2008年秋天文学会

GLASTガンマ線天文衛星の打ち上げ成功とLAT望遠鏡の性能

Fermi−LAT　国際共同研究チーム　&　日本フェルミ衛星チーム
広島大学　大杉　節

1)打ち上げ成功、6月12日1:05
2)新しい名前
「フェルミガンマ線天文衛星」
(Fermi Gamma-ray Space Telescope)
3)ファーストライト
全天ガンマ線マップ(地図)

http://www.nasa.gov/mission_pages/GLAST/main/index.html

日本Fermi (旧GLAST)グループ

＊日本Fermi衛星チーム（仮称）メンバー（15名＋学生）

広島大学:　大杉　節、深澤泰司、水野恒史、片桐秀明、山崎　了
JAXA/ISAS:高橋忠幸、尾崎正伸、内山泰伸、佐藤理江、大野雅功
東京工業大学:河合誠之、片岡　淳、中森健之
東京大学:　牧島一夫
名古屋大学:福井康夫

＊支援・資金

高エネルギー加速器研究機構・日米科学技術協力事業
（高エネルギー分野）
文部科学省科学研究費補助金（特定領域「ブラックホール天文学の 新展開、
計画研究:高感度GeVγ線観測で探る巨大ブラックホールの進化とジェットの放出機構」研究代表者 深沢泰司（広島大学教授））

その他、理化学研究所、広島大学、JAXA/ISAS、東京大学等の支援も受けました
ご支援いただいた機関にこの場を借りまして厚く御礼申し上げます

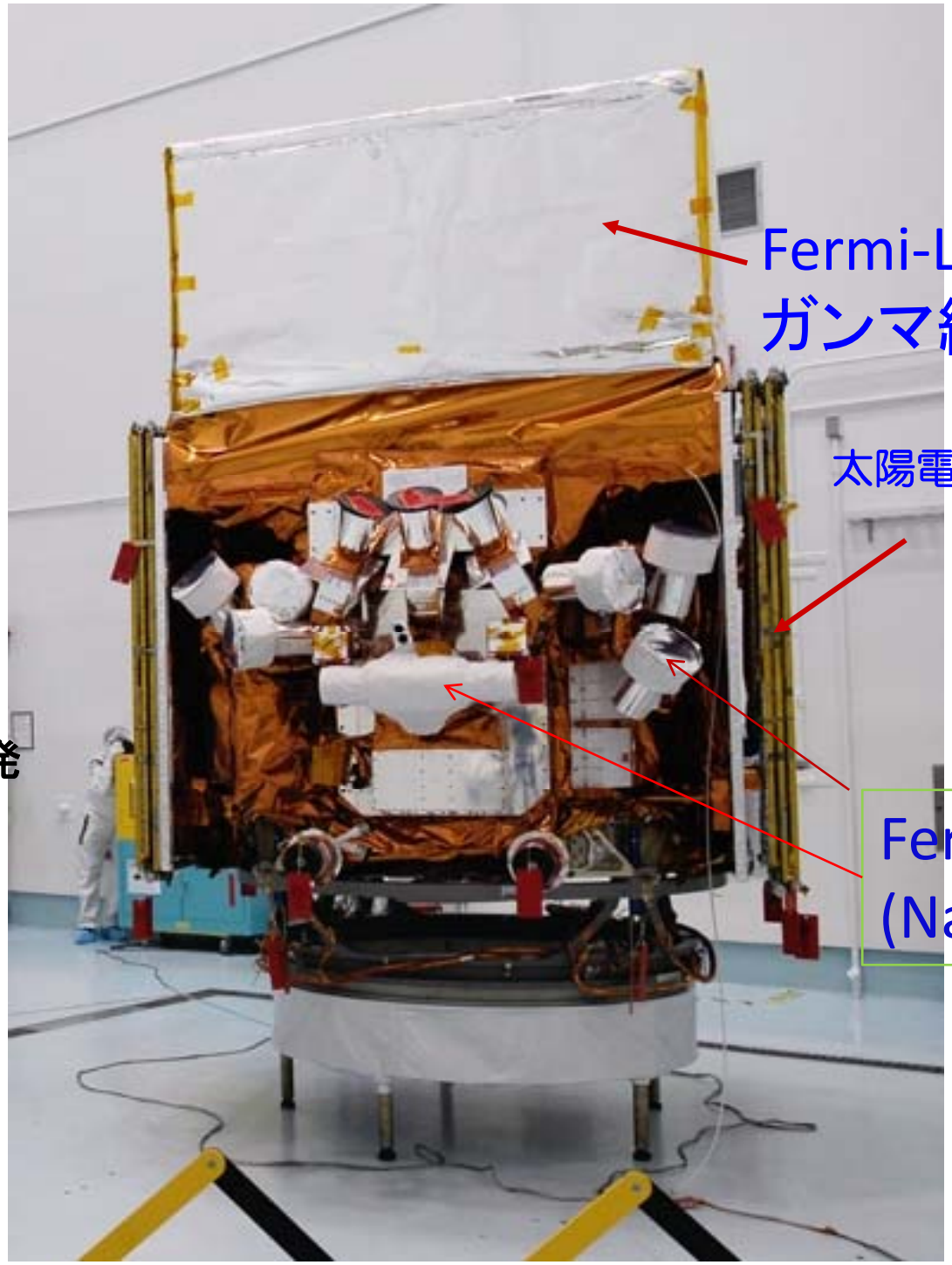
フェルミガンマ線望遠鏡
６月１２日打ち上げ
Cape Canaveral, Florida

Fermi衛星

大きさ
高さ:2．9m
幅　:1．8m
衛星重量:4．3トン
（望遠鏡:3．0トン）

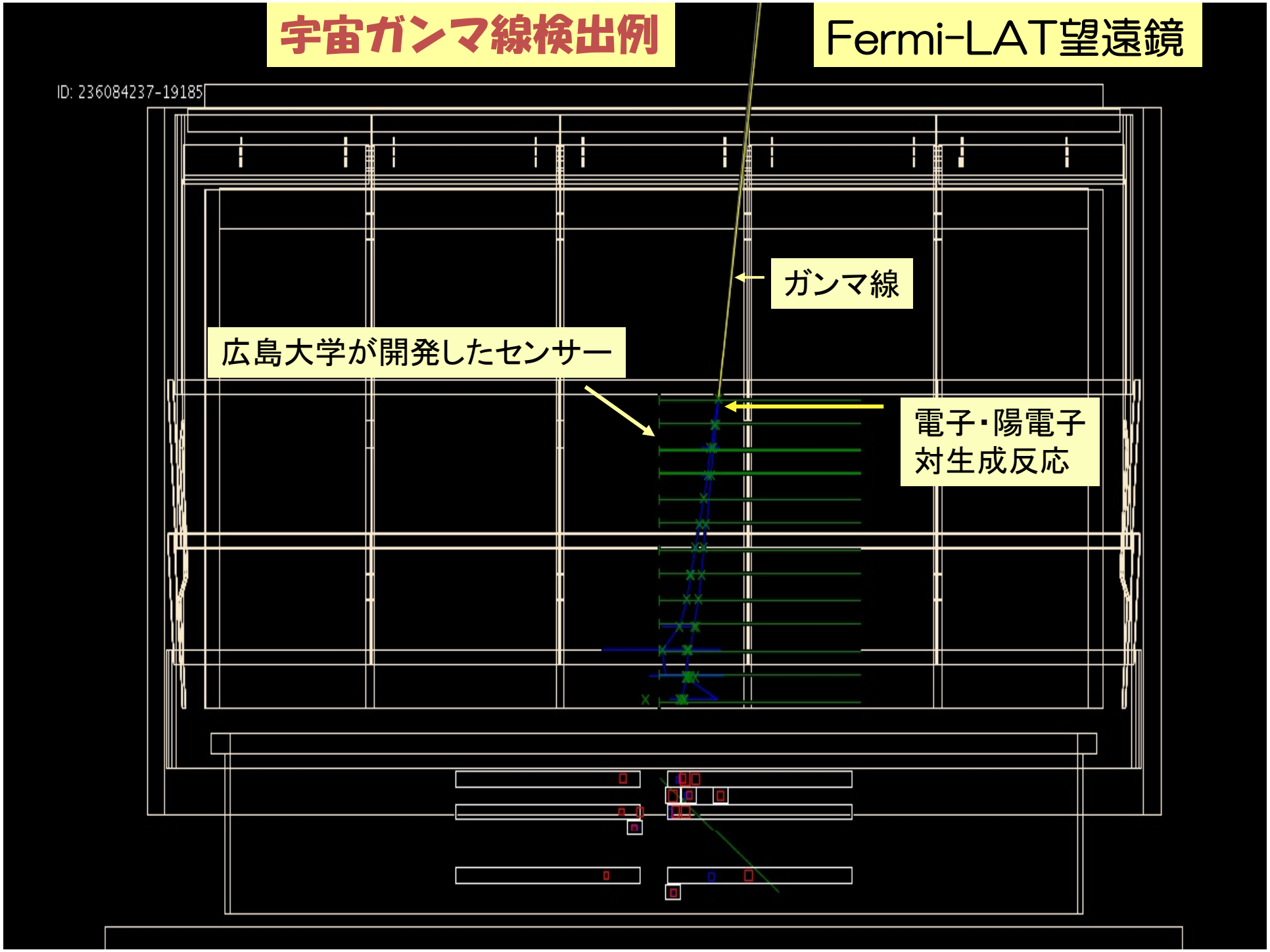
米国、日本、イタリヤ
フランス、スエーデン
ドイツの国際共同開発

軌道:560ｋｍ円軌道
一周:95分

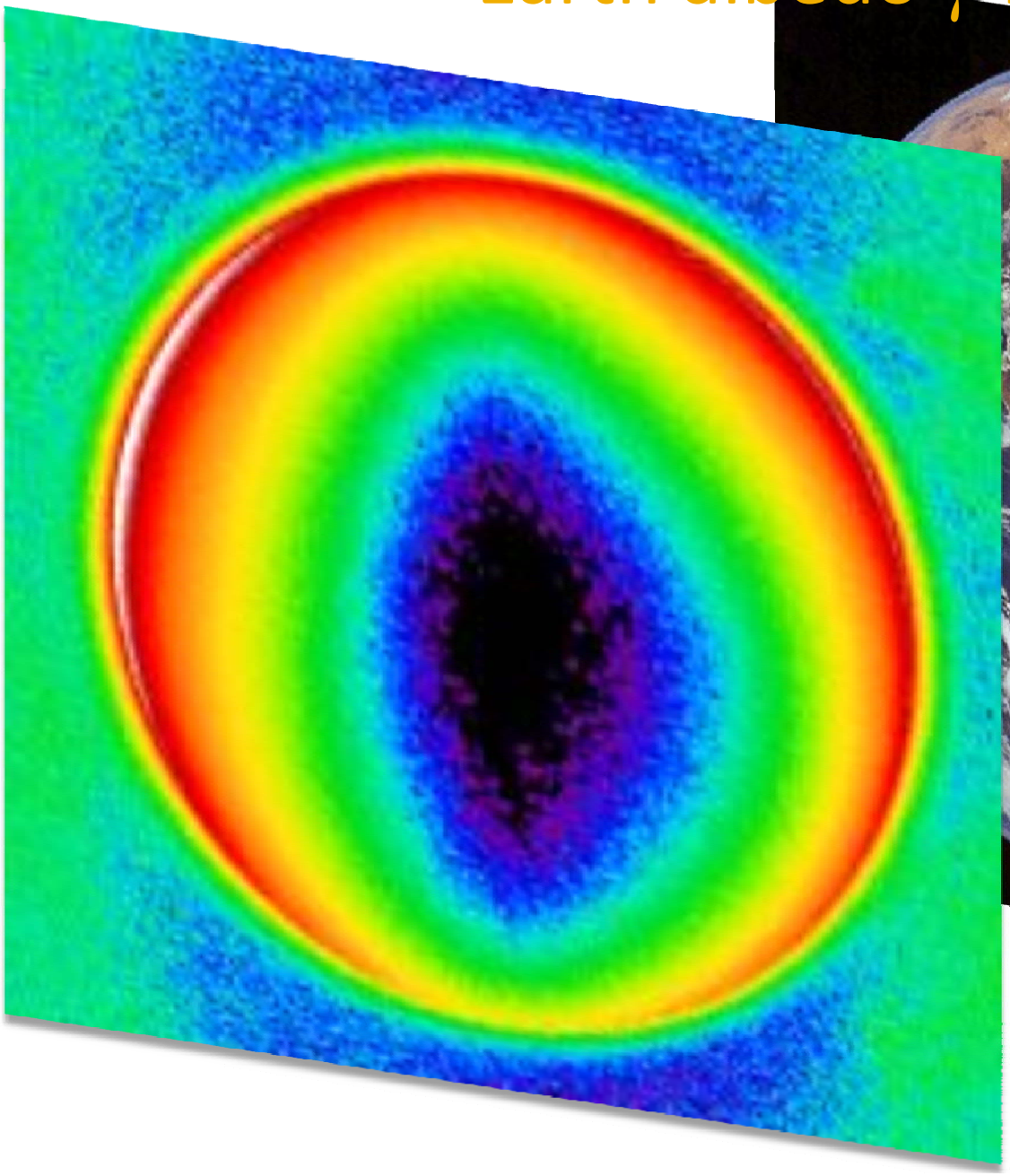


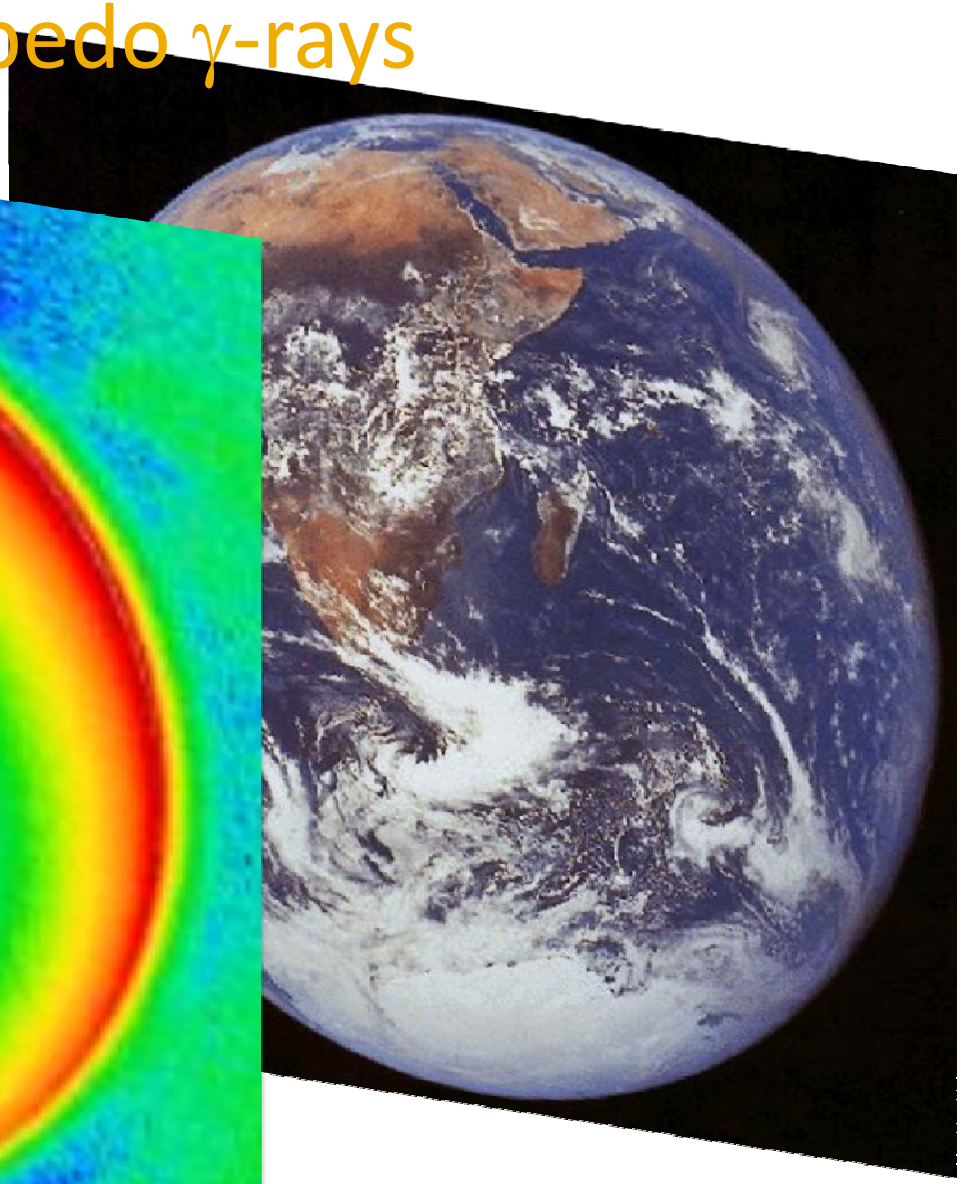
宇宙ガンマ線検出例

Fermi-LAT望遠鏡



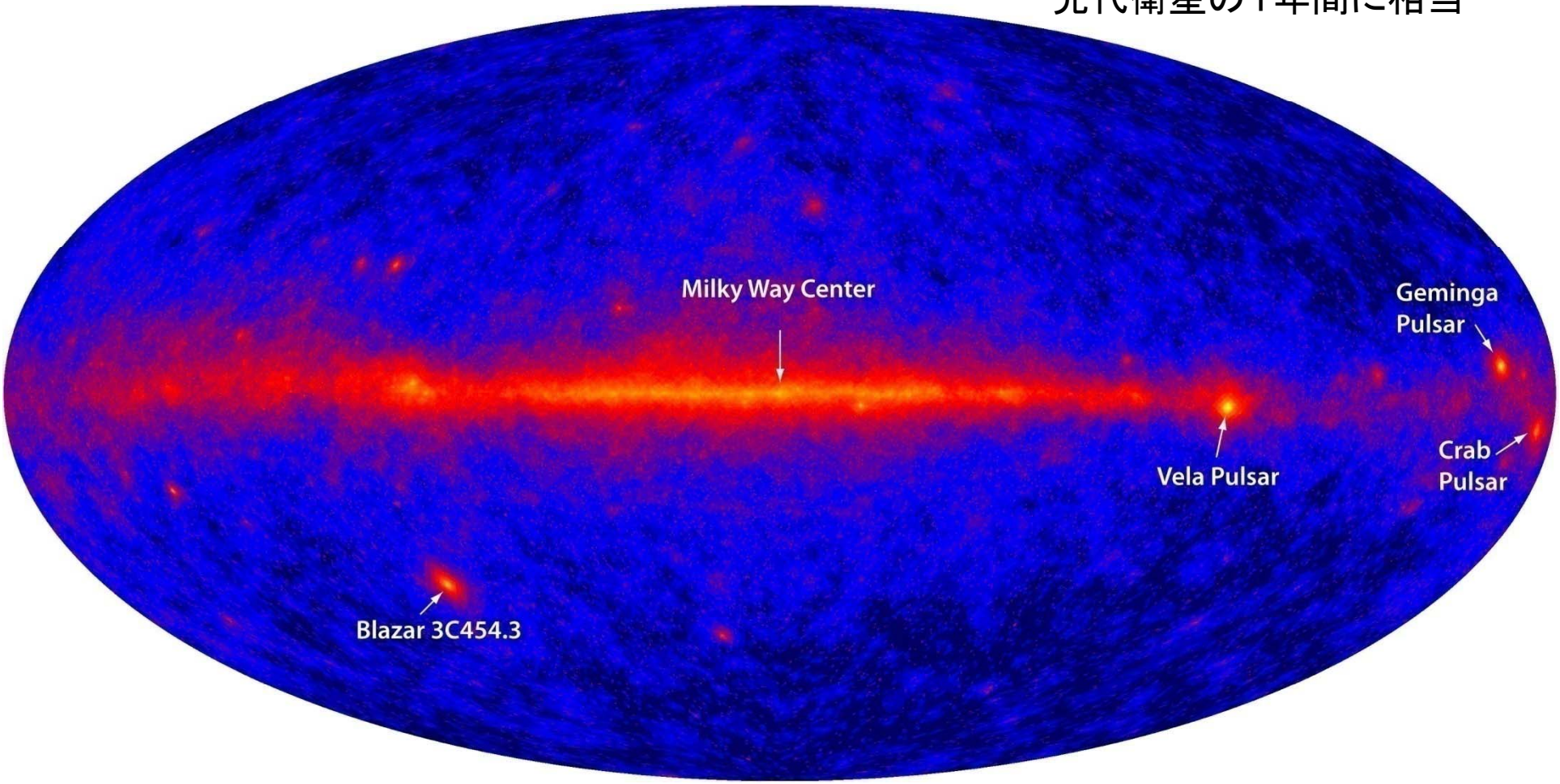
Earth albedo γ-rays



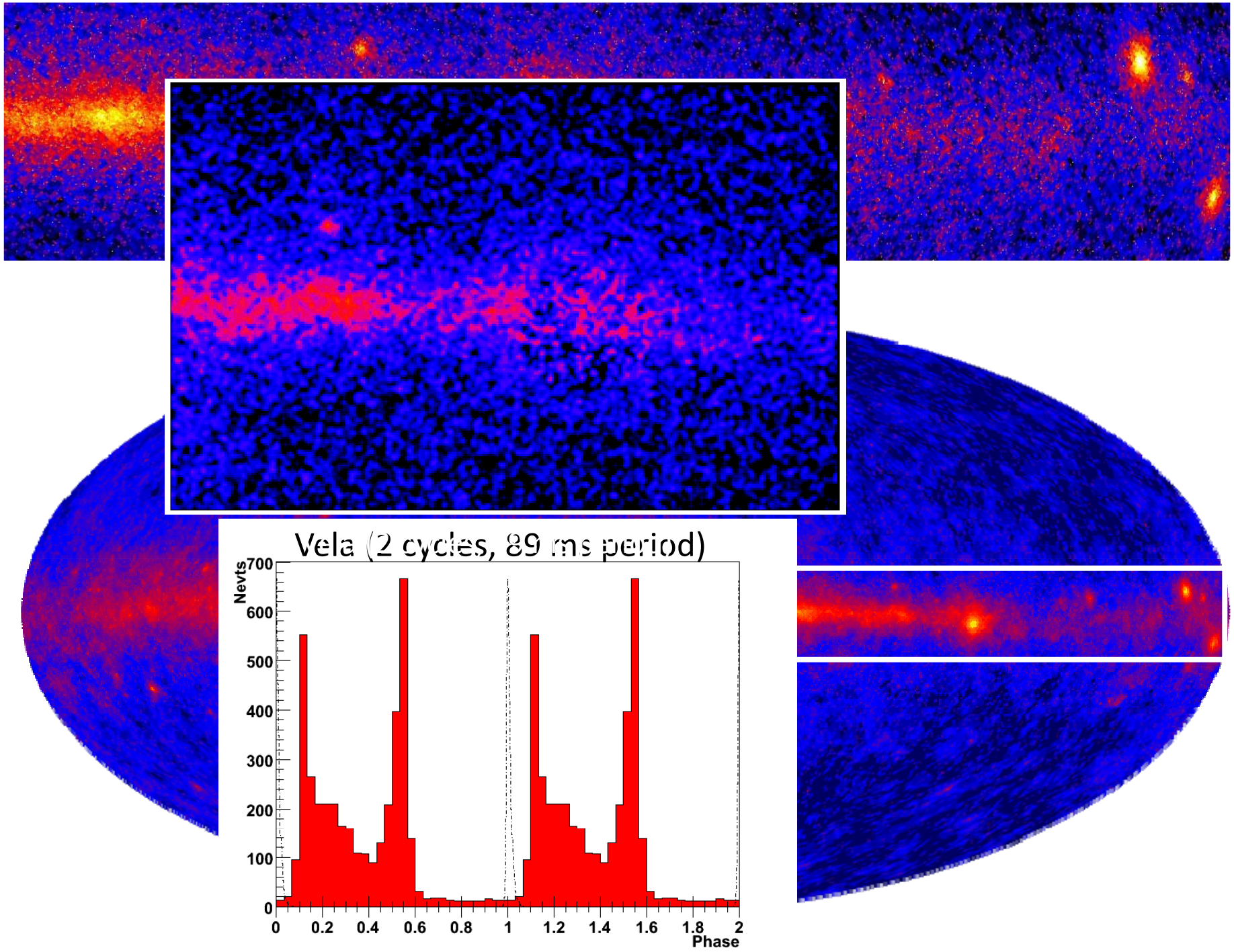


LAT観測全天ガンマ線マップ

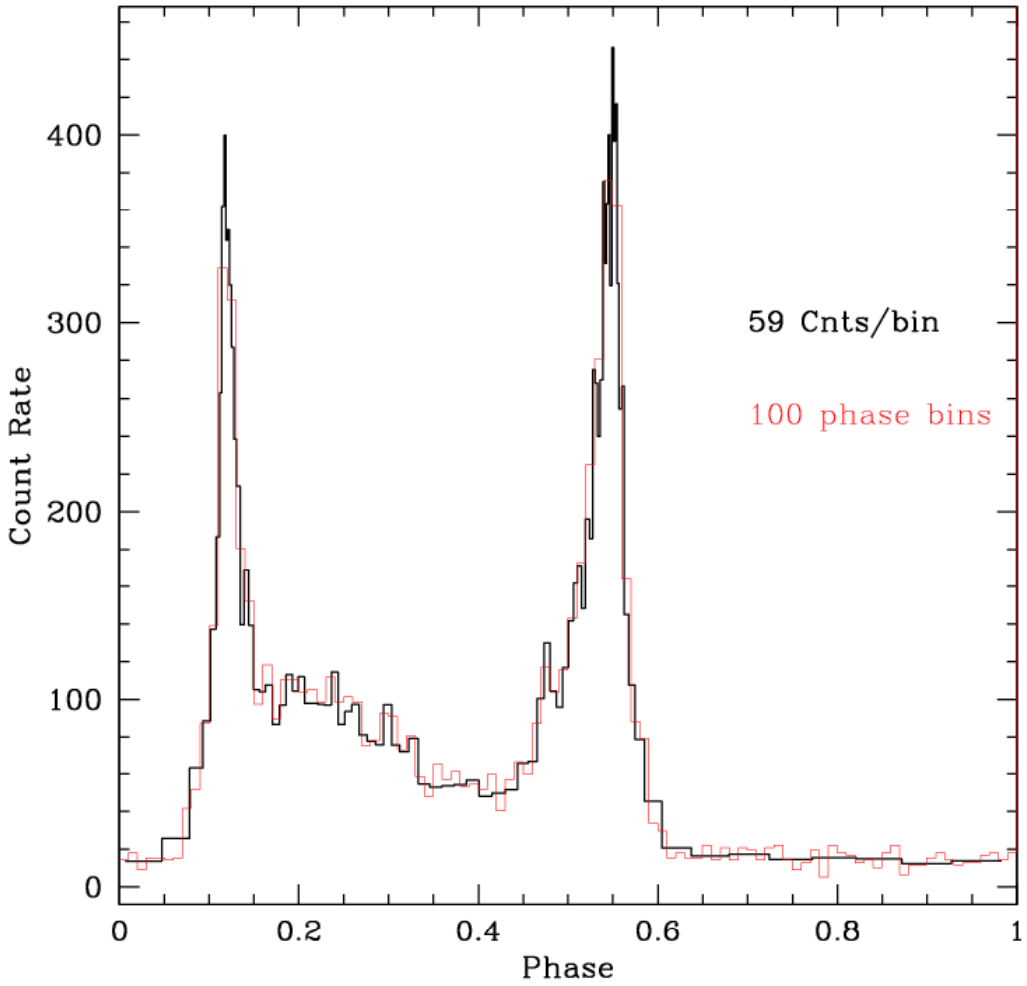
95時間（4日）観測データ
先代衛星の1年間に相当



フェルミ天文衛星により得られたガンマ線宇宙地図。中央の天野側銀河面の明るい放射、明るいパルサー、巨大ブラックホールが見えている。著作権：NASA/DOE,国際GLASTチーム

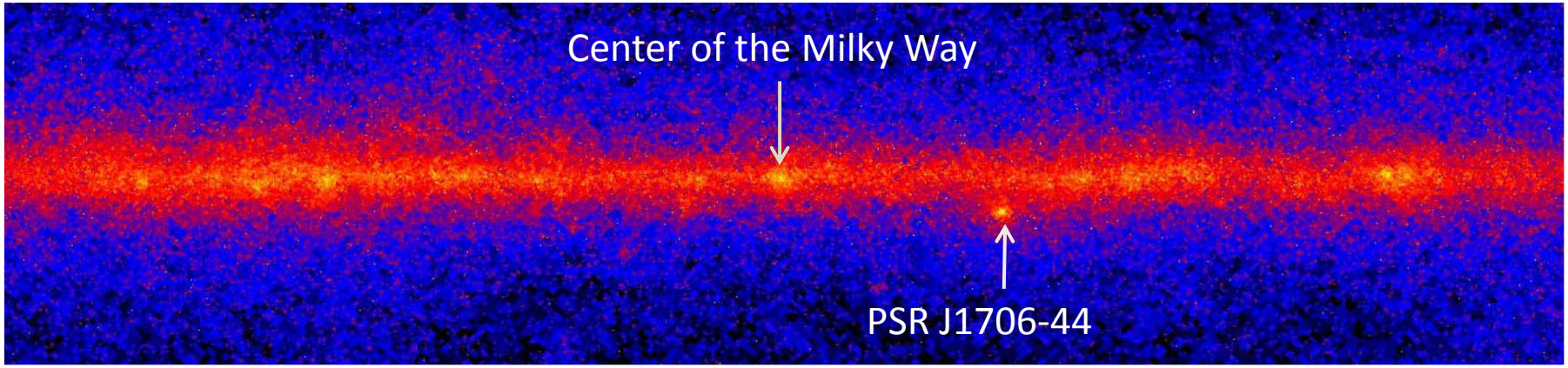

Vela (2 cycles, 89 ms period)
Nevts
700
600
500
400
300
200
100
0
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
Phase

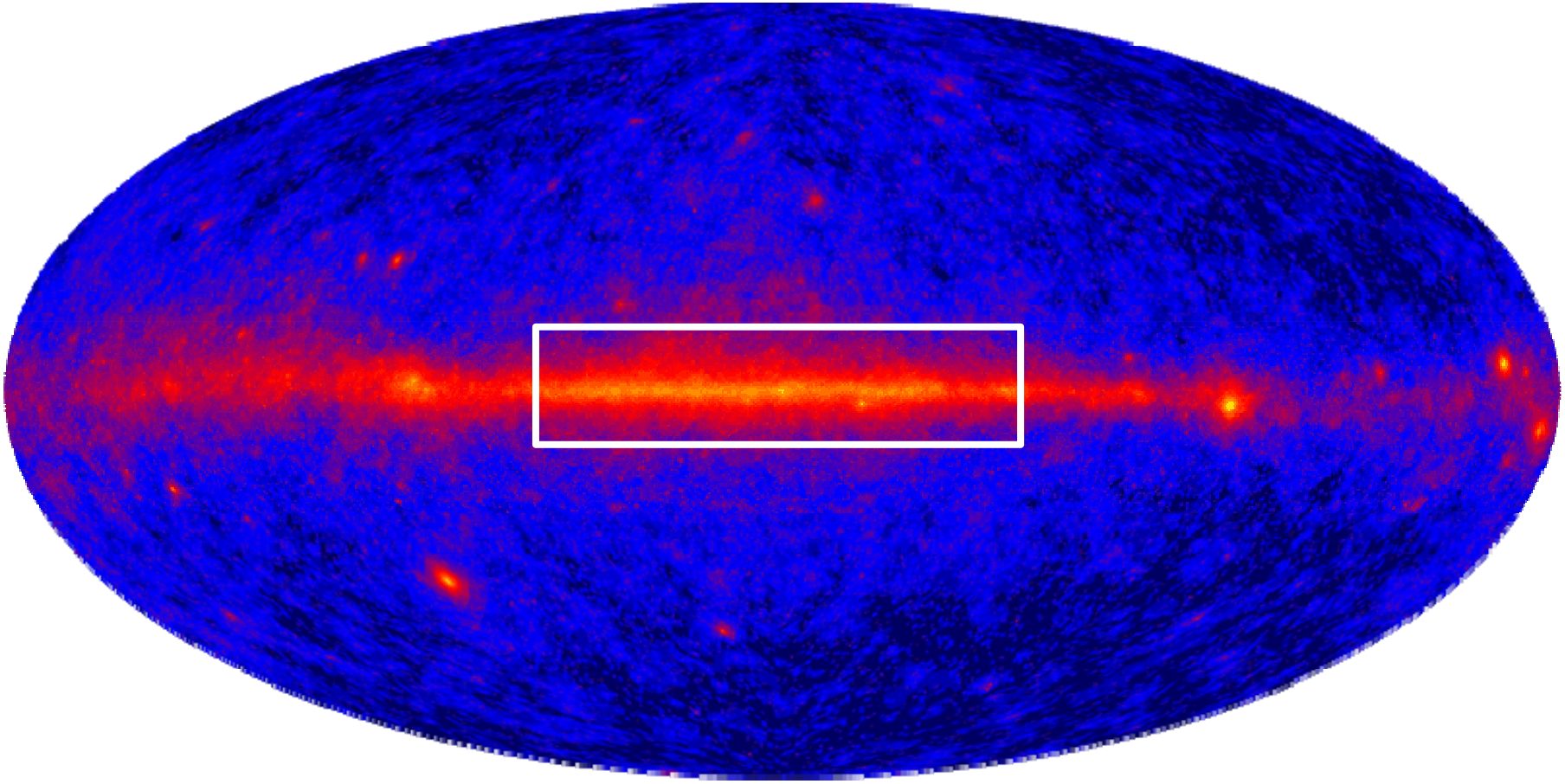
Vela pulsar



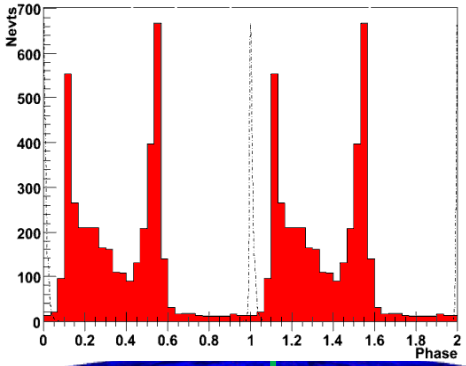
Parkes radio ephemeris used to fold γ-ray data

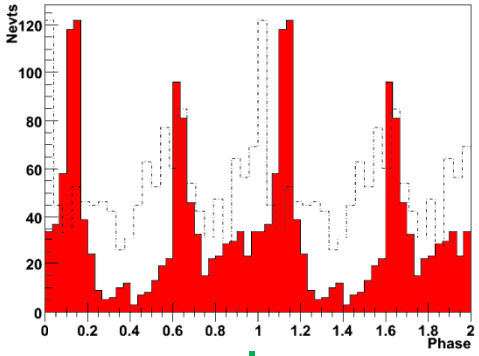
γ-ray data show structure down to ~100 microsec.

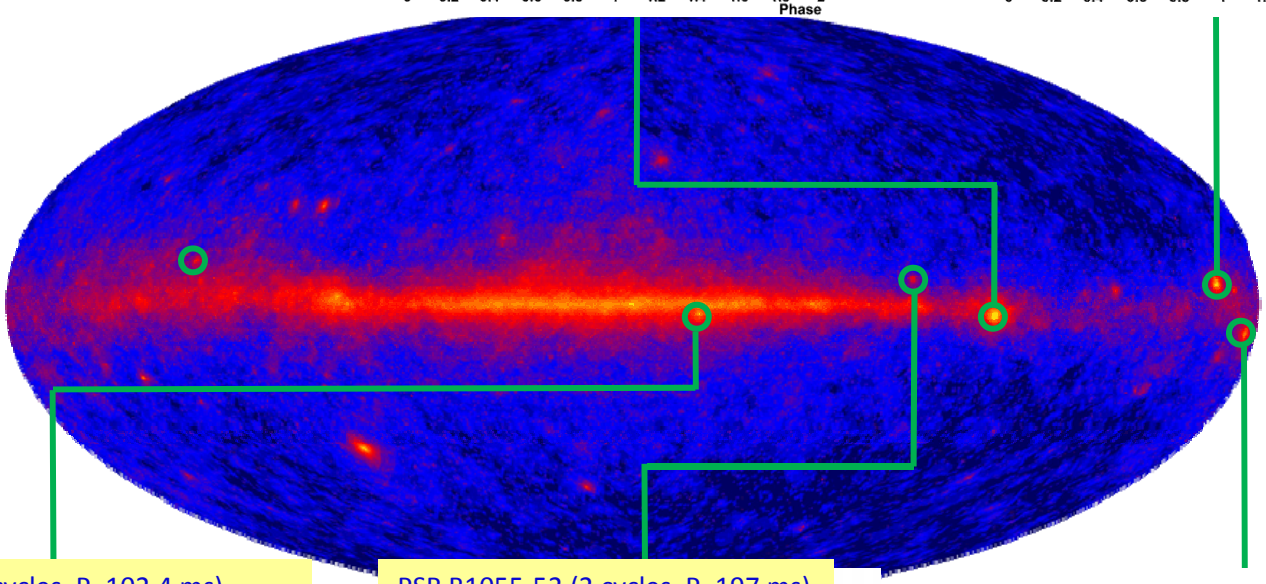

Center of the Milky Way
PSR J1706-44



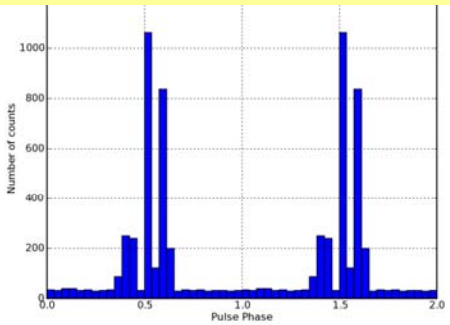
In a few days, *Fermi* has confirmed the EGRET pulsars and found some new γ-ray pulsars as well



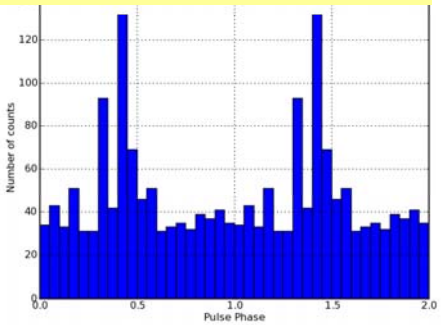


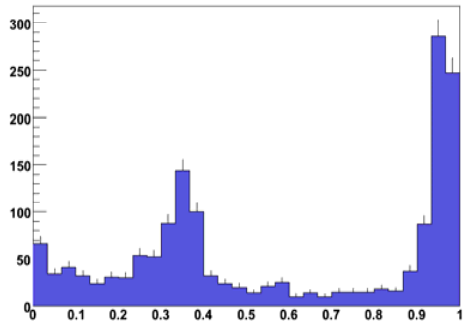


PSR B1706-44 (2 cycles, P=102.4 ms)

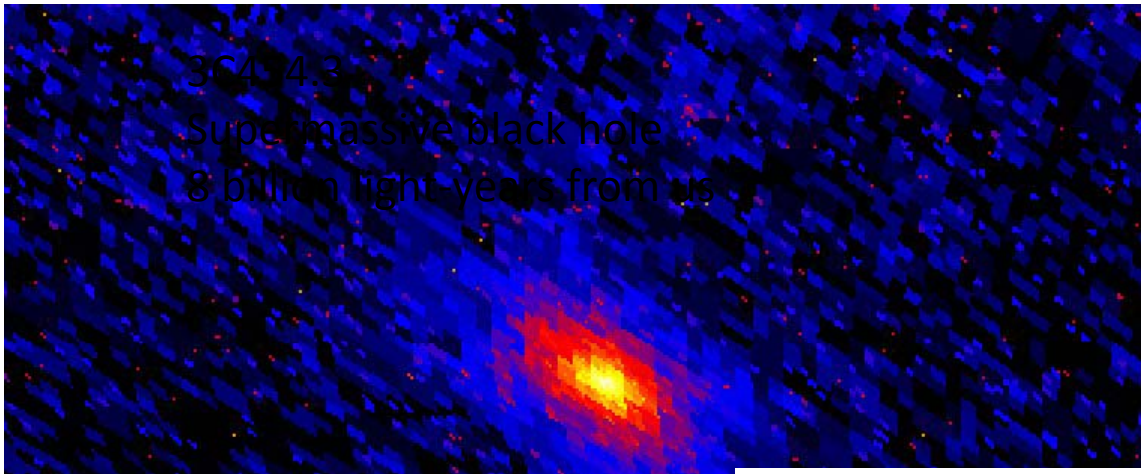


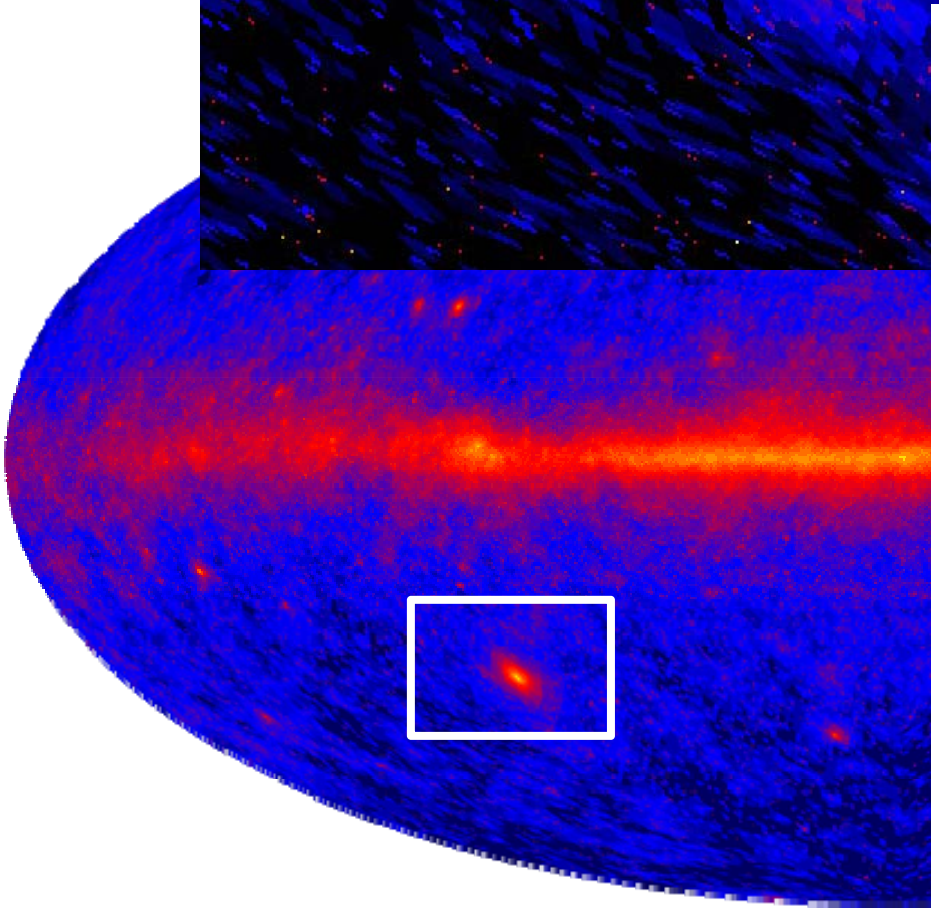
PSR B1055-52 (2 cycles, P=197 ms)





ap





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.

フェルミ衛星の観測研究

- パルサーの粒子加速とガンマ線放射機構の解明
- 巨大ブラックホールがエンジンとなっている活動銀河核のジェット状粒子加速現象の解明
- ガンマ線バースト現象の観測と粒子加速メカニズムの解明
- 暗黒物質粒子の探索と宇宙進化のかかわりの研究
- 高エネルギー宇宙線加速機構の解明

今後の活動

＊GRB　ー＞　GCN、　Flare等　ー＞ATEL
＊Multiwavelength　Observation　Campaign
http://fermi.gsfc.nasa.gov/science/multi/

＊Fermi 衛星のデータ
観測開始から１年間は、衛星開発グループが
観測データの占有解析権を持つ
１年以内に初期データの多くの論文を発表予定
（１年後の公開，以後は直ちに公開）

＊LAT運用：４極衛星運用モニター体制を作る。
１極は日本に設置
（２４時間を４分割、衛星の状態監視及び
全天リアル体制監視・・突発事象発見時には
アラートを全世界へ）

GLAST LAT Collaboration

- **France**
  - IN2P3, CEA/Saclay
- **Italy**
  - INFN, ASI, INAF
- **Japan**
  - Hiroshima University
  - ISAS/JAXA
  - RIKEN
  - Tokyo Institute of Technology
- **Spain**
  - ICREA and Institut de Ciencies de l'Espai
- **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 for Particle Physics
  - Goddard Space Flight Center
  - 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)

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