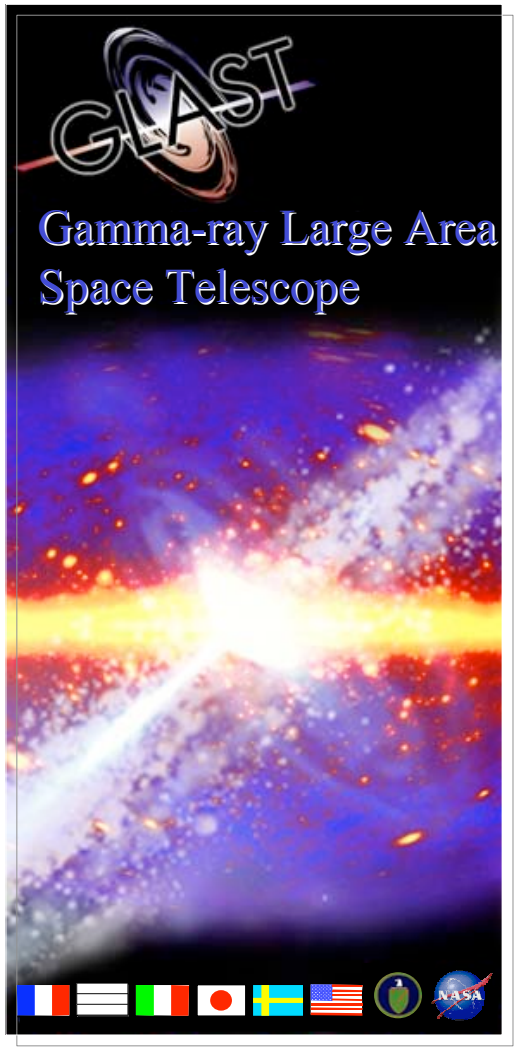


A Plan for the GLAST-LAT Blazars Multiwavelength Campaigns in 2008

G. Tosti

Physics Dept. & INFN Perugia

on behalf of the

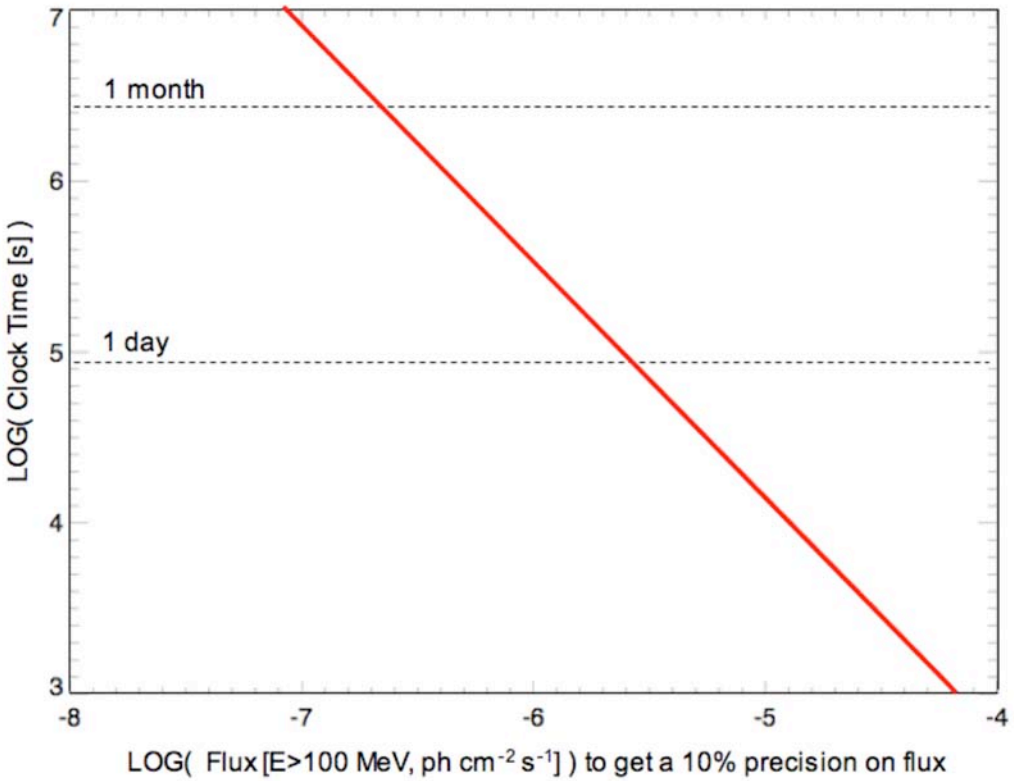
LAT Science Working Group on Blazars and other AGNs

Outline

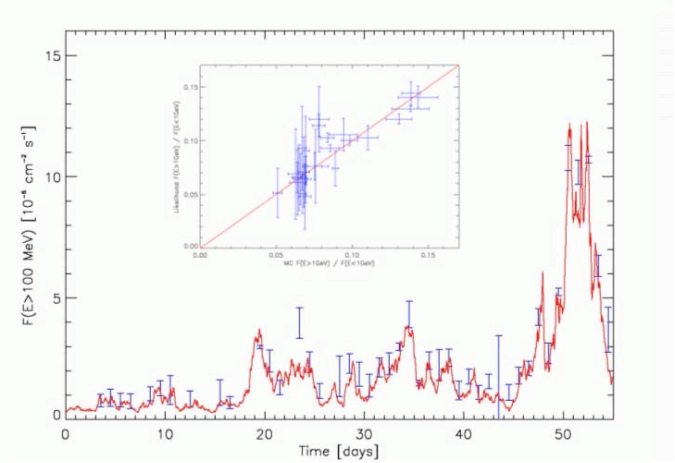
- GLAST – LAT & Blazars
  - LAT Capabilities and Science Goals
- The 2008 Plan for MW observations of Blazars
- Ongoing Activities
  - Suzaku, RXTE and other proposals
- Conclusions

GLAST-LAT & Blazars: LAT Capabilities

- Coverage of about 20% of the sky at any istant with good sensitivity
- The entire sky will be observed every 3 hours
- Uniform exposure in survey mode
- Broad energy range (20 MeV – 300 GeV)

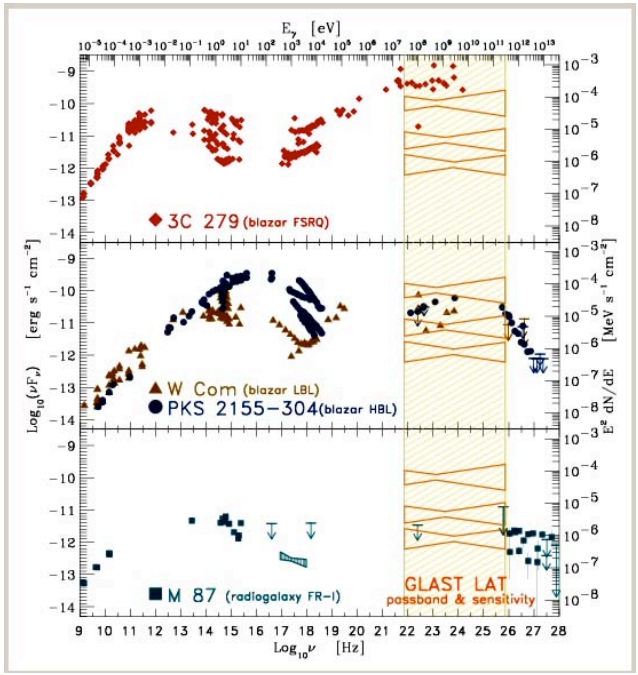


GLAST-LAT & Blazars: LAT Capabilities



Example of a daily light curve as will be measured by the LAT for 3C279 . The inset displays the true F(E>1 GeV)/F(E<1 GeV) hardness ratios versus the measured ones.

- Daily sampled LC can be easily obtained for most of the bright blazars → Variability on timescales >= 1 day can be well investigated.
- Intra-day (hours) variations can be detected for the brightest gamma-ray blazars.
- Detailed spectral variation analysis and intrabands delays studies may be performed
- Multiepoch SEDs can be obtained.



SEDs for four gamma-ray sources and the average expected LAT passband and sensitivity for 1 day, 1 month and 1 year of observations.

Science Goals: GLAST answers to key questions

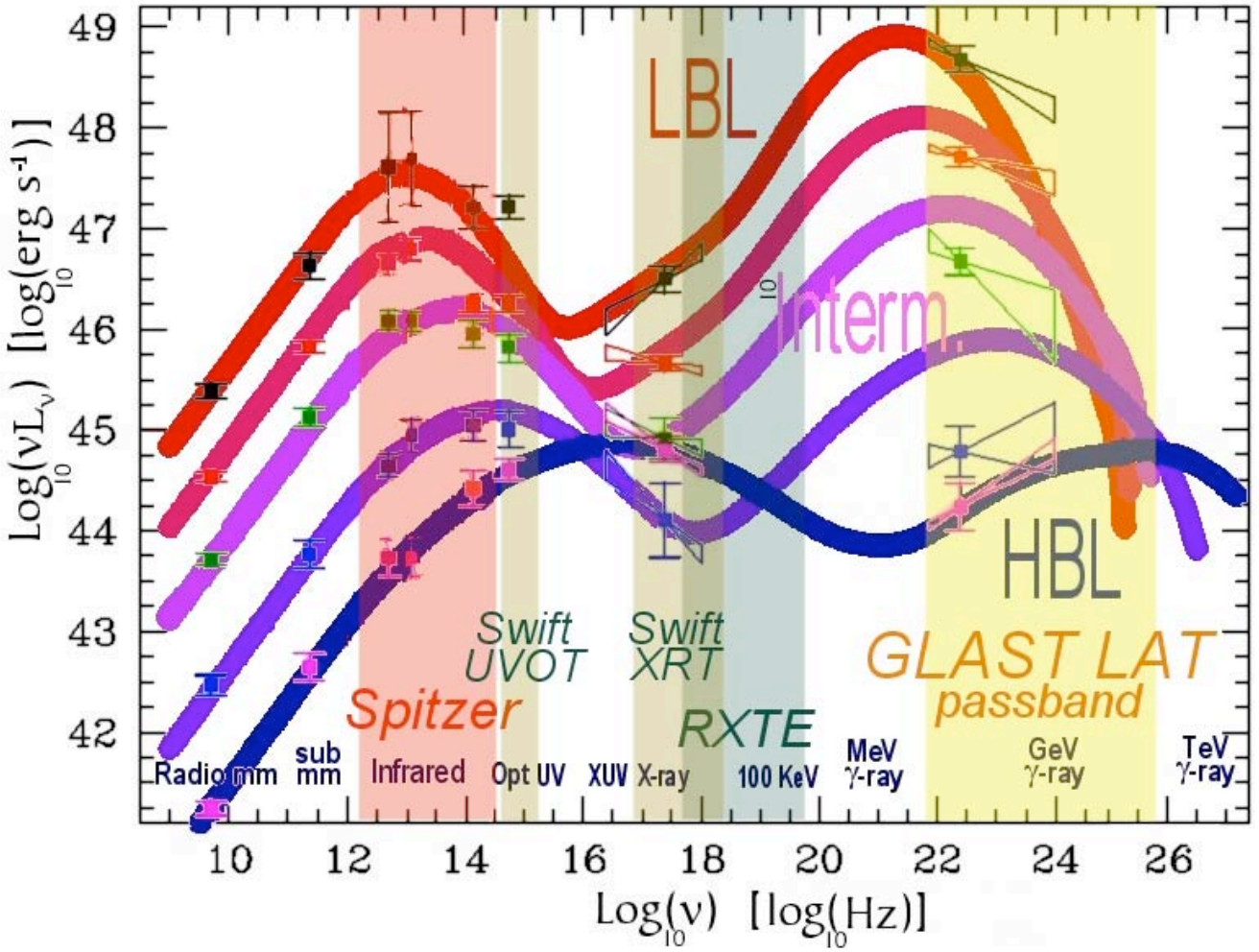
- What is the jet beaming factor?
- What is the jet matter content (electron-proton vs. pair plasmas)?
- How are the relativistic electrons accelerated?
- What is/are the jet emission mechanism/s ?
- How and where jets emit gamma-rays ?
- What are the mechanisms producing blazar variability?
- What is the blazar duty-cycle?
- Etc…

(see Lott et al., P12.20; Celotti's talk; Padovani's talk; Taylor's talk, etc.)

GLAST can give an answer to most of the open questions if a good coordination with other [ground/space based] observatories will be established → **Multiwavelength strategies** appear to be a key issue in understanding the blazar phenomenon during the GLAST Mission

The AGN Science Group MW Plan for 2008

Activities coordinated with the LAT MW Group (see Thompson's talk)



The AGN Science Group MW Plan for 2008

Activities coordinated with the LAT MW Group (see Thompson's talk)

- **Target of Opportunity (MW-ToO)**
  - **When a source will be in a bright state in gamma ray**

- **Planned Intensive Campaign (MW- IPC, months)**
  - **On a few selected sources**

- **Planned Long-Term Campaign (MW- PLC , >=1 year)**
  - **On a sample of selected sources**

ToO Campaigns

In case of a Gamma-Ray Flaring event in:

- **Known sources** (see Chiang et al. poster P19.13 on ISOC – ASP)
  - ca. 20 sources will be monitored on daily and weekly time scales;
  - data will be made public
  - Fast communication of the flaring event (e.g. GCN-like system)

- **Unknown sources**
  - Fast communication of the flaring event (~12h) (e.g. GCN-like system)

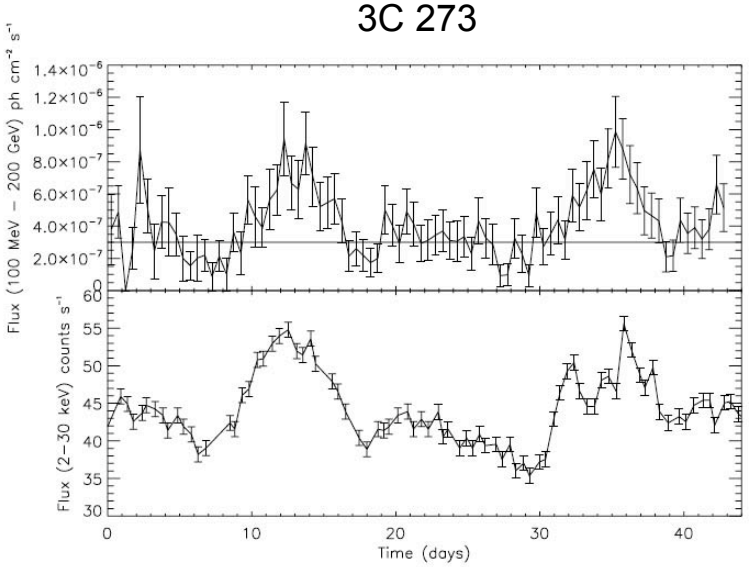
A LAT contact person will be available to coordinate the MW efforts

→ Let us know about your interest to contribute to these campaigns and to collaborate with the LAT team

→ We invite you to submit ToO proposals to other facilities and use the public data for your own research

MW – PIC (1-3 months)

Gamma & X ray LC simulation for 3C 273



Source Name	TYPE	Campaign Manager
PKS 0528+134	FSRQ	B. Lott
3C 273	FSRQ	J. Carson
3C 279	FSRQ	G. Madejski
Mrk 501	HBL	D. Paneque
1ES 1959+650	HBL	
Mrk 421	HBL	
PKS 2155-304	HBL	B. Giebels
BL Lacertae	LBL/IBL	G. Tosti

We invite you to join us during these MW campaigns → Please contact the Campaign Managers

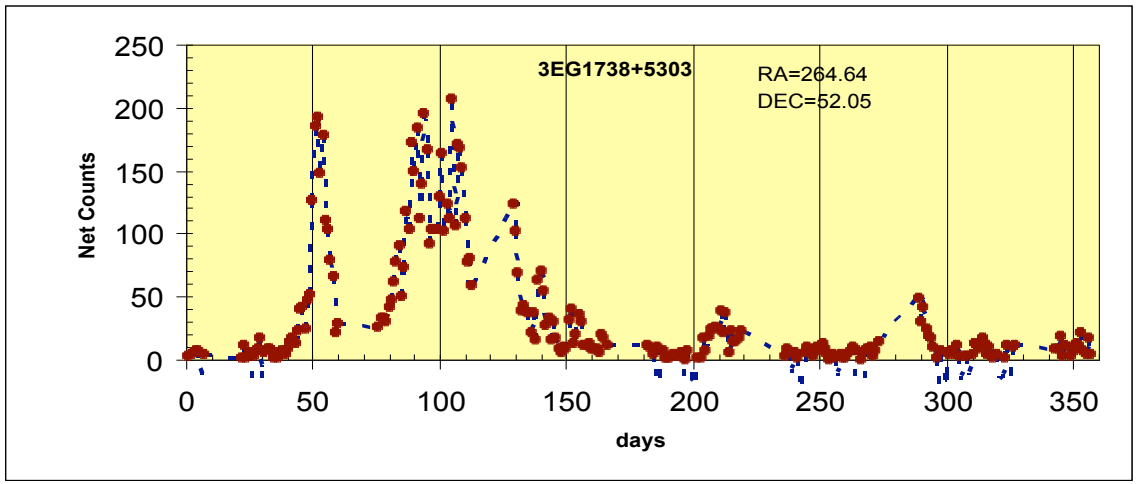
Other Sources of interest for MW-PIC

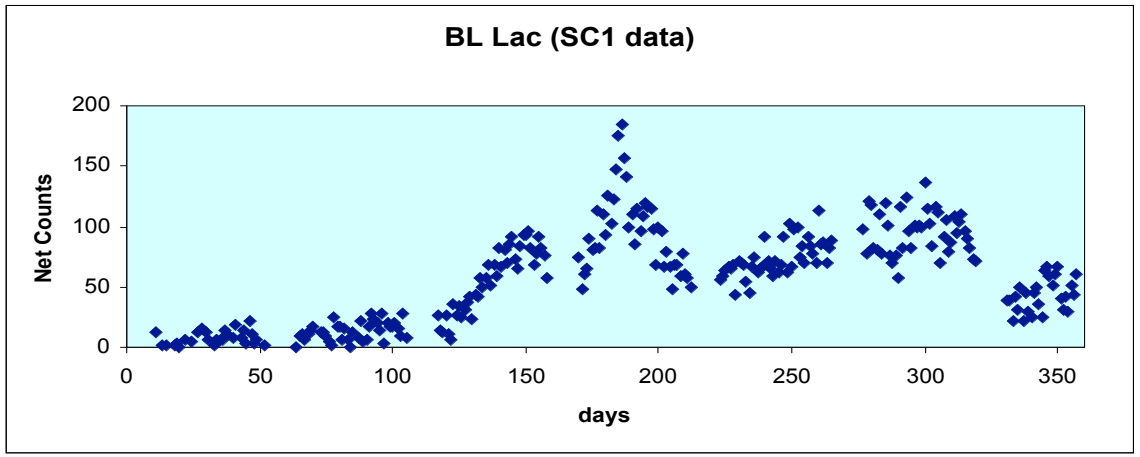
PKS 0735+178 , PKS 0537- 441, AO 0235+164, S5 0716+714, W Com, 3C 66A , 3C 454.3

Add your favorite source to the list..

Long Term Monitoring

- **GLAST - LAT will observe every source on the sky**





Long Term Monitoring

- **Selection of a sample of Bright Sources for MW observations**
  - **A very preliminary list at : http://glastweb.pg.infn.it/blazar/**
    - **Long term radio/optical/X-ray data available**
    - **Most included in ongoing Radio monitoring program:**
      - » **MOJAVE, Michigan (UMRAO), Metsahovi,**
    - **Most included in ongoing Optical monitoring program:**
      - » **Perugia, REM(La Silla), Torino, Tuorla, Colgate, GTN, WEBT,etc**
    - **Most included in:**
      - » **3EG Catalog, RXTE- ASM monitoring, SWIFT- BAT monitoring, WMAP Catalog**
    - **Several observed by TeV telescopes**

  This catalog can be used to plan Long Term Monitoring/Planned MW Campaign

  will be revised when GLAST will be is in orbit

  → Please send us your favorite source to be included in the list

  → Start to observe regularly your favorite sources and let us know about your effort

- **MW archive (Historical data, new Obs,etc)**

  → Please help us to build the knowledge-base of your favorite source

MW Campaigns: ongoing activities

- **Radio**
  - » **cm-mm-sub-mm dedicated monitoring (see Fuhrmann's talk)**
  - » **VLBI, VLBA, MOJAVE, etc, (see e.g. Taylor's talk, Kadler's talk, and sevelal posters)**
- **Optical/IR**
  - » **REM (Oct 15, 2006) proposal accepted**
  - » **WEBT (see Poster by Villata et al. - P.15.10)**
  - » **GTN**
  - » **SPITZER (to be submitted Feb. 16)**
  - » **Polarization (?), Spectroscopy (?)**
- **X-ray**
  - » **Suzaku (proosal submitted Dec. 2006) (see Kataoka's talk)**
  - » **RXTE (26.01.2007- 7 proposal submitted)**
  - » **INTEGRAL (to be submitted) ; *Swift***
  - » *XMM proposal involving several LAT- AGN Science Group members was recently accepted*
- **TeV**
  - » **Informal agreements: VERITAS, HESS, MAGIC, CANGAROO**

Conclusions

GLAST will observe a lot of Blazars, we need a good MW coverage to have the best science return from this mission.

We invite you to join us in this LAT MW effort....

....a new window on the gamma-ray sky is going to be opened

Please Contact:

- **The LAT MW coordinator: Dave Thompson (djt@egret.gsfc.nasa.gov)**
- **The LAT AGNs SG Coordinators (lott@cenbg.in2p3.fr, paolo.giommi@asi.it)**
- **The MW-PIC Campaign Managers**

....your comments, suggestions, observations are welcome