
# Fermi-LAT Observations of Transient Gamma-Ray Sources near the Galactic Plane

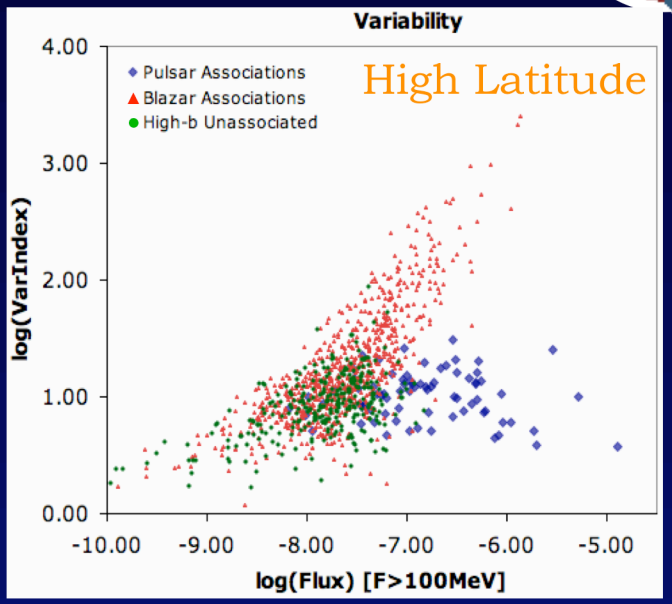
*Elizabeth Hays*

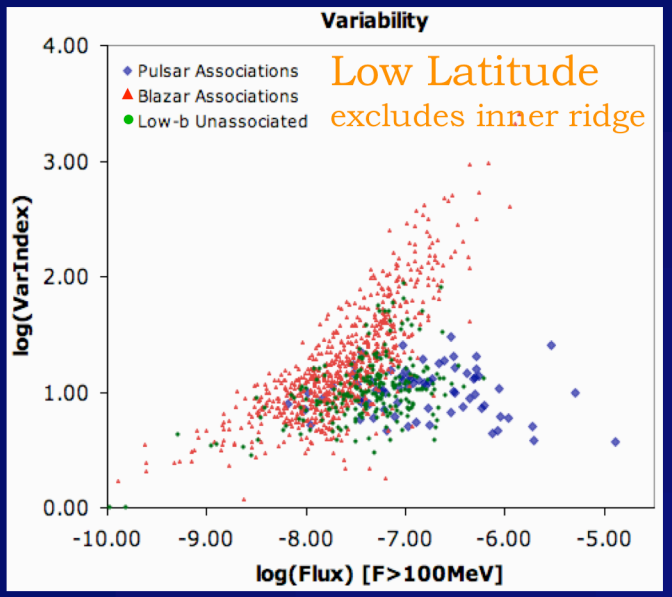
*(NASA/GSFC)*

*on behalf of the Fermi-LAT Collaboration*

# Variability in the LAT

- LAT Bursts *(N. Omodei)*
- Blazar Flares
  - ~1/3 of bright source list variable
  - ~50 Astronomer's Telegrams on day/week flares, 3 unassociated *(B. Lott)*
- Radio Galaxies
  - Decade variability *(Kataoka P1-33)*
- X-ray Binaries
  - Variability in LS I +61 303 *(R. Dubois)*
  - Flares in Cygnus X-3 *(S. Corbel)*
- Unidentifieds
  - Monthly variability index in the catalog *(J. Ballet; E. Ferrara P5-196)*
  - Unidentified Flares?

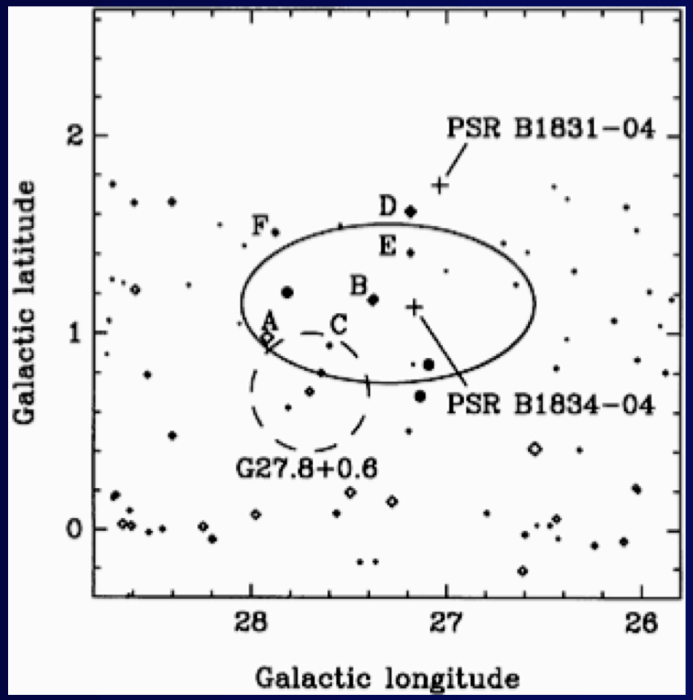


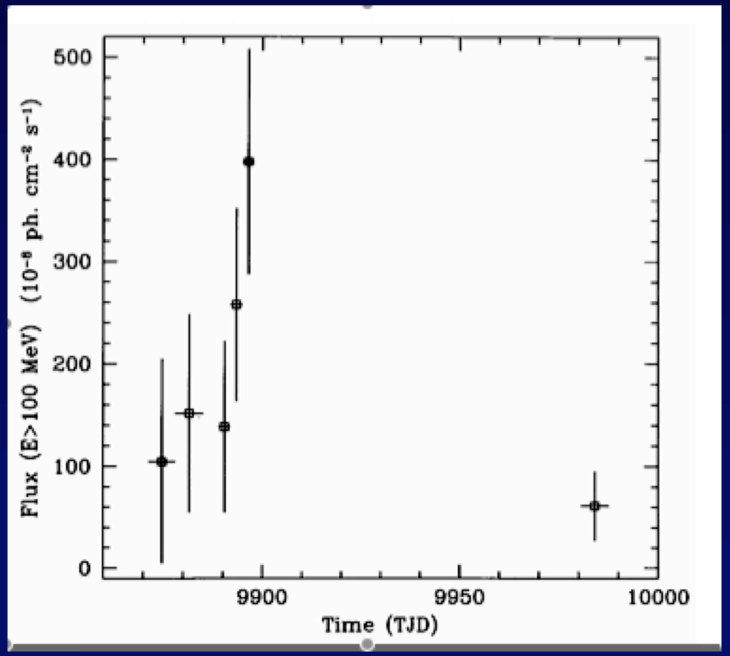



# Unidentified Transients in EGRET

## GRO J1838-04

EGRET observed 3.5 day flare near the Galactic Plane in June 1995



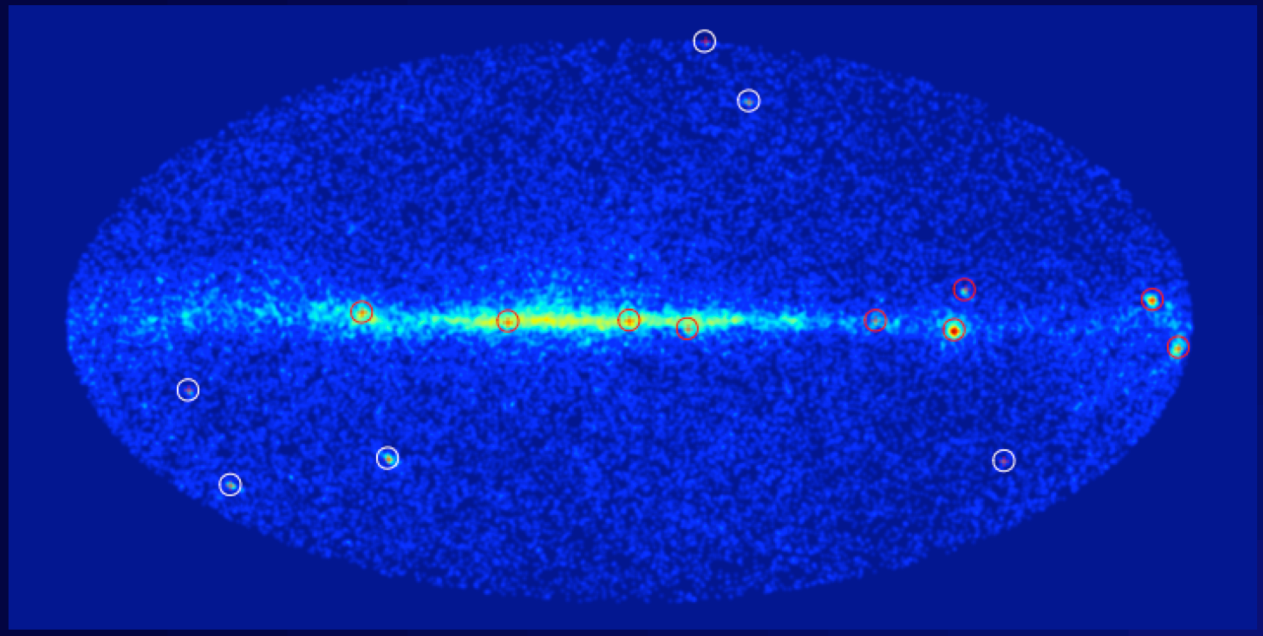




Tavani et al. 1997, ApJ, 479, L109

No blazar candidates found

# Automated Science Processing

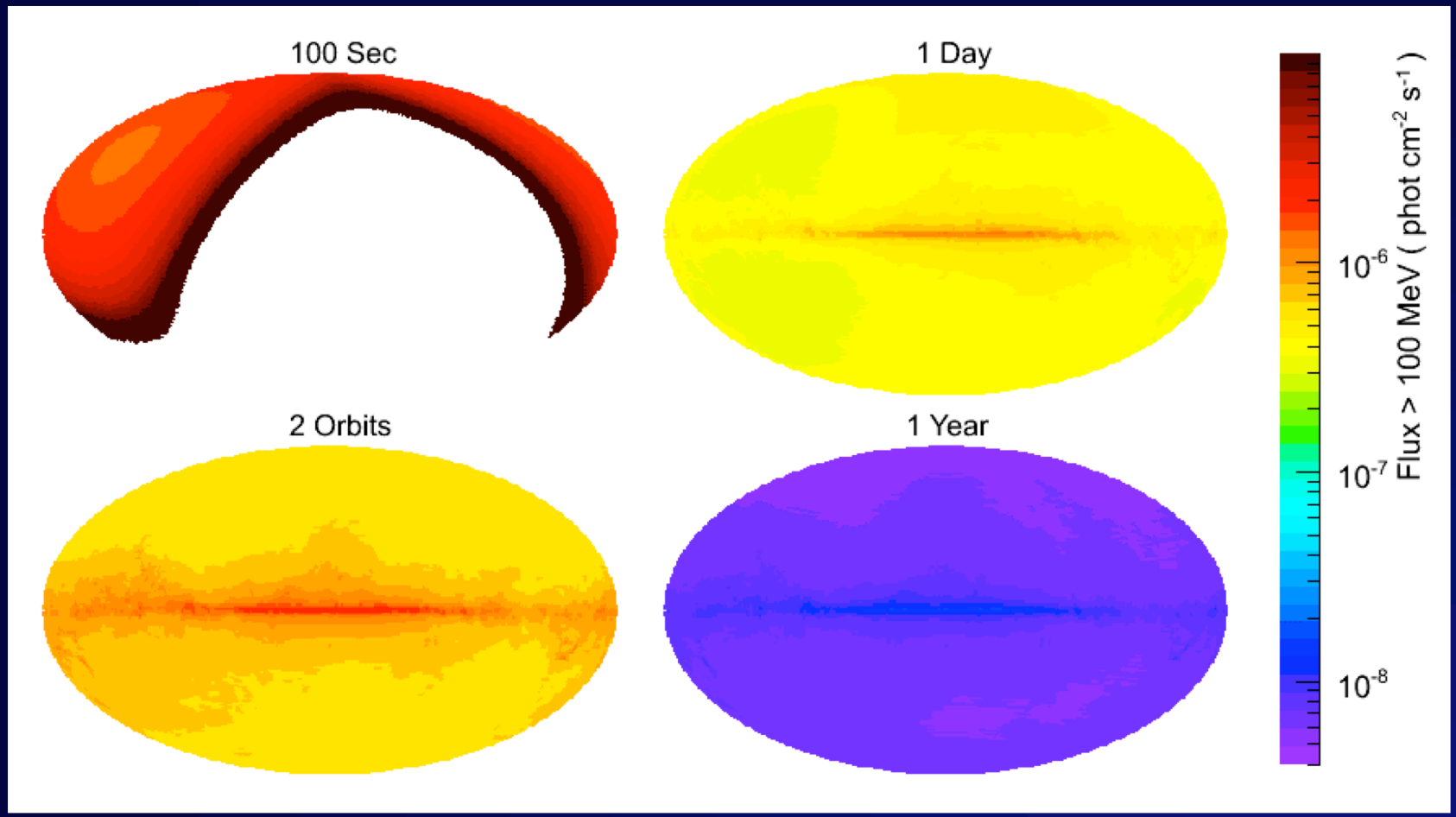
Automated all-sky search runs every
6 hours, 1 day, 1 week



1 day count map
(E>100 MeV)

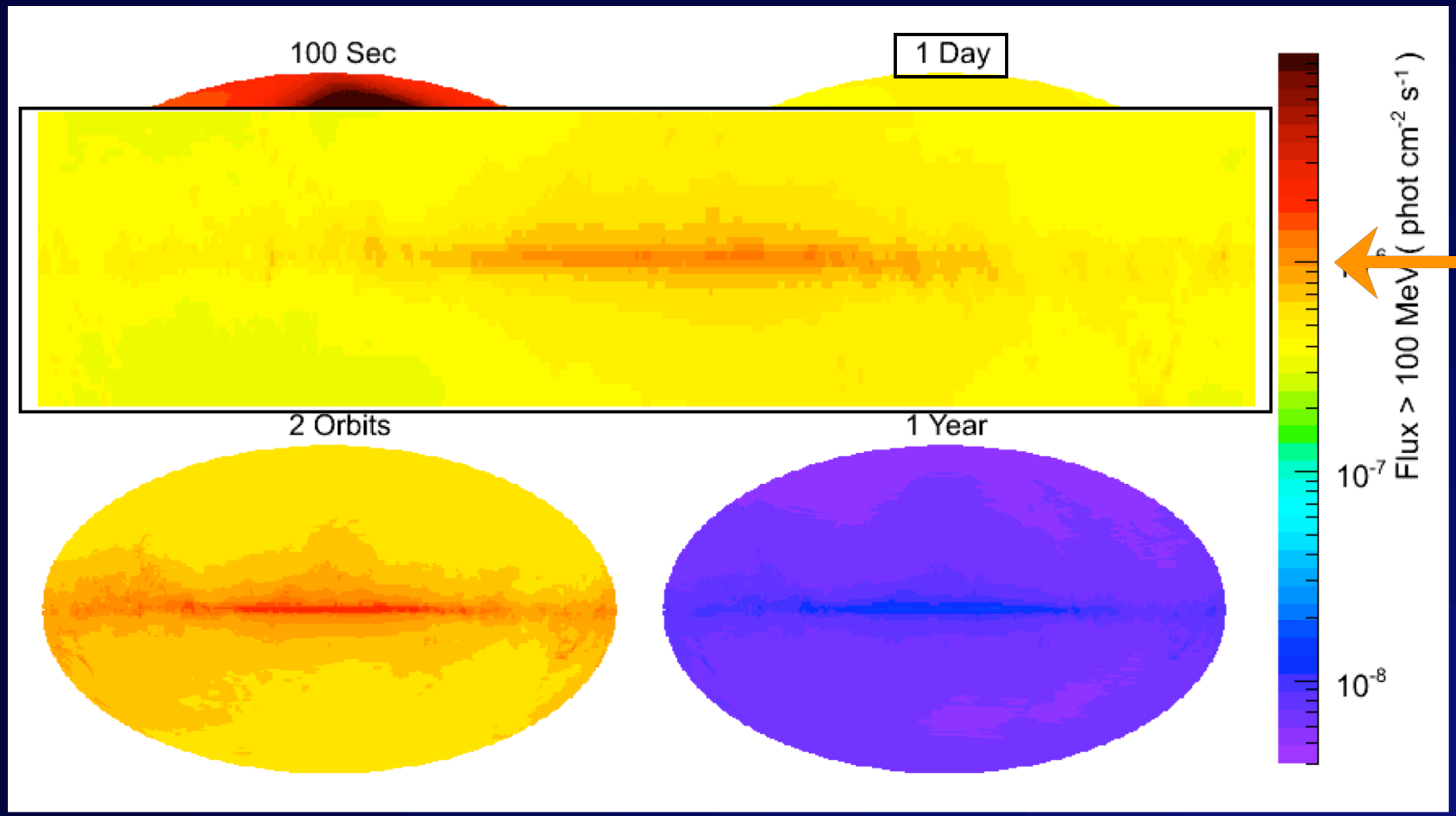
LAT flare advocates monitor results and trigger multiwavelength follow-up (48 ATELs since launch).
Weekly reports at http://fermisky.blogspot.com/
*(Poster P5- S. Ciprini)*

# LAT Sensitivity with Time



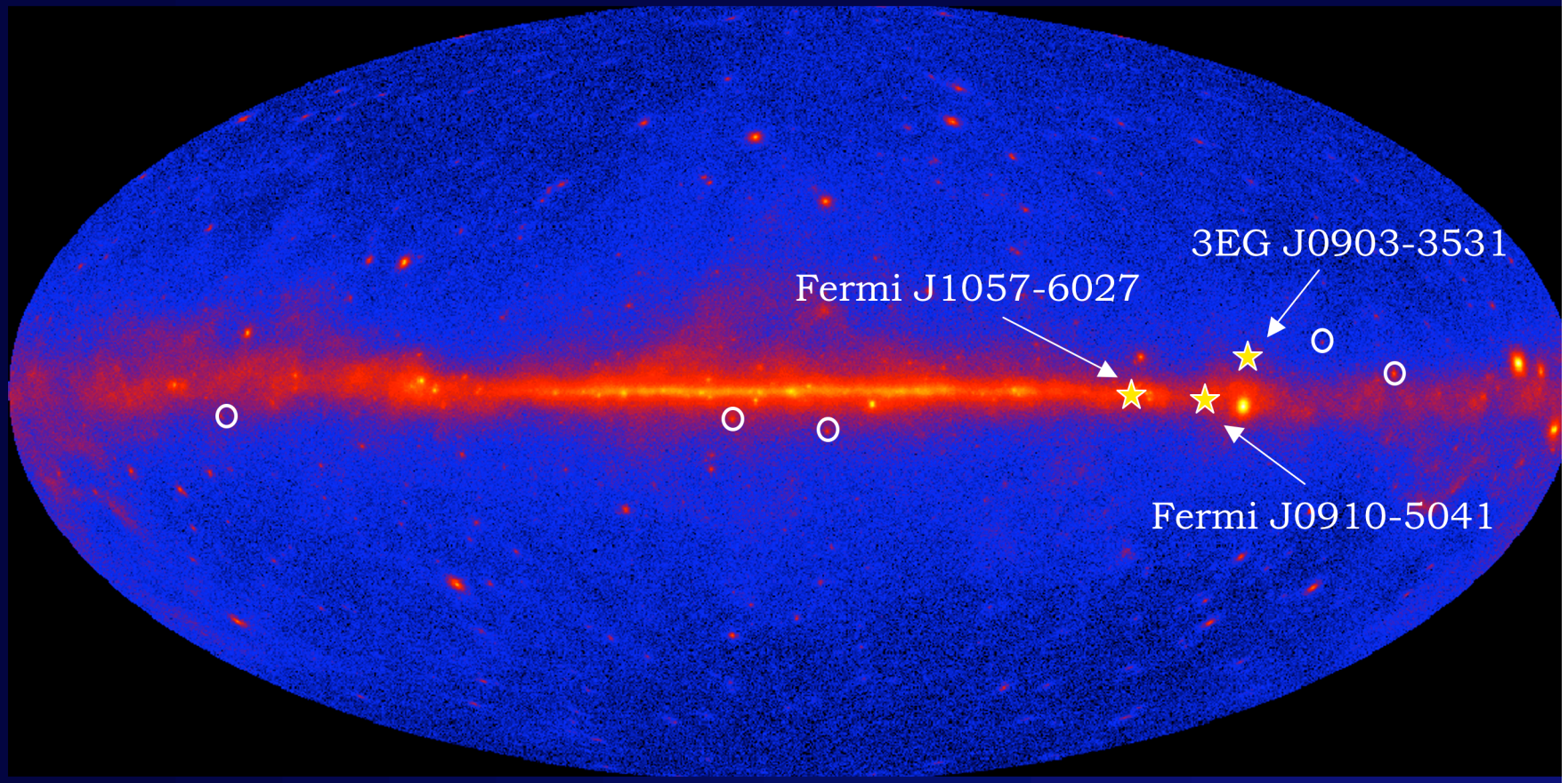

Orbit poles exposed every other orbit
Some asymmetry due to SAA passages

# LAT Sensitivity with Time




Orbit poles exposed every other orbit
Some asymmetry due to SAA passages

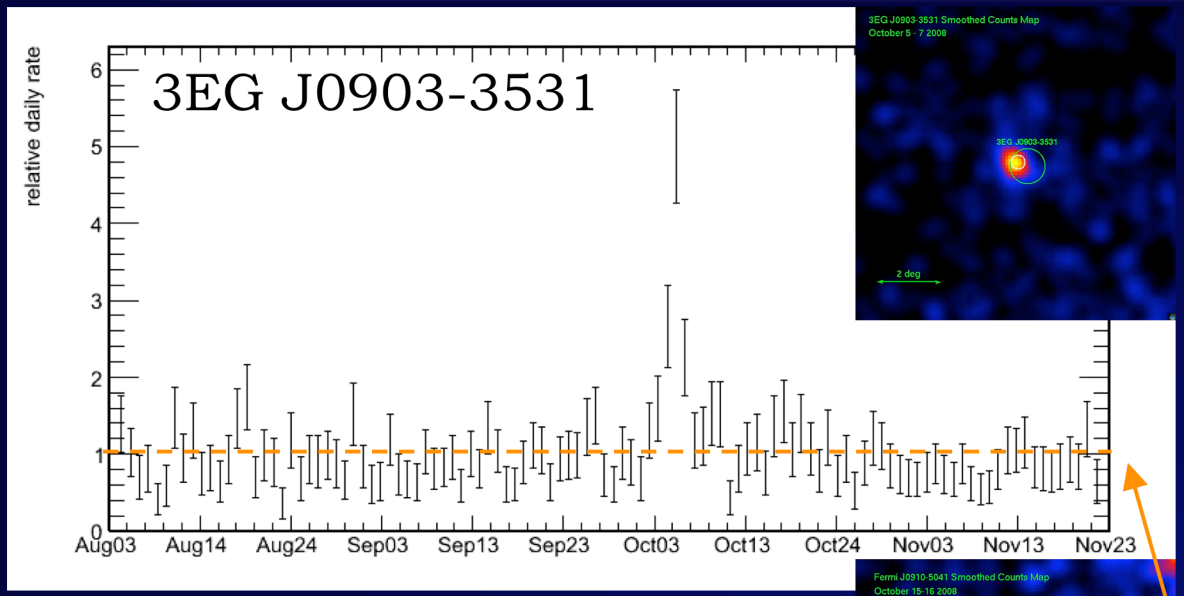
# Transients and Blazars near the Plane

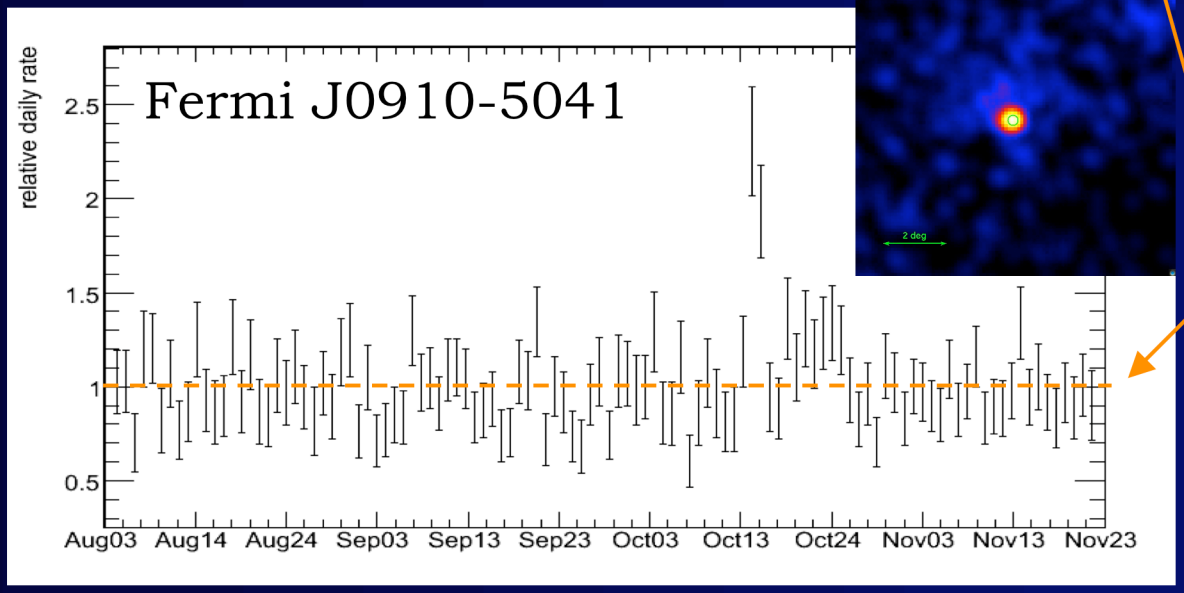



★ Unidentified transients

○ Low latitude blazars from the bright source list

# Two Short, Bright Flares




High confidence
>10 sigma

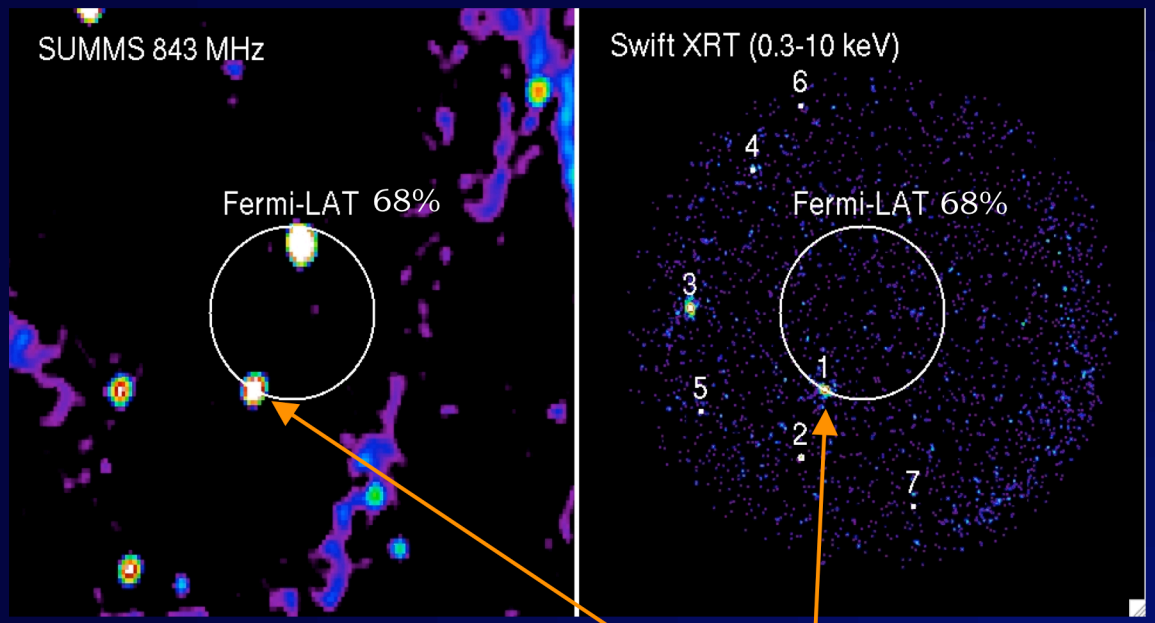
Counts per day
(E>200 MeV)

- 2 deg radius
- exposure corrected
- scaled to average background rate

Average background rate

E. Hays

# Counterpart Search - Fermi J0910-5041

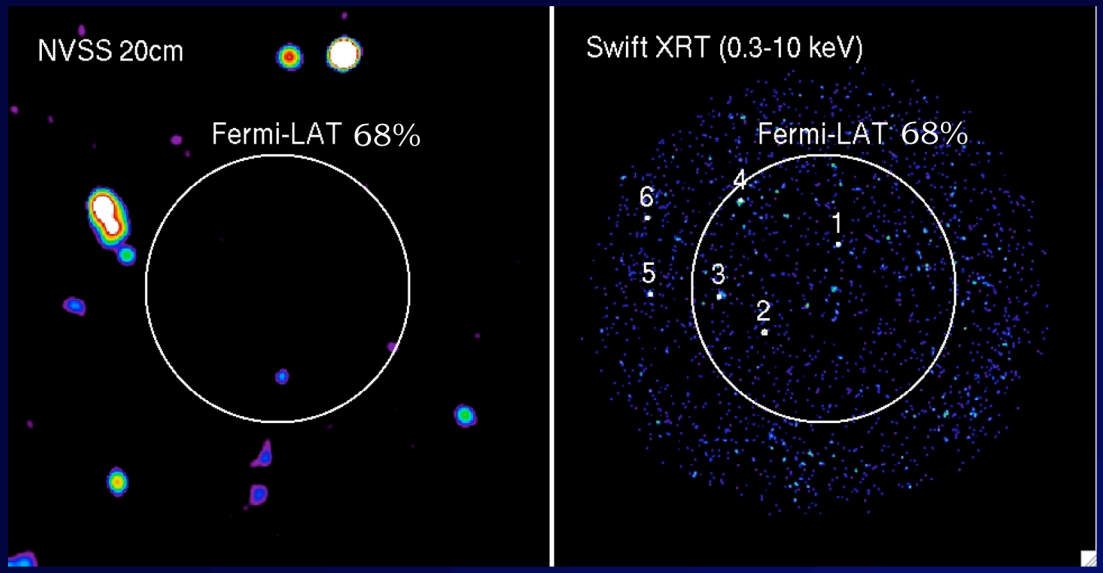


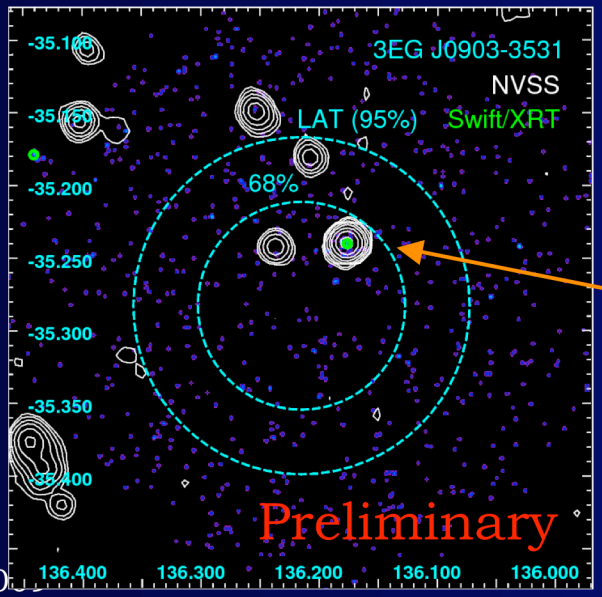

**Fermi J0910-5041**
(ATEL #1788)

- October 15, 2008, gamma-ray increase over 2 days
- 10x above average gamma-ray flux
- Swift XRT TOO within 1 day

LAT 95% error circle (0.1 deg) contains Swift XRT source (Landi et al. ATEL #1822) coincident with flat-spectrum radio source from SUMMS and AT20G (Sadler ATEL #1843)

# Counterpart Search - 3EG J0903-3531



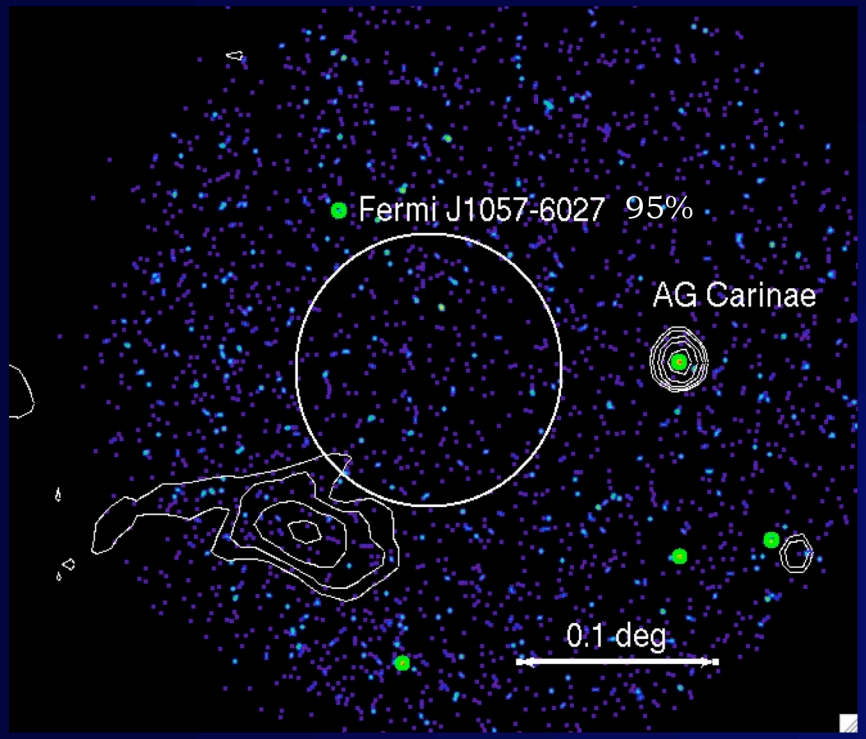




**3EG J0903-3531**
(ATEL #1771)

- October 5, 2008, gamma-ray increase over 3 days
- 5x above 3EG flux
- 15x above average gamma-ray flux
- Swift XRT TOO within 2 days

Updated LAT 95% error circle (8 months, 0.1 deg)) contains a flat-spectrum radio source and Swift/XRT source

# Counterpart Search - Fermi J1057-6027




X-ray map: Swift XRT (0.3-10 keV)
Radio contours: MGPS

## Fermi J1057-6027

- June 11, 2009, gamma-ray increase over 1 day
- Coincident with a known LAT source
  - 95% confidence radius 0.068 deg
- 10x above average gamma-ray flux
- Swift XRT TOO within 1 day (ATELS #2082, #2083)
  - Outside error circle at 7.7' AG Carinae, luminous blue variable (LBV) star with X-ray and radio emission

# Summary

- LAT is a powerful monitor of the GeV sky
  - Entire sky every 3 hours
  - Good 1 day sensitivity in Galactic plane
  - 68% confidence radius for day-scale transients ~
- Automated Science Processing + Flare Advocates provide rapid alerts
- 3 unidentified transients detected near the Galactic Plane in Year 1
  - 2 with possible radio/X-ray counterparts
  - Correlated variability needed for firm ID
- LAT monitoring and multiwavelength counterpart searches continue