Gamma-ray Large
Area Space
Telescope

GLAST Large Area Telescope

Monthly Mission Review

LAT Flight Software Status

May 2, 2007

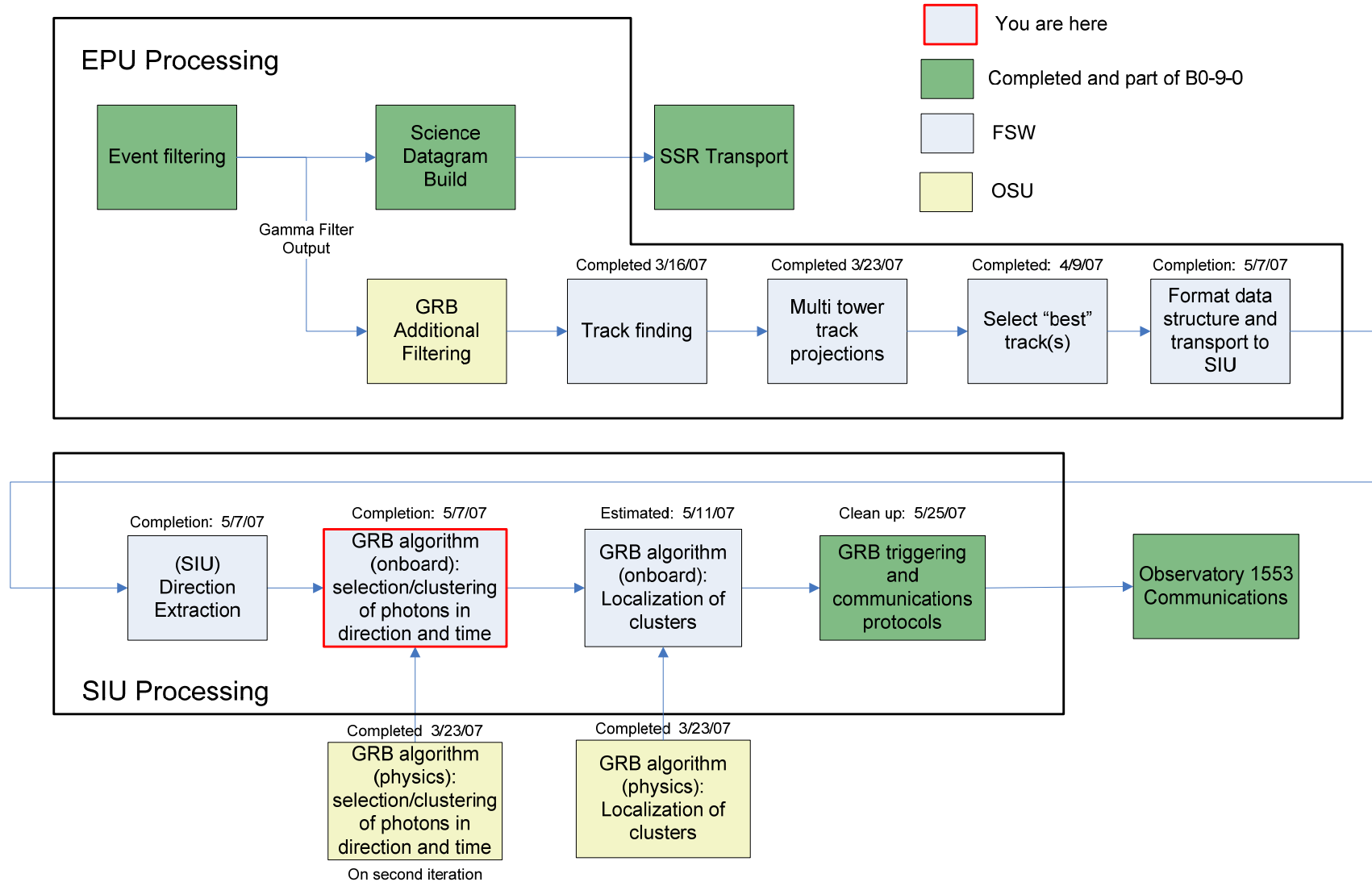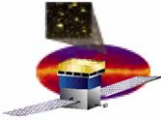**Jana Thayer**

Stanford Linear Accelerator Center

FSW Status

- **B0-10-1 available for upload to LAT**
  - **Successfully built, installed and regression tested on Testbed**
  - **LCI bug that causes occasional loss of LCI data is corrected in this build**
  - **Functionality includes resolutions to some long-awaited LIM, LATC, event filter, compression, and LAT-GBM interface JIRAs**
- **B1-0-0:**
  - **Tasks have been split up among several developers to expedite delivery**
  - **Build contents:**
    - **Includes all B0-10-1 functionality**
    - **FSW-292: GRB detection algorithm**
      - **5.3.10.2.1 GRB Location Accuracy**
      - **5.3.10.2.2 Modification of GRB criteria**
      - **5.3.11.3.3 Process Attitude Data**
      - **5.3.11.6 GRB Alert Message Latency**
      - **5.3.11.7 LAT GRB Repoint Request Message to SC**
      - **5.4.1 System of Units (metric system)**
      - **5.4.2.x Coordinate Systems (3 requirements)**
      - **5.4.3 Resource Margin**
  - **Target build date: 5/25/07**
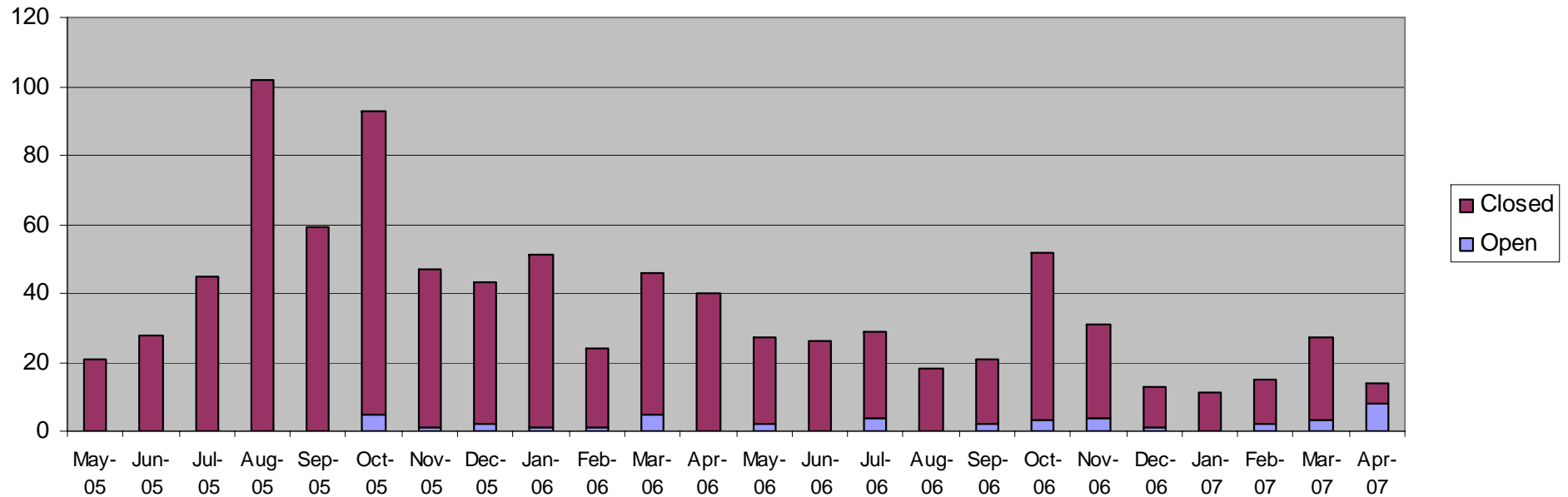 - **Target Delta-FQT-B: 6/26/07**
  - **Upload to LAT: week of 6/26/07**

GRB Processing and Detection Dataflow

You are here

Completed and part of B0-9-0

FSW

OSU

EPU Processing

Event filtering → Science Datagram Build → SSR Transport

Gamma Filter Output

GRB Additional Filtering → Track finding → Multi tower track projections → Select "best" track(s) → Format data structure and transport to SIU

Completed 3/16/07 — Track finding
Completed 3/23/07 — Multi tower track projections
Completed: 4/9/07 — Select "best" track(s)
Completion: 5/7/07 — Format data structure and transport to SIU

SIU Processing

(SIU) Direction Extraction → GRB algorithm (onboard): selection/clustering of photons in direction and time → GRB algorithm (onboard): Localization of clusters → GRB triggering and communications protocols → Observatory 1553 Communications

Completion: 5/7/07 — (SIU) Direction Extraction
Completion: 5/7/07 — GRB algorithm (onboard): selection/clustering of photons in direction and time
Estimated: 5/11/07 — GRB algorithm (onboard): Localization of clusters
Clean up: 5/25/07 — GRB triggering and communications protocols

GRB algorithm (physics): selection/clustering of photons in direction and time
Completed 3/23/07
On second iteration

GRB algorithm (physics): Localization of clusters
Completed 3/23/07

JIRA Metrics as of 29 April 2007

- **Open issues are divided as follows**
  - **14 planned for B1-0-0**
  - **15 planned for B2-0-0 (post L+60)**
  - **12 deferred indefinitely**
  - **3 unscheduled**
    - **1 being assessed by FSW team**
    - **2 awaiting Project CCB adjudication**
- **GRB algorithm is FSW's highest priority**
  - **All JIRAs not relating to GRB are worked in parallel where work will not impede GRB**
  - **JIRAs requiring a resource currently assigned to GRB are lower in priority**
  - **Several of the open JIRAs are trivial changes and will be addressed during a GRB lull**
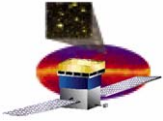
GLAST Large Area Telescope

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Gamma-ray Large Area Space Telescope
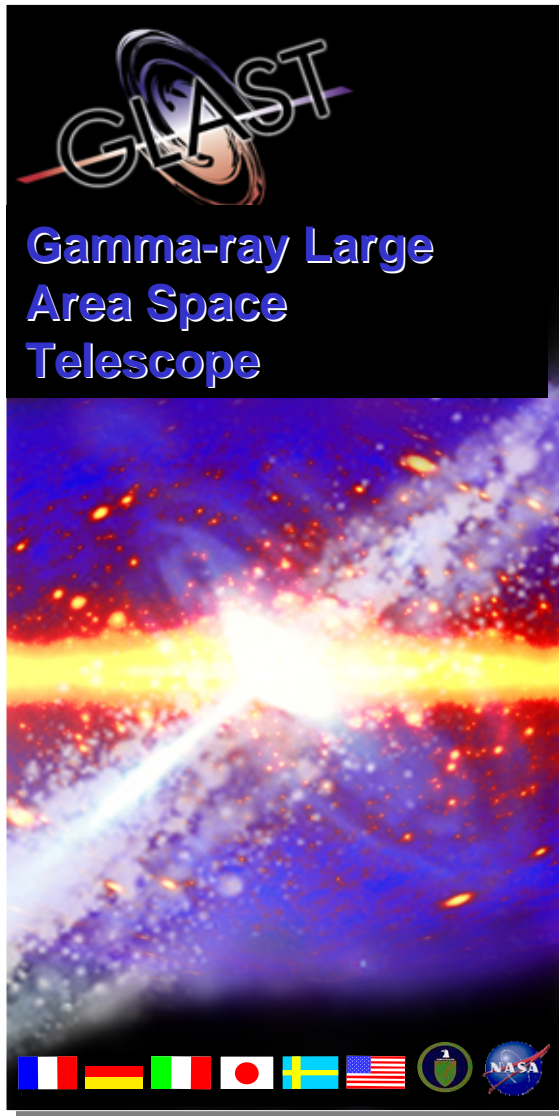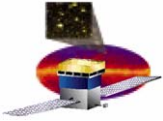
Backup

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B1-0-0 JIRA issues (in order of priority)

Key	Summary
FSW-292	Implement GRB detection algorithm
FSW-899	Configure onboard gamma filter to PASS any event with raw calorimeter energy above a certain (configurable) value
FSW-305	Summary/statistics telemetry stream needs to be created for on-board event processors
FSW-693	Command confirmation configuration report
FSW-732	Task messaging configuration report
FSW-806	Revisit rate counter implementation
FSW-911	report file ID of corrupted file
FSW-918	Include Run ID in housekeeping
FSW-879	Define the ACD hit map delay as an iterable in LCI
FSW-880	Add some configuration registers as parameters to LCI
FSW-582	Capture of layer splits in LATC does not consider the FE mode registers
FSW-789	LCI event data is inconsistent if TEM errors or diagnostics present
FSW-917	Implement the filter parameters described in TD-08805-01
FSW-456	EMP and LCM do zlib compress with malloc/free, should use MBA_alloc/free

▢ Changes to ground software or configurations
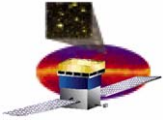
Calibration Issues

- **Statement of problem**
  - Several calibration runs did not return all of the data requested
    - Previous calibration runs were successful
    - Subsequent calibration runs were unsuccessful
  - Mitigation: restart LCI task
- **Root cause is a race condition in LCI**
  - A semaphore is being set twice and taken once
  - Successfully able to duplicate problem in dataflow lab with debug code that exacerbates race condition
- **Fixed in B0-10-1**

Testing GRB detection algorithm

- **Diagram below shows dataflow and highlights the missing pieces of infrastructure**
  - **Diagram does *not* show testing of LAT-GBM interface which has already been done during FQT-A**
  - **Test scripts are being written by FSW to**
    - **analyze science data to evaluate performance of GRB detection algorithm**
    - **analyze telemetry to obtain CPU utilization (needed to satisfy resource margin requirements)**
- **Testing begins when GRB algorithm is delivered**

OSU

Generate Monte Carlo to simulate GRB, including attitude information

GRB Monte Carlo (FES input format)

FES | LAT Testbed

Science Data Interface

Archive science data

FSW

Analyze science data to evaluate performance of GRB algorithm

GRB Monte Carlo (VSC attitude information)

VSC

1553

1553 VSC to TB: Attitude information contained in Magic 7 goes from VSC to Testbed and must be synched with FES GRB Monte Carlo

1553 TB to VSC : LAT telecommands to GBM and LAT generated burst alert telemetry

Work in progress

Complete

Archive telemetry

FSW

Analyze telemetry to evaluate CPU utilization of GRB algorithm