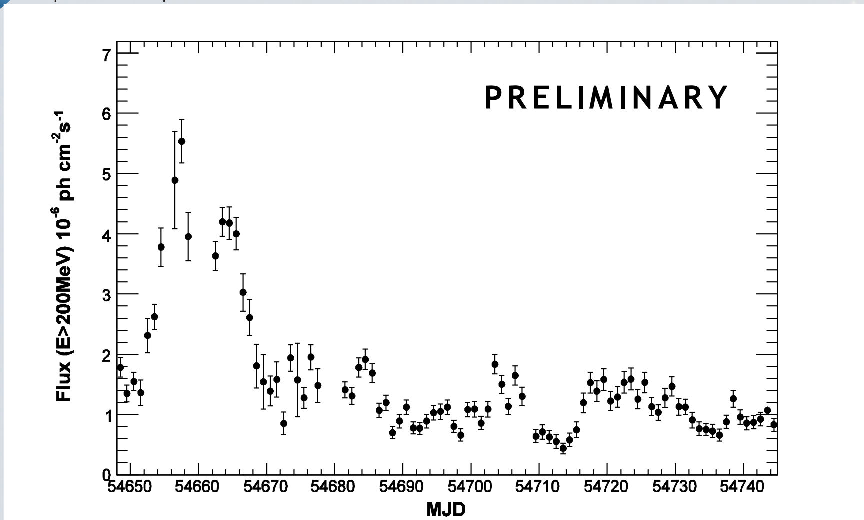
This is a well-known radio source classified as a Flat Spectrum Radio Quasar (FSRQ), observed by several X-ray instruments. This is the first time that it has been reported to have gamma-ray emission.

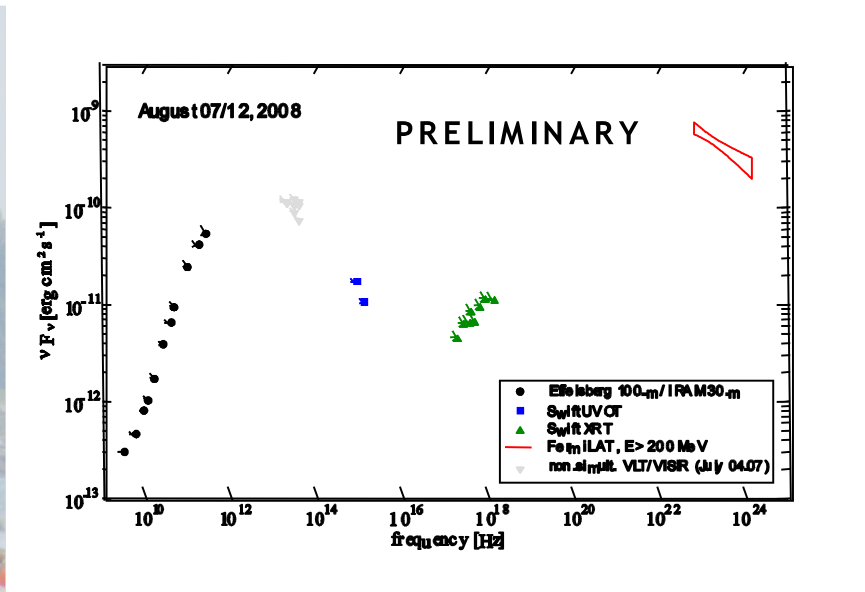
Please note that PKS 1502+106 has two possible redshifts listed in the literature: z=0.56 and 1.83; the former seems preferred (A.E. Wright et al. 1979 ApJ 229,73; B.J. Wilkes 1986, MNRAS, 218, 331).

Because GLAST has just started its scientific standard operations, regular gamma-ray monitoring of this source will be pursued. In consideration of the ongoing activity of this source we strongly encourage multiwavelength observations of PKS 1502+106.

The GLAST LAT is a pair conversion telescope designed to cover the energy band from 20 MeV to greater than 300 GeV. It is the product of an international collaboration between NASA and DOE in the U.S. and many scientific institutions across France, Italy, Japan and Sweden.

3C454.3 with LAT





Snapshot SED for Aug 7-12 2008

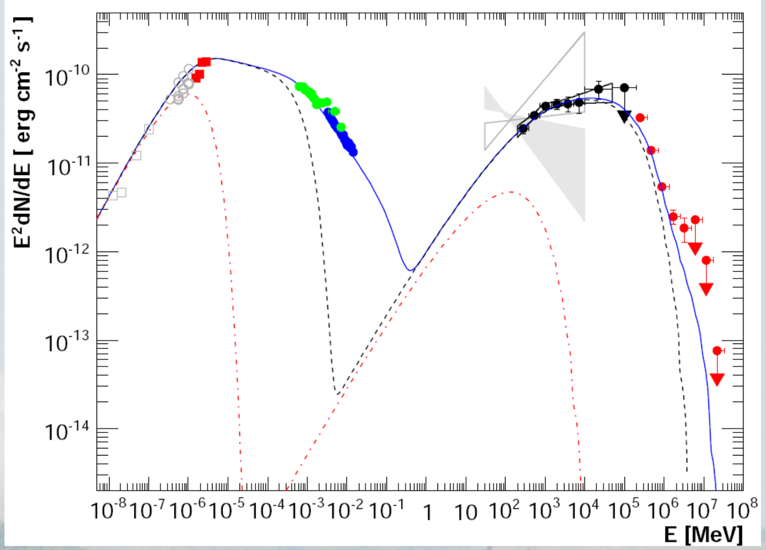
Vital statistics:

* Well-known radio source, identified with an OVV quasar at z = 0.859
* Good VLBI data, superluminal expansion, δ = 25, Γ_{jet} ~15, θ ~ 0.8°
* Detected by EGRET, AGILE
* Very active (bright, rapidly variable) since 2000

- 3C454,3 has been clearly detected in the early Fermi LAT data, and showed rapid flares, with the risetime on a scale of ~3 days
- Such rapid variability by itself implies a very compact emission region which would be optically thick to the escape of γ-rays via e+/e- pair production
- Problem is avoided via invoking relativistic motion with Doppler factor δ > 6 – consistent with the VLBI-measured jet geometry

Fermi-HESS-RXTE observations of PKS 2155-304

- Our Campaign: 11 nightly obs. using HESS, ATOM, RXTE (+ Swift)
  - First multiwaveband observations of a blazar SED using Fermi and an ACT
  - Monitor for very high state outburst similar to the July 2006 flare seen by HESS (Swift ToO)
  - Study correlated variability between various bands.



  - VHE: ~0.2 Crab, $\Gamma_{int} \approx 2.5$
  - HE: Γ_L=1.61±0.16, Γ_h=1.96±0.08, E_b=1.0±0.3 GeV
  - X-ray: Γ_L=2.36±0.01, Γ_h=2.67±0.01, E_b=4.4±0.5 keV
    - p_0=1.3, p_1=3.2, p_2=4.3 where $dn/d\varepsilon \propto \varepsilon^{-p}$
    - break energies: ε_1=7.4GeV, ε_2=120GeV
    - R=1.5×10^{17}cm, δ=32, B=0.02G
  - Single zone SSC model fits the time-averaged SED

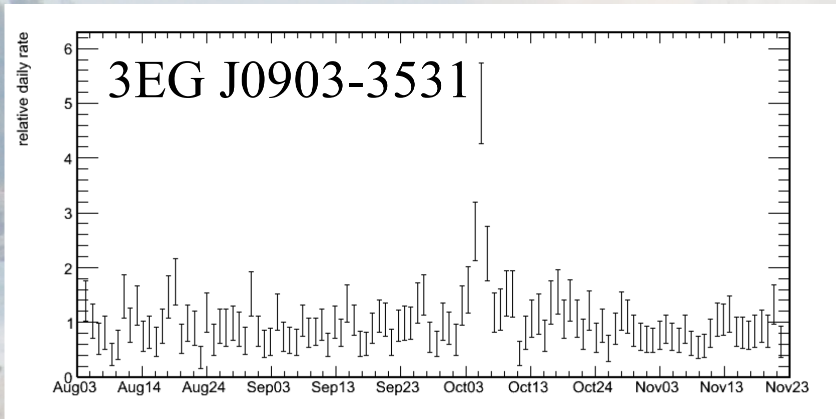
- X-rays are produced by highest energy electrons, $\varepsilon > \varepsilon_2$
- HE and VHE are produced by electrons with $\varepsilon_1 < \varepsilon < \varepsilon_2$

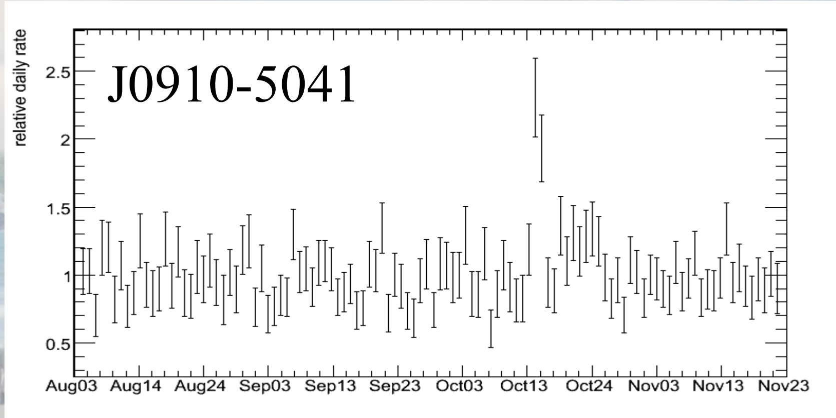
=> X-rays can vary (mostly) independently of VHE emission (cf. July 2006 flare)

Observations of Transients in the Galactic Plane

- Brightening of a source in the Galactic Plane from October 5 through October 7 2008. Preliminary LAT location at RA=136.25°, DEC=-35.45° spatially coincident with 3EG J0903-3531. Spectrum best fit by a photon index of 2.2 +/- 0.1 and an integral flux > 100 MeV of 1.1 +/- 0.2 x 10^{-6} ph cm^{-2} s^{-1}. Well above EGRET measurements of average flux 1.6 x 10^{-7} ph cm^{-2} s^{-1} and peak flux 3.2 x 10^{-7} ph cm^{-2} s^{-1}

- LAT transient J0910-5041 appeared on October 15 through 16 2008 at preliminary location RA=137.69°, DEC=-50.74°. No record of previous gamma-ray activity. Spectrum best fit by a photon index of 1.9 +/- 0.1 and an integral flux > 100 MeV of 1.1 +/- 0.2 x 10^{-6} ph cm^{-2} s^{-1}.

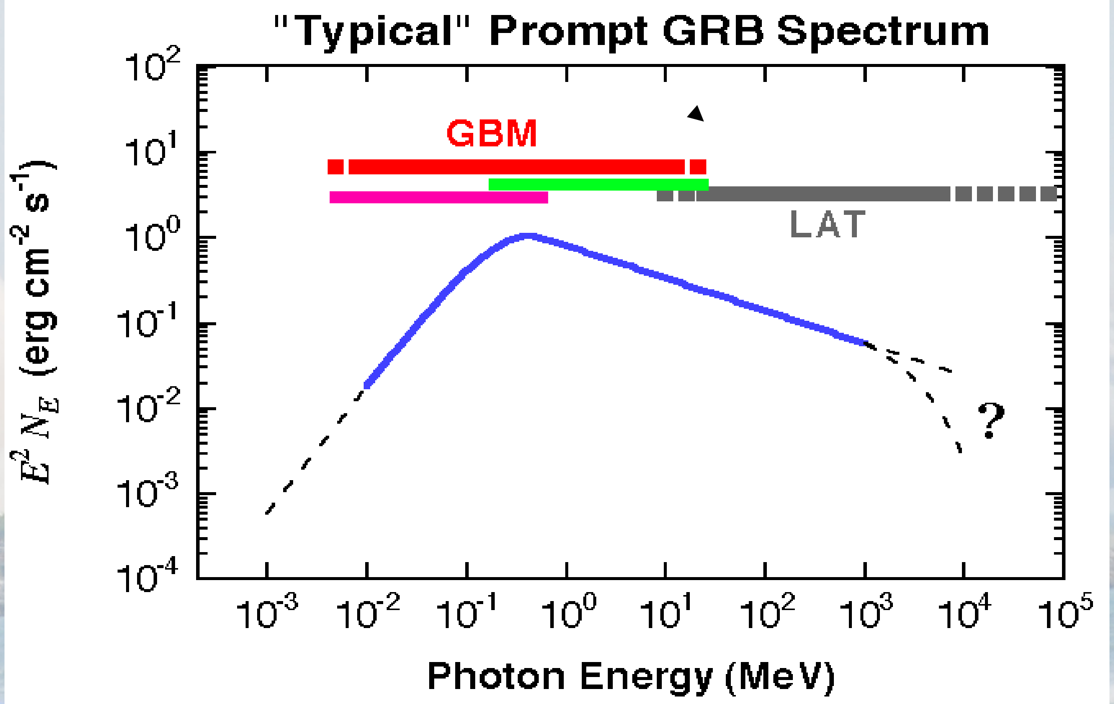




Fermi and GRB

- LAT: <20 MeV to >300 GeV. With both onboard and ground burst triggers.
- GBM: 12 NaI detectors— 8 keV to 1 MeV. Used for onboard trigger, onboard and ground localization, spectroscopy: 2 BGO detectors— 150 keV to 40 MeV. Used for spectroscopy.
- Total of >7 energy decades!

Exceptionally good spectral observations of the prompt phase of lots of GRB



Fermi-LAT Observed GRB

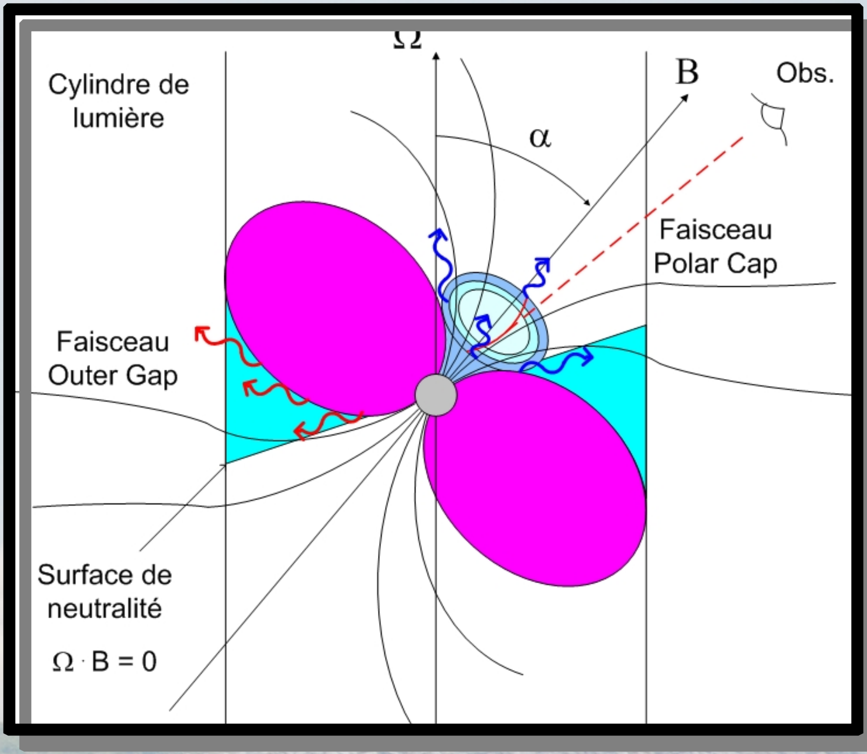
- **GBM (since July 14 up to Christmas)**
  - **97 GRB (16 short bursts)**

- 4 LAT detections:
  - GRB080825C
    [GCN 8183 – Bouvier, A. et al.,
    GCN 8141, 8184 – van der Horst, A. et al.]
    More than 10 events above 100 MeV
  - GRB080916C
    [GCN 8246 – Tajima, H. et al., GCN 8245, 8278 – Goldstein, A. et al.]
    More than 10 events above 1 GeV and more than 140 events above 100 MeV (used for spectral analysis)
  - GRB081024B
    [GCN 8407 – Omodei, N. et al., GCN 8408– Connaughton, V. et al.]
    First short GRB with >1 GeV emission
  - GRB081215A
    [GCN 8684 – McEnery, J. et al., GCN 8678– Preece, R. et al.]
    At 86 deg to LAT boresight, LAT excess seen in raw count rates

II. Galactic Sources Pulsars & Diffuse background

Pulsars as cosmic accelerators

- With B~10^8 T and P(rotation)~10 ms => ΔV=10^{18} V between equator and poles...but things are not so simple
- The magnetosphere is filled with a conducting plasma (charges extracted from the pulsar) => No acceleration along closed field lines (E⊥B)
- Acceleration (E//B) is possible in 2 regions (open lines extending beyond the light cylinder):
    - Polar caps
    - Outer gaps



Pulsar phase calculation with known ephemerides

Given: **GPS event time stamps**

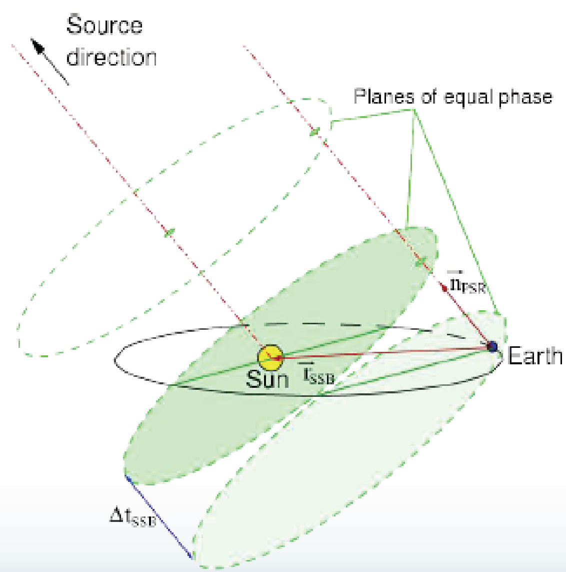
transform to solar system barycenter $\rightarrow T_{SSB}$

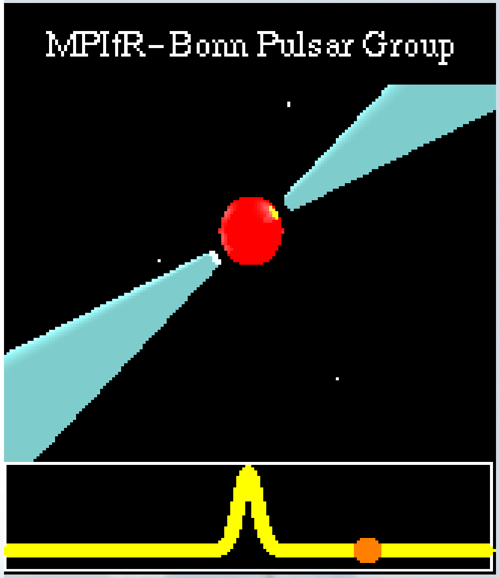
compare with pulsar ephemerides $(T_0, f, \dot{f})$:

$$\varphi = f \cdot \Delta t_{SSB} + \frac{1}{2}\dot{f} \cdot \Delta t_{SSB}^{\ 2}, \qquad \Delta t_{SSB} \equiv T_{SSB} - T_0,$$
$$\varphi(T_0) \equiv 0$$

→ Pulsar phase for each event

correction for Earth‘s motion



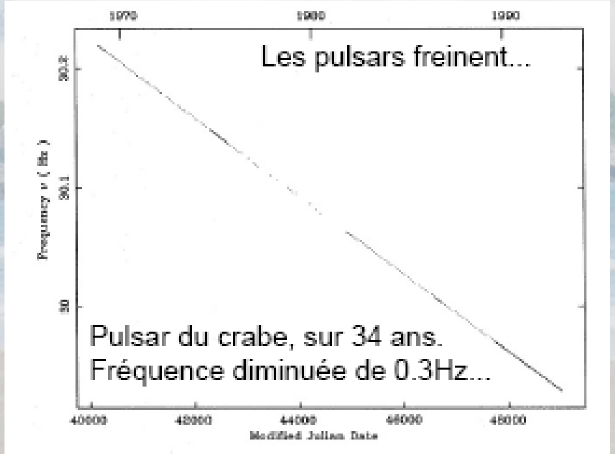


Fermi needs timing measurements

- Gamma-ray photons from pulsars are not frequent (1 over 1330 rotations is received from the Crab Pulsar !!!)
- Fermi observations are long (several months) => billions of rotations of the pulsar
- High precision needed for the phase calculation (i.e fraction of rotation)

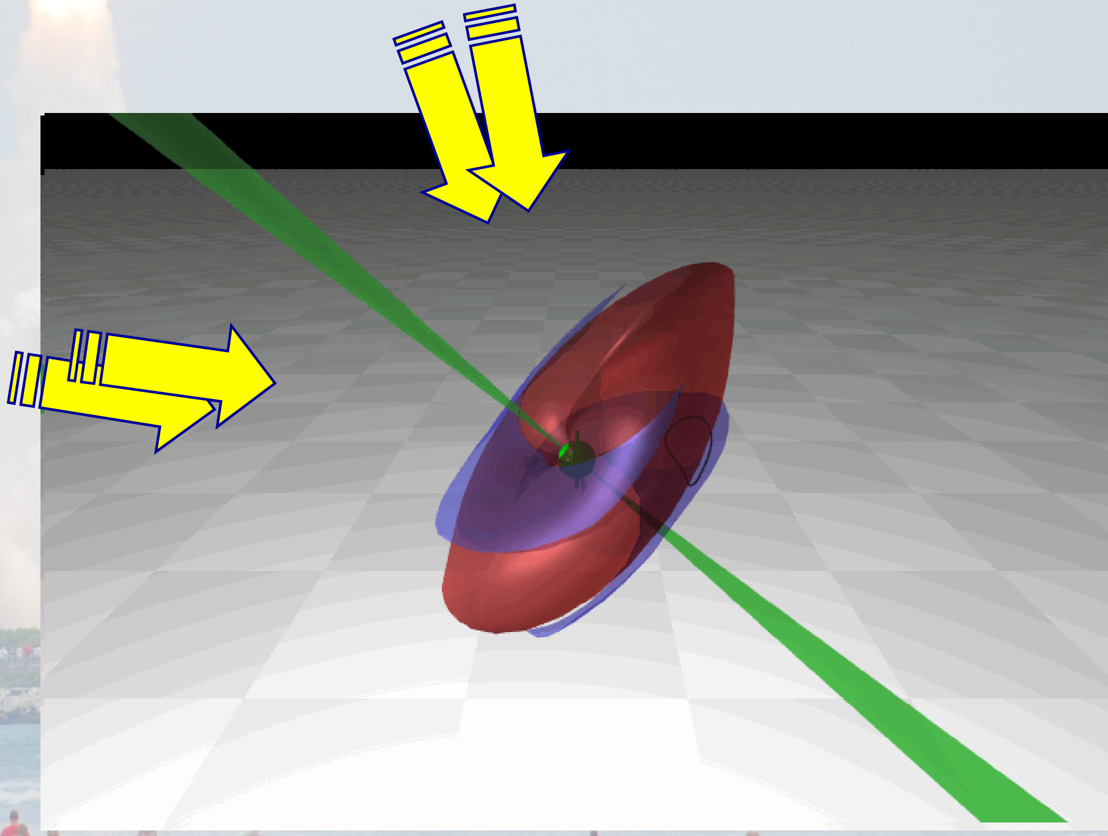
2 possibilities:

- Using known ephemeris at other wavelengths (radio or X-rays)
- Blind search for Geminga-like pulsars (using Fast Fourier Transform or Time Differencing Technique that reduces the computational time)



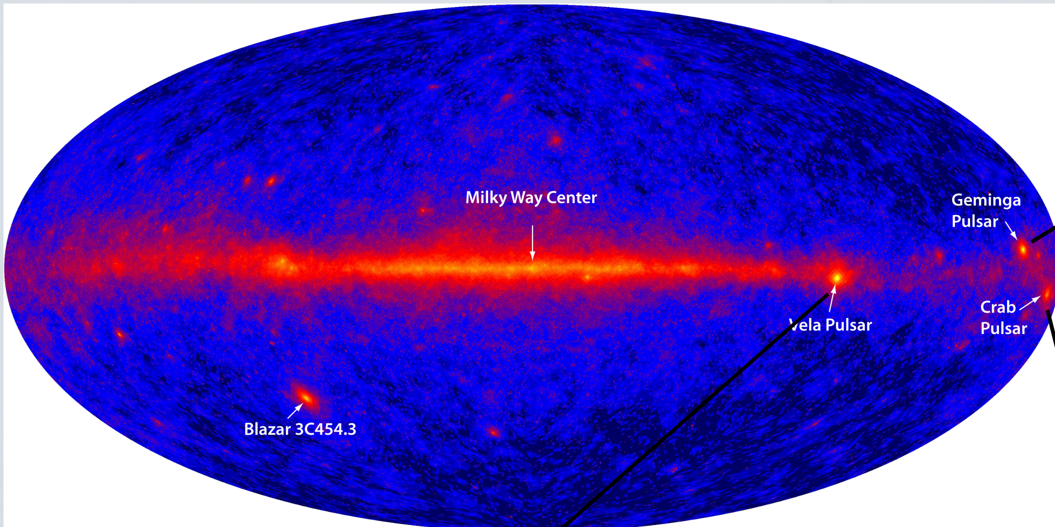
Pulses? Depends on where you look

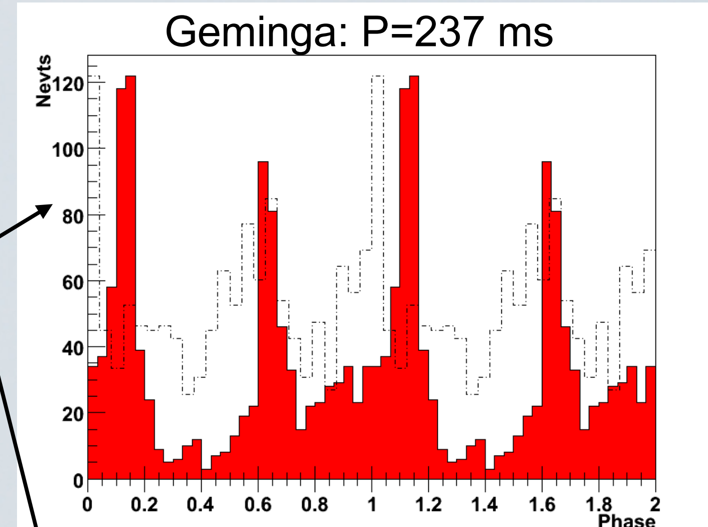
- Basic outer gap predictions
  - Radio along B axis
  - γ-ray along equator
- 4 Possible cases
  - Both: Radio + γ-ray PSR
    - Most famous objects
  - Radio-only PSR
    - fainter slot gap γ?
  - Neither: no Radio, no γ-ray
    - Thermal X-ray only
    - Hard to find!
  - Gamma: γ-ray only
    - Geminga, CTA-1

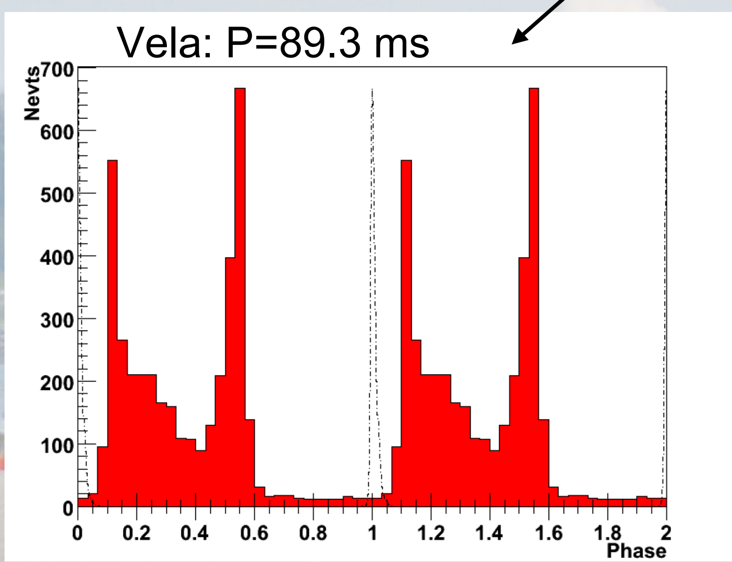


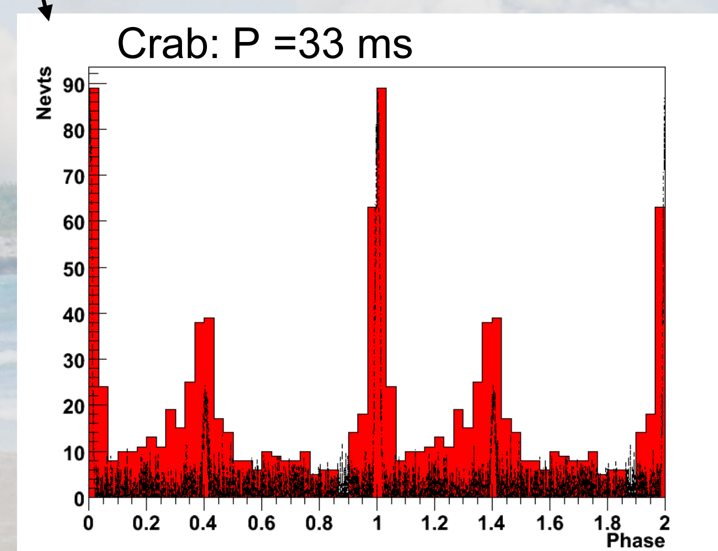
Fermi Gamma-ray Space Telescope

Pulsars (using early engineering data)

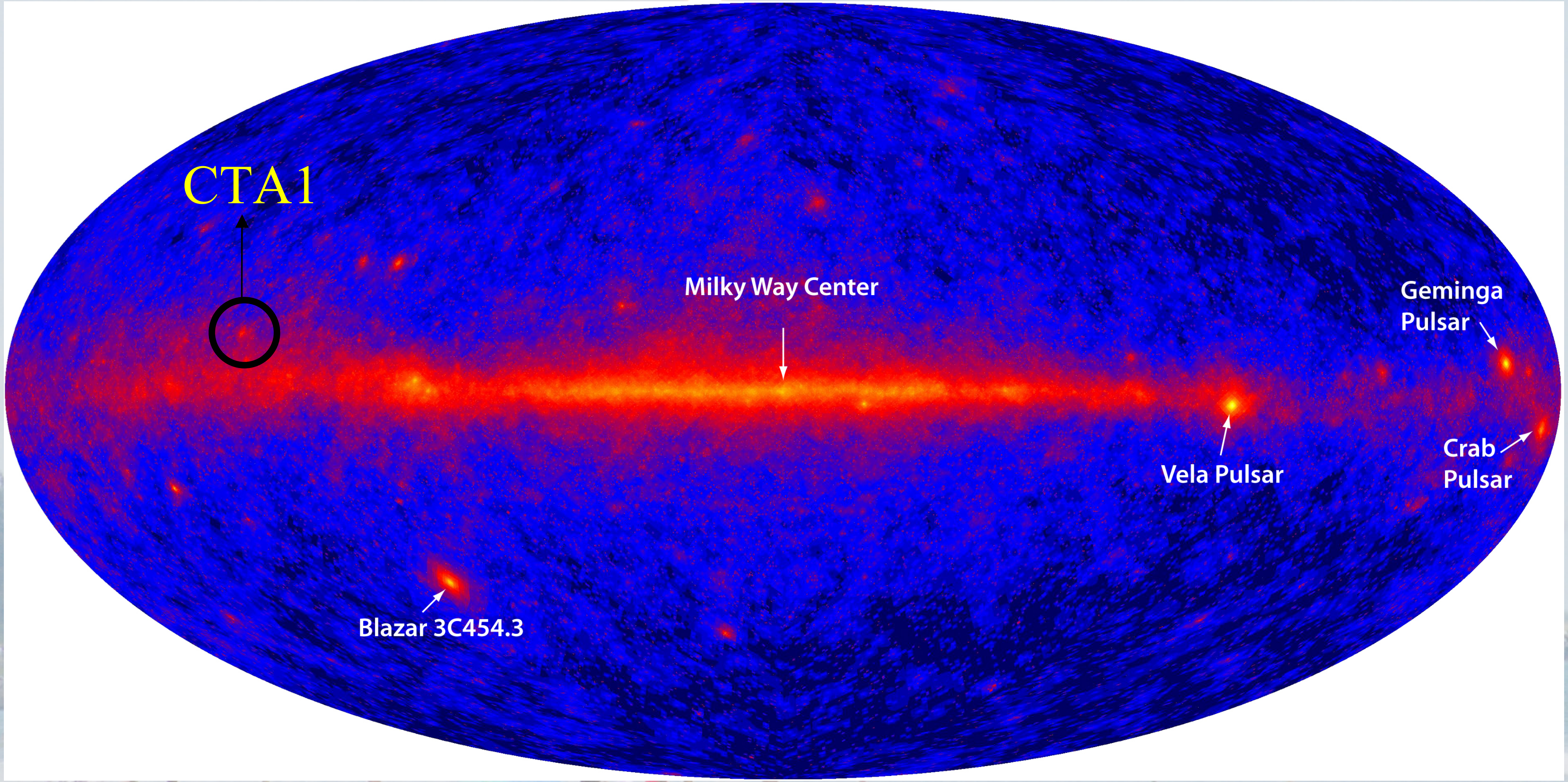






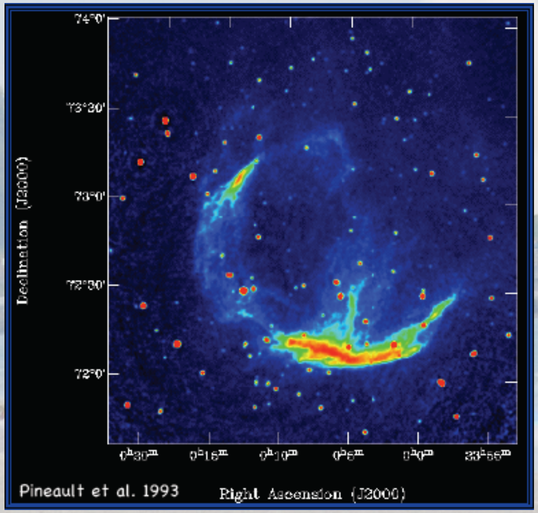


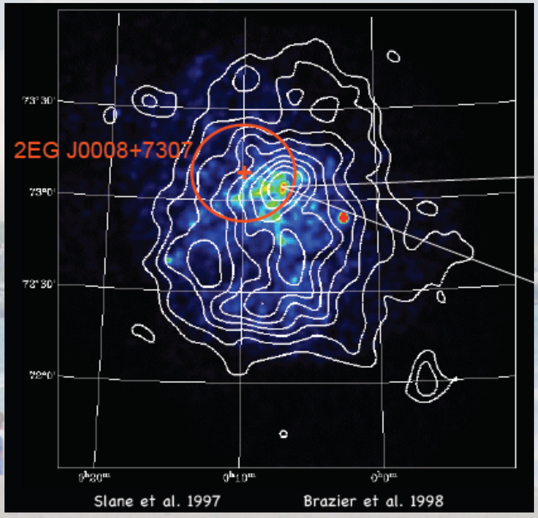
A gamma-ray source in the young supernova remnant CTA1

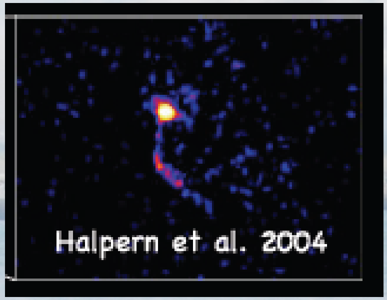


G119.5+10.2: CTA 1

- Large diameter SNR (~90') with a partial shell morphology in radio
- D= 1.4 ± 0.3 kpc; Age ~ 5000-15000 yrs => young SNR in the Sedov phase
- CTA1 contains a faint X-ray source RXJ0007.0+7303 at a center of a PWN
- Chandra observations: jet structure from compact source
  - Definitely a pulsar though no sign of periodicity found
- High energy emission from EGRET source 3EG J0010+7309 matches RX J0007.0+7303 though EGRET position uncertainty is very large
  - Is the EGRET source associated with the Pulsar ? The PWN ?





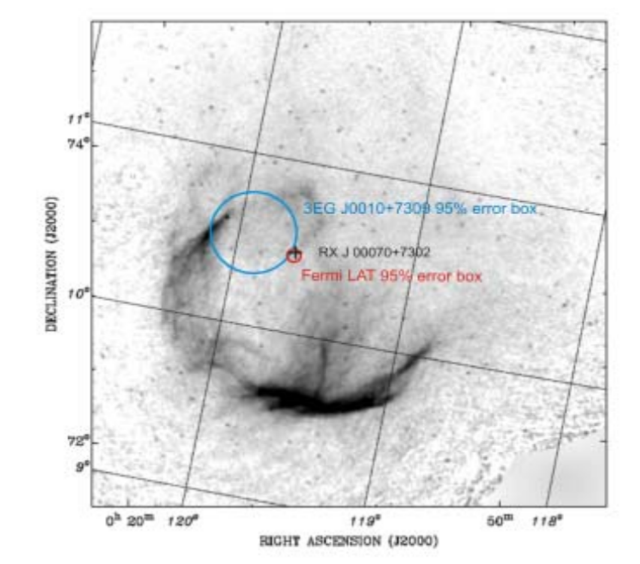


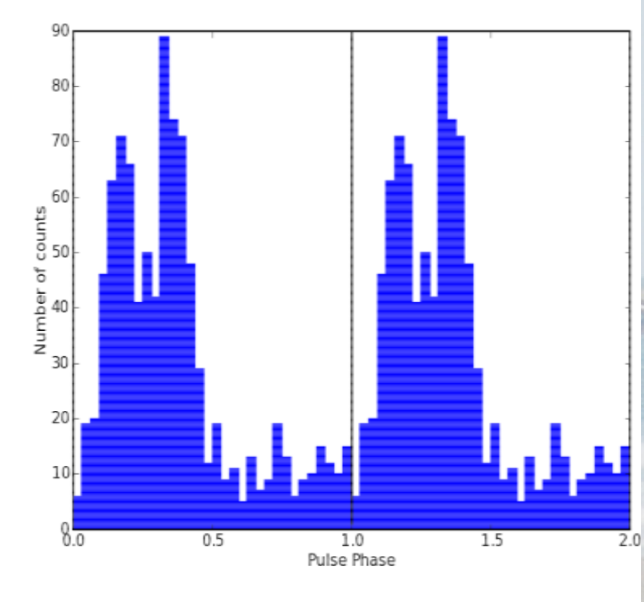
Fermi Gamma-ray Space Telescope

LAT discovers a radio-quiet pulsar !

> 900 photons (E >100 MeV) detected by the LAT
Flux = (3.8 ± 0.2)E-7 ph cm^{-2} s^{-1}

- Selection of γ-rays (E > 100 MeV) within a radius of 1°
- Arrival time of LAT photons corrected to the solar-system barycenter using the Chandra position
- Application of a blind search technique based on photon arrival time differencing
  - Significant pulsations
  - P ~ 316 ms
  - Pdot ~ 3.6E-13
  - Characteristic age ~ 14 000 yrs
  - Spin down power ~ 4.5E35 erg s^{-1}

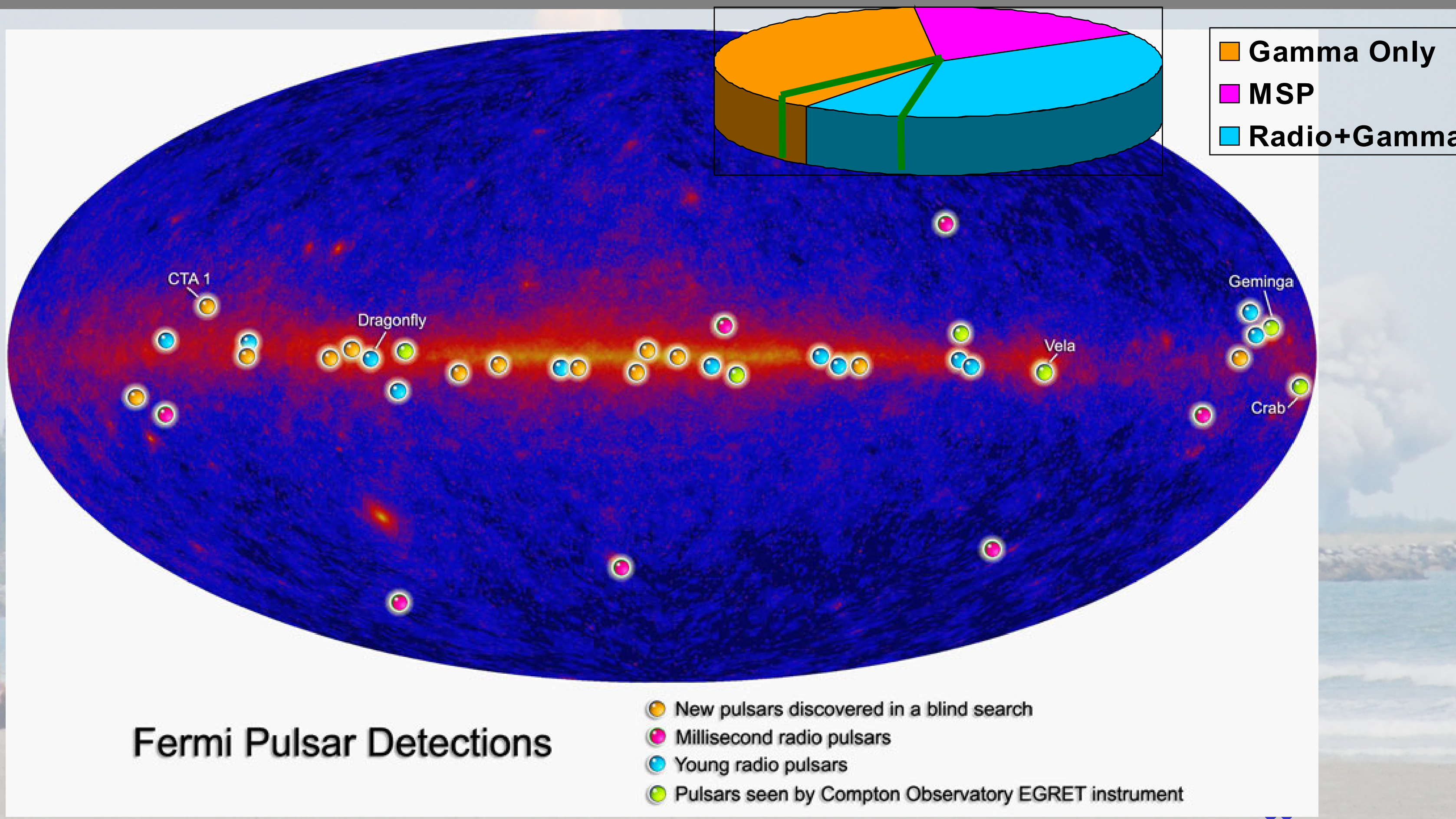




More details in:
The Fermi Gamma Ray Space Telescope discovers the Pulsar in the Young Galactic Supernova-Remnant CTA 1, Science Express, 16th October 2008 (astro-ph 0810.3562)

Fermi detects slew of new pulsars

The Fermi Telescope has found 12 previously unknown pulsars (orange). It also detected gamma-ray emissions from known radio pulsars (magenta, cyan) and from known or suspected gamma-ray pulsars (green).



The Galactic Diffuse Emission

- Cosmic-rays interacting with gas and radiation in the galaxy create γ-rays:
  - Proton or ion collisions with interstellar matter => $\pi^0 \rightarrow \gamma$
  - Inverse Compton scattering of energetic electrons on radiation fields
  - Bremsstrahlung of energetic electrons
- Dominated by Π^0 – decay emission around 1 GeV.

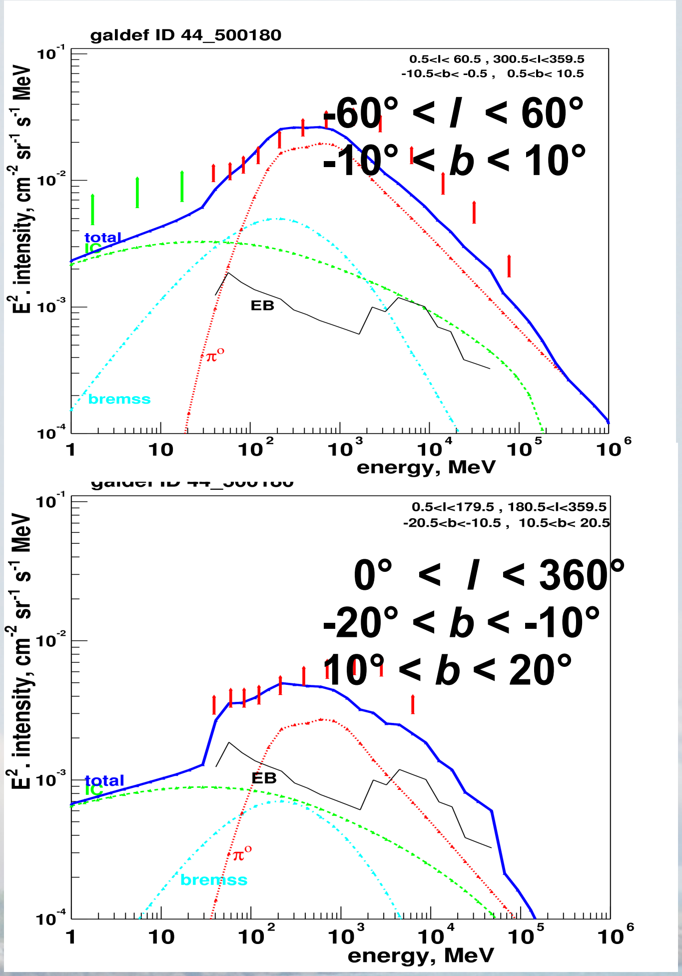
Modeling the Galactic Diffuse Emission

- Reference model for Fermi based on GALPROP:
  - CR source disitribution and particle spectra at the sources
  - Gas distribution/composition in the Galaxy (HI, HII, H_2)
  - Galactic magnetic fields
  - Transport equations
- Returns a γ-ray diffuse sky model
- Fine Tuning by comparison with data

EGRET GeV Excess

- EGRET observations showed excess emission > 1 GeV when compared with conventional models tuned to reproduce local cosmic-ray nuclei and electron spectra.

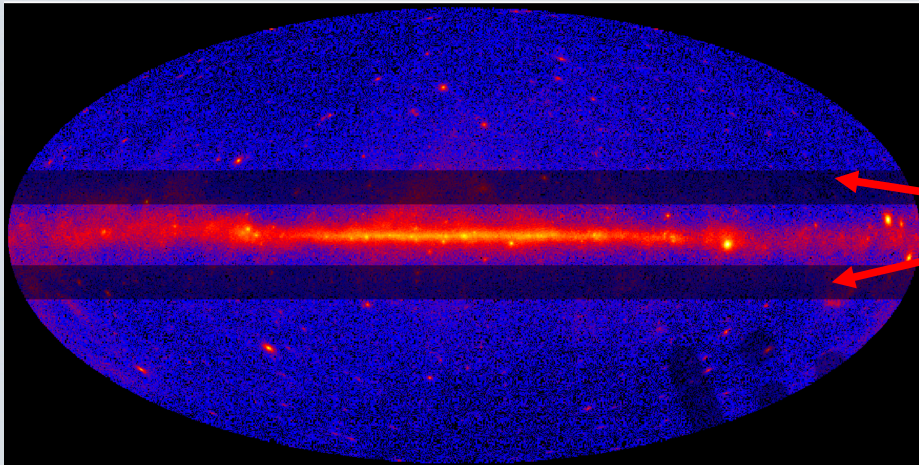
- Variety of explanations
  - Variations in cosmic-ray spectra over Galaxy
  - Unresolved sources (pulsars, SNRs, …)
  - Dark matter
  - Instrumental

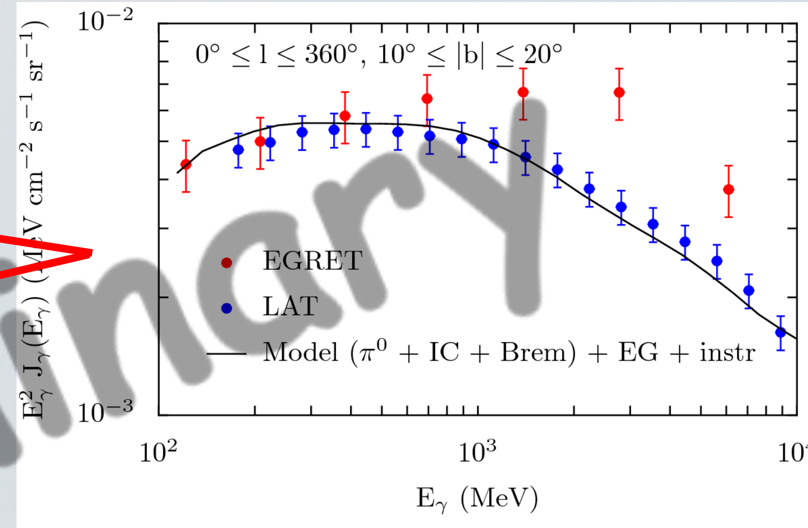


~100% discrepancy > 1 GeV

Strong, Moskalenko & Reimer
ApJ 613, 962 (2004)

The Fermi LAT View





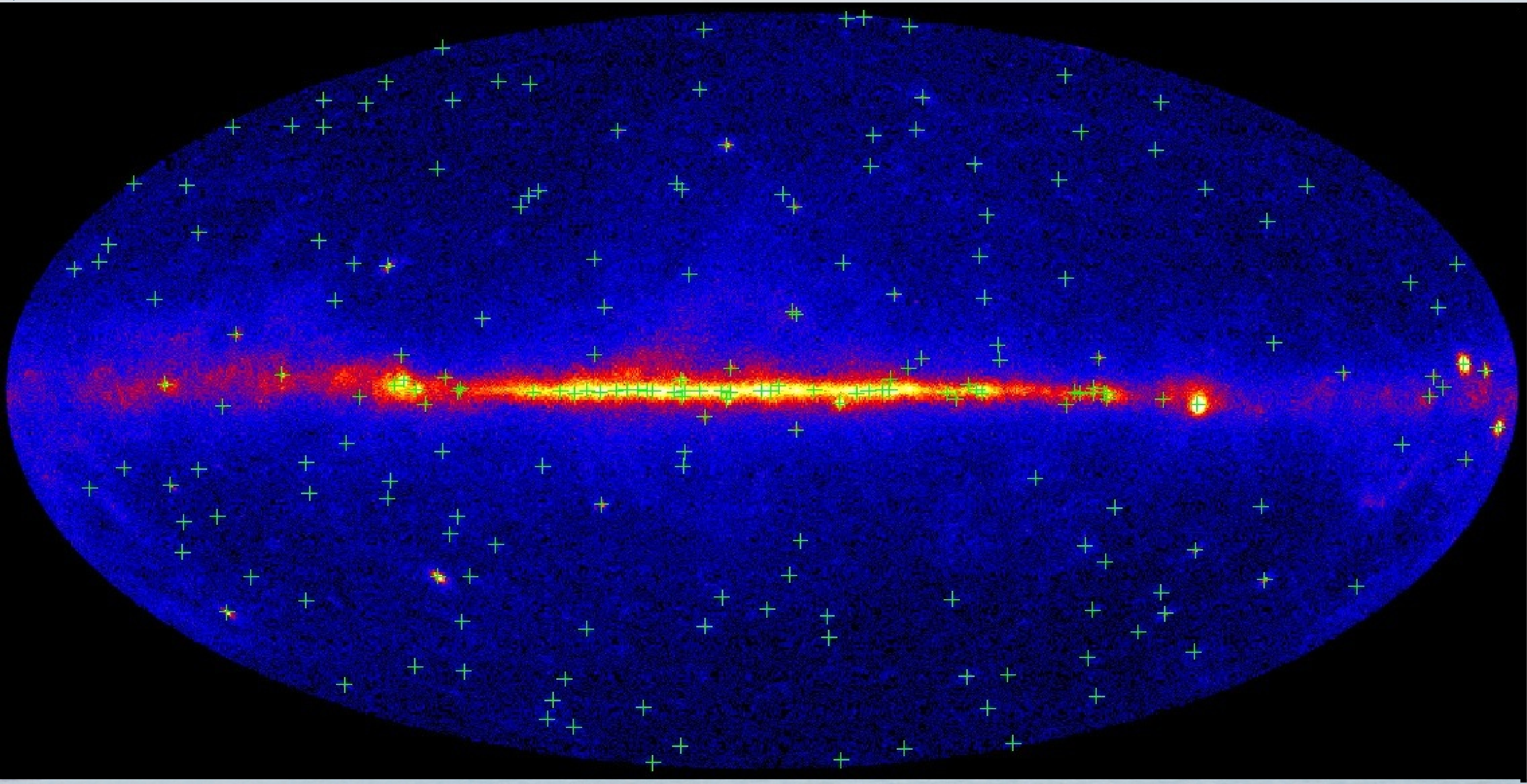
- Spectra shown for mid-latitude range → *GeV excess in this region of the sky is not confirmed.*
- Sources are not subtracted but are a minor component.
- LAT errors are systematic dominated and estimated ~10% → this is preliminary.
- EGRET data is prepared as in Strong, et al. 2004 with a 15% systematic error assumed to dominate (Esposito, et al. 1996).
- EG + instrumental is assumed to be isotropic and determined from fitting the data at $|b| > 10°$.

III. LAT bright source list

Constructing the LAT Bright Source List

- Data used are the first three months of all-sky scanning data, Aug. - Oct. 2008.
- Maximum likelihood analysis was used to determine source significance, fluxes in two energy bands, locations, and variability information, all of which will be included in the list.
- Only sources with confidence level greater than **10σ** were retained for the bright source list.
- The resulting bright source list is not a catalog:
  - Not complete - many more sources at lower significance
  - Not flux limited - cut is on confidence level
  - Not uniform - sources near the Galactic plane must be brighter because of the strong diffuse background.

205 Preliminary LAT Bright Sources



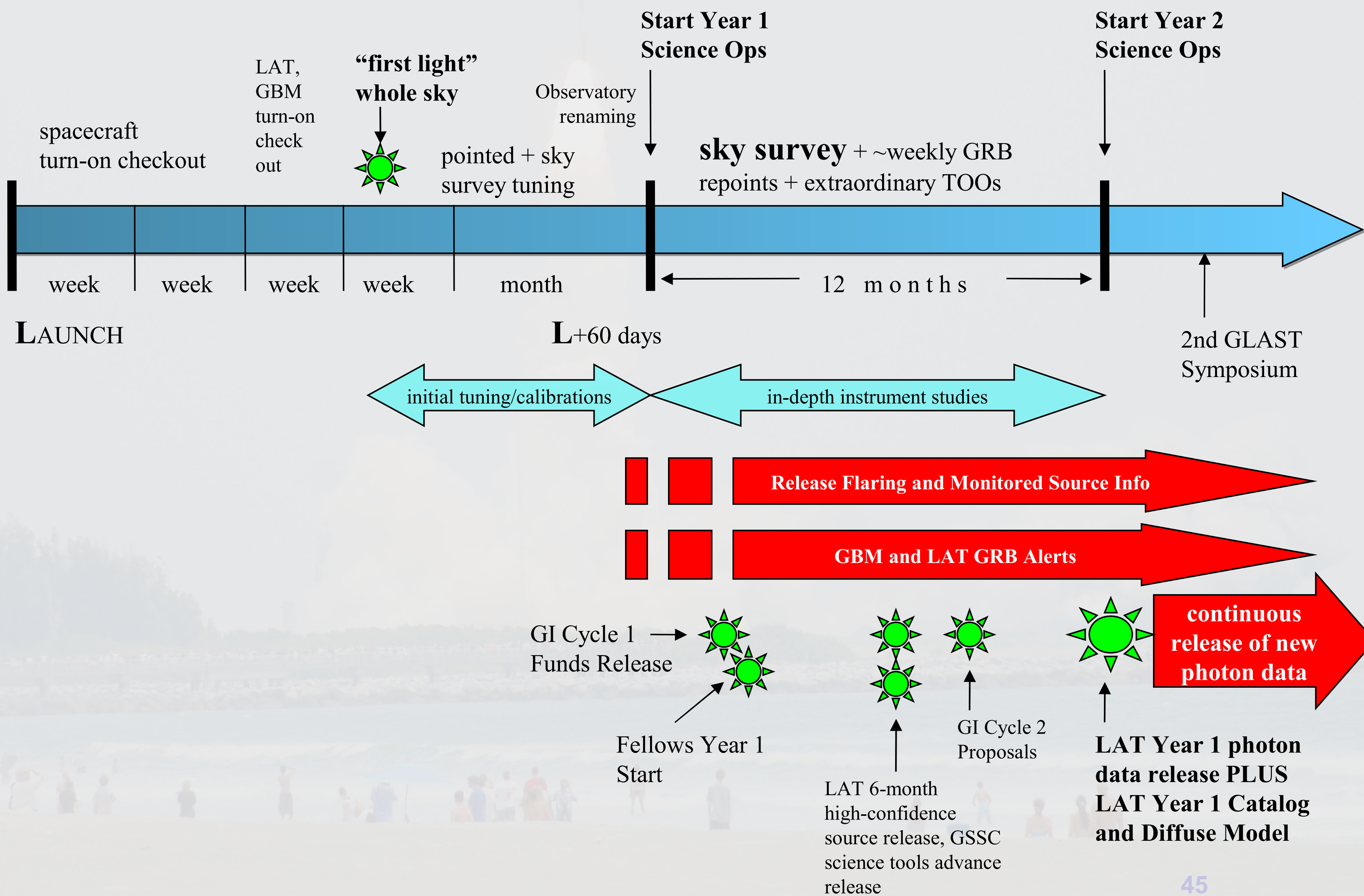
Crosses mark source locations, in Galactic coordinates.

205 Preliminary LAT Bright Sources - Some Information

- EGRET on the Compton Observatory found fewer than 30 sources above 10 σ in its lifetime.
- Typical 95% error radius is less than 10 arcmin. For the brightest sources, it is less than 3 arcmin. Improvements are expected.
- About 1/3 of the sources show definite evidence of variability.
- More than 30 pulsars are identified by gamma-ray pulsations.
- Over half the sources are associated positionally with blazars. Some of these are firmly identified as blazars by correlated multiwavelength variability.
- Over 40 sources have no obvious associations with known gamma-ray emitting types of astrophysical objects.

Fermi Gamma-ray Space Telescope

Year 1 Science Operations Timeline Overview



LAT First Year Source Monitoring List

http://fermi.gsfc.nasa.gov/ssc/data/policy/LAT_Monitored_Sources.html

Flux/spectra as a function of time (daily and weekly integrations) for all sources in the list.

PLUS, same for any source flaring above 2e-6 ph/cm^2/s until the flux drops below 2e-7 ph/cm^2/s (~several per month)

A "quicklook" analysis to get the results out as quickly as possible. Tables will be updated as analysis and calibrations improve.

Source Type	Source Name	EGRET Name	Average or Min. Flux (10^{-8} γ $cm^{-2}s^{-1}$)	Galactic Lattitude	Redshift	TeV Source
Blazar	0208-512	3EGJ0210-5055	85.5 ± 4.5	-61.9	1.003	
	0235+164	3EGJ0237+1635	65.1 ± 8.8	-39.1	0.94	
	PKS 0528+134	3EGJ0530+1323	93.5 ± 3.6	-11.1	2.060	
	PKS 0716+714	3EGJ0721+7120	17.8 ± 2.0	28	0.3	
	0827+243	3EGJ0829+2413	24.9 ± 3.9	31.7	0.939	
	OJ 287	3EGJ0853+1941	10.6 ± 3.0	35.8	0.306	
	Mrk 421	3EGJ1104+3809	13.9 ± 1.8	65.0	0.031	Yes
	W Com 1219+285	3EGJ1222+2841	11.5 ± 1.8	83.5	0.102	
	3C 273	3EGJ1229+0210	15.4 ± 1.8	64.5	0.158	
	3C 279	3EGJ1255-0549	74.2 ± 2.8	57.0	0.538	
	1406-076	3EGJ1409-0745	27.4 ± 2.8	50.3	1.494	
	H 1426+428	NA		64.9	0.129	Yes
	1510-089	3EGJ1512-0849	18.0 ± 3.8	40.1	0.36	
	PKS 1622-297	3EGJ1625-2955	47.4 ± 3.7	13.4	0.815	
	1633+383	3EGJ1635+3813	58.4 ± 5.2	42.3	1.814	
	Mrk 501	NA		38.9	0.033	Yes
	1730-130 NRAO 530	3EGJ1733-1313	36.1 ± 3.4	10.6	0.902	
	1ES 1959+650	NA		17.7	0.048	Yes
	PKS 2155-304	3EG2158-3023	13.2 ± 3.2	-52.2	0.116	Yes
	BL_Lacertae (2200+420)	3EGJ2202+4217	39.9 ± 11.6	-10.4	0.069	Yes
	3C 454.3	3EGJ2254+1601	53.7 ± 4.0	-38.3	0.859	
	1ES 2344+514	NA		-9.9	0.044	Yes
HMXB	LSI+61 303 2CG135+01	3EGJ0241+6103	69.3 ± 6.1	1.0		Yes

Summary

- The GLAST Launch and LAT Activation and on-orbit commissioning have been huge successes!!

- GLAST has been renamed Fermi in "First Light" ceremony on August 26
- Many sources already detected:
  - 205 sources above 10σ
  - More than 30 pulsars
  - Several blazars and 2 transients in the galactic plane
  - 4 GRBs detected by the LAT, 97 detected by the GBM
  - Sun and Moon detected with high confidence...

The list of 205 bright sources will be released on February 6th

Lots of exciting science to come !