

# GLAST LAT Multiwavelength Planning

## Guidelines for Cooperative Efforts between the LAT Collaboration and Other Researchers

Draft 5 – August 2, 2007

### 1. Introduction

The GLAST Large Area Telescope (LAT) Collaboration recognizes the high value of coordinated multiwavelength observations as a way to maximize the scientific return from the mission. Planning for such cooperative efforts in a way that fairly recognizes the contributions of all participants is essential. This document outlines some general guidelines for such coordinated programs.

**This document is primarily intended to assist outside groups in knowing how to work with the LAT team.** It supplements the internal LAT documents:

“GLAST LAT Collaboration Guidelines for Multiwavelength Proposals and Data”

“LAT-MD-00349-01, GLAST LAT Collaboration Publication Policy”

### 2. GLAST LAT Data, Software, and Experience

Under policies established by NASA and the GLAST Project, the LAT data are handled in two ways depending on the phase of the mission:

- a. In Phase 1, nominally the year following the start of science operations, the LAT photon event data are proprietary to the LAT Collaboration. High-level products, such as source fluxes, locations, and energy spectra measured on various time scales, will be released as public data for some subset of the full data obtained by the LAT. Some details are given at <http://glast.gsfc.nasa.gov/ssc/data/policy/summary.html> and links from that page.
- b. In Phase 2, covering the rest of the mission, the LAT photon data will be released to the scientific community as soon as processed.

Several months before the beginning of Phase 2, the GLAST Science Support Center (GSSC) will make available software and supporting information, developed in cooperation with the LAT Collaboration, sufficient to carry out scientific analysis of the data. This support will include exposure information, a model of the Galactic and extragalactic diffuse gamma radiation, and a pulsar timing database.

The LAT Collaboration may develop additional software and expertise in data analysis beyond the basic tools provided by the GSSC. Advanced methods of this type are

intended for specific, detailed analyses and are not required to be released to the scientific community. These resources may be a valuable contribution by the LAT Collaboration in any multiwavelength effort.

### **3. Multiwavelength Cooperation – Basic Principles**

- The LAT Collaboration encourages any individual or group with observations at other wavelengths (or non-electromagnetic results such as neutrinos or particles) that would produce enhanced science in combination with LAT data to form a topical collaboration with the LAT team to pursue this work. Formal affiliation with the LAT Collaboration is not required. Such an “ad hoc” collaboration will focus on a particular scientific subject. Individuals or groups planning continuous or repeated collaborative efforts with the LAT team may wish to apply for Affiliated Scientist membership in the LAT collaboration. Affiliated Scientists work more closely with the LAT team than individual outside researchers or groups working on specific topical collaborations.
- Any information shared within this topical collaboration will be treated in confidence, not to be distributed beyond the LAT collaboration and the non-LAT researchers or groups participating in the topical collaboration.
- This topical collaboration will work on a non-exclusive basis. Multiple groups may join a single topical collaboration or set up several topical collaborations with the LAT team. Any part of the topical collaboration is free to publish its own results, not using shared information. Only combined work will be published jointly.

### **4. Multiwavelength Cooperation – Outline of the Process**

- a. Make contact with the LAT Collaboration. The primary analysis work of the LAT is done by specialized science groups. The LAT multiwavelength coordinator, currently Dave Thompson (David.J.Thompson@nasa.gov), is available to help connect interested individuals or groups with the appropriate LAT science group for a particular topic. Outside researchers who know members of the LAT team are welcome to contact a science group directly.
- b. Identify, in cooperation with the LAT science group, the specific topic of the investigation. The LAT science group will coordinate the activities of the topical collaboration with the rest of the LAT Collaboration, including the Analysis Coordinator, the Principal Investigator (PI) and the Publication Board. Outside researchers may have similar institutional or collaboration requirements.
- c. Designate a single point of contact from the outside researchers, or points of contact if multiple individuals/groups are participating. A single point of contact from the LAT will also be identified (campaign manager for a short-term

observing program, for example). Within the LAT team, the science group leads are responsible for designating the single point of contact.

- d. Formulate a plan for sharing of data and/or models. The LAT data would typically be provided in high-level form, such as light curves or energy spectra, during the first year. In year 2 and beyond, all the data are public. The contribution of the LAT team will likely be detailed analysis of the LAT data, multiwavelength modeling, and multiwavelength expertise in combining data and models. The LAT PI and the LAT multiwavelength coordinator should be informed when a proposed plan is formulated.
- e. Carry out the analysis.
- f. Publish the results. See below for publication guidelines.
- g. In case of issues within the topical collaboration, the subject can be taken to the lead scientists of the LAT collaboration and the outside research group for joint resolution. The ultimate decision from the LAT side rests with the LAT Principal Investigator, Peter Michelson. A corresponding lead scientist from the outside group would represent that group's interests.

## **5. Publication Guidelines**

The LAT Collaboration has identified two publication categories for papers using unpublished LAT data, either of which could have collaborating authors from outside the LAT Collaboration:

- Category I papers are those presenting major LAT results, including major discoveries, catalogs, and summaries. Authorship on a Category I paper is open to all full members of the LAT Collaboration and is nominally led by a LAT author. Cases in which important discoveries depend on both LAT and outside work will be considered on a case-by-case basis and could be led by outside authors. An example of a Category I paper from a past mission would be the Hartman et al., 1992, paper describing the discovery of gamma-ray emission from 3C279. The author list was the entire EGRET team at the time.
- Category II papers are those reporting detailed analysis or modeling on a source or limited number of sources. Authorship on a Category II paper is limited to direct contributors to the work, determined by the LAT science groups in consultation with the LAT Publication Board. The lead author could be from outside the LAT Collaboration. An example of a Category II paper from a past mission would be the Wehrle et al., 1998, paper describing a multiwavelength campaign on 3C279, including EGRET. The author list includes some, but not all, EGRET scientists.

When a topical collaboration is formed between the LAT team and outside researchers, the agreement will include a tentative understanding of the publication or publications anticipated, based on these publication categories and discussion with the LAT PI. Some possibilities (not an exhaustive list) include:

- Outside researchers who have upper limits or a few data points that add in a meaningful way to a LAT measurement (detection) will typically become authors on a LAT-led paper, either Category I or II.
- Outside researchers whose measurements are augmented by a LAT upper limit will typically lead a Category II publication including a limited number of LAT authors.
- If two or more detections including the LAT and outside resources are involved, the choice may be to publish results separately and then follow up with a joint paper with a combined analysis. In such cases, authorship will have to be negotiated on the follow-up paper (Category II).
- If two or more detections including the LAT and outside resources are involved, particularly for a major result, the LAT Collaboration (through the PI) and the outside group can negotiate lead authorship.
- Theoretical work benefiting from specialized LAT analysis may prefer to wait until the basic data have been published by the LAT team and then follow up with a theorist-led paper with a few LAT authors who are directly involved in specialized LAT data analysis (Category II).

## Appendix – Practical Information for Outside Researchers

Outside researchers working on multiwavelength (MW) collaborations with the LAT team may find the following suggestions helpful:

- A data archive is available at SLAC. The LAT team can store a copy of your data for a topical collaboration, with access restrictions if needed.
- FITS is a useful format for large tables or images.
- For spectral information, particularly broadband spectral energy distributions, the preferred units are Hz and JyHz. Note that  $\text{ergs/cm}^2\text{s}$  units are easily converted to JyHz (factor of  $10^{23}$ )
- For data to be announced publicly, the Astronomer's Telegram – ATEL (<http://www.astronomerstelegam.org/>) is a useful venue. Reminder: all agreements with the LAT team are non-exclusive; the LAT team and outside groups are free to publish their own data.
- The LAT team asks outside observers to send to the LAT point of contact (campaign manager) a form (copy and sample attached) giving information about planned observations.
- Studies of Active Galactic Nuclei (AGN) are primary targets for multiwavelength cooperation. The LAT team has identified four types of MW programs for AGN studies:
  - Monitoring campaigns, including the sources for which LAT has agreed to make data public during the first year. Repeated observations of such sources are excellent MW programs.
  - Planned Intensive Campaigns (PIC). These are sources for which maximum MW resources are needed for a pre-determined observation schedule.
  - Planned Target of Opportunity Campaigns (TOO). Proposals to other facilities allow LAT or other observatories to trigger a campaign.
  - Ad-hoc Intensive Campaigns (AIC). Such programs could be triggered for sources not already included in the various planned programs.
- A principal source of information about LAT multiwavelength planning is the public Multiwavelength Web site <https://confluence.slac.stanford.edu/display/GLAMCOG/GLAST+LAT+Multiwavelength+Coordinating+Group>

# Participation in Multiwavelength Observing Campaign

Observer: \_\_\_\_\_

Target: \_\_\_\_\_

For this campaign, the policy on data sharing will be: if you observe and send data that can be used, you are a co-author of a resulting multiwavelength publication unless you just want an acknowledgment. Anyone who contributes data keeps the right to publish those data separately.

I/we will participate in the observing campaign of the source \_\_\_\_\_ organized by the GLAST/LAT collaboration.

Contact information (e-mail, phone):

\_\_\_\_\_

Details of my observation:

Obs. Facility	Observer/PI/Contact	Observations planned for	Frequency or wavelength	Comments

Please check:

A) This information should be kept confidentially.	
B) This information can be distributed among the participating scientists of this campaign, in particular to identify potential (quasi) simultaneous observations. (DEFAULT)	√

If you checked B): Do you want us to help organize (quasi) simultaneous observations at other wavelengths? Please give below all additional information that other observers may need in order **to enhance your science (add additional pages if needed)**:

## Participation in Multiwavelength Observing Campaign - Sample

Observer: Ann Wehrle

Target: 3C454.3

For this campaign, the policy on data sharing will be: if you observe and send data that can be used, you are a co-author of a resulting multiwavelength publication unless you just want an acknowledgment. Anyone who contributes data keeps the right to publish those data separately.

I/we will participate in the observing campaign of the source 3C454.3 organized by the GLAST/LAT collaboration.

Contact information (e-mail, phone): [awehrle\\_ssi@earthlink.net](mailto:awehrle_ssi@earthlink.net), 818-679-2342

Details of my observation:

Obs. Facility	Observer/PI/Contact	Observations planned for	Frequency or wavelength	Comments
Spitzer IRS	Wehrle	July 28, 2007	IR	40 min. integration
Spitzer IRS	Wehrle	Aug. 2-6, 2007	IR	40 min. each

Please check:

A) This information should be kept confidentially.	
B) This information can be distributed among the participating scientists of this campaign, in particular to identify potential (quasi) simultaneous observations. (DEFAULT)	√

If you checked B): Do you want us to help organize (quasi) simultaneous observations at other wavelengths? Please give below all additional information that other observers may need in order **to enhance your science (add additional pages if needed)**:

Spitzer Schedule can be inspected at  
<http://ssc.spitzer.caltech.edu/approvdprog/sched/plan/>

Simultaneous radio and optical observations would be appreciated. Please forward this information to potential observers.