



The GLAST Burst Monitor

Purpose: To augment the GLAST capabilities for studying gamma-ray bursts by providing extended spectral response and on-board locations to allow repointing the LAT.

Institutions:

**Marshall Space Flight Center,
Max Planck Institute for Extraterrestrial Physics,
University of Alabama, Huntsville.**

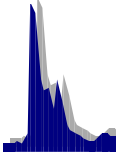
Principal Investigator:

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Co-Principal Investigator:

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<http://gammaray.msfc.nasa.gov/gbm/>



Additional Key Personnel

TM MSFC

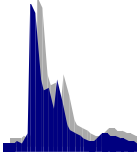
- | **Dr. Gerald Fishman**
- | **Mr. Stephen Elrod (Project Manager)**

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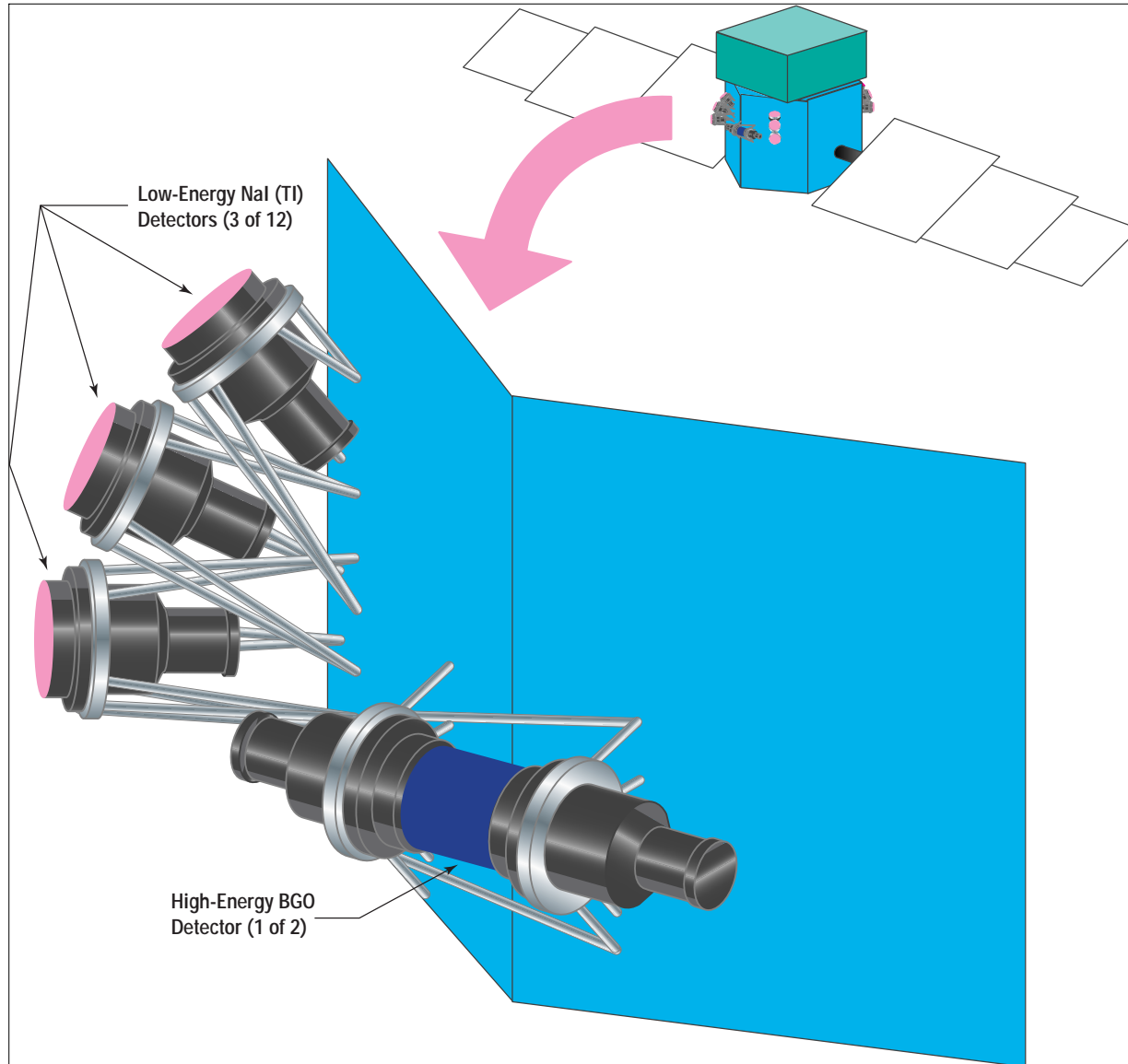
- | **Dr. Roland Diehl**
- | **Dr. Robert Georgii**
- | **Dr. Andreas von Kienlin**
- | **Prof. Dr. Volker Schoenfelder**

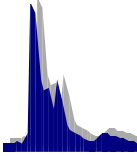


Burst Monitor Approach

- ™ Place main emphasis on the unique capability of GLAST for spectral observations.**
- ™ Have very large FOV (\gg LAT) to allow repointing of the LAT.**
- ™ Use array of twelve 5" by 0.5" NaI detectors to locate GRBs (as with BATSE) and get low energy spectrum.**
- ™ Use two 5" by 5" BGO detectors to obtain broad spectral coverage.**

GBM Detector Concept





Burst Locations

TM On-Board

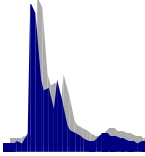
- | Available in several seconds
- | Sufficient accuracy to repoint LAT
- | Other data as necessary to make repoint decision

TM On-Ground Automated

- | Uses real-time telemetry link
- | GCN notifications
- | Two or more levels of time/accuracy

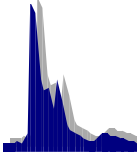
TM On-Ground Manual

- | Human interaction to achieve best accuracy
- | Available in 1-2 days



Burst Monitor Performance

- ™ Spectral coverage from a few keV to ~30 MeV (overlap with LAT)**
- ™ Field of View: 8.6 sr (using AO definition) (LAT is 2.4 sr)**
- ™ Sensitivity**
 - | ~0.57 photons cm⁻² s⁻¹ (nominal on-board burst trigger)**
 - | ~0.35 photons cm⁻² s⁻¹ (ultimate 5 σ sensitivity)**
- ™ On-board location accuracy <15° for most bursts**
- ™ Mass: 54.5 kg (20% contingency, mounting hardware not included)**
- ™ Power: 17.8 watts (based on BATSE, without contingency)**
- ™ Telemetry rate: 4 kbps (nonburst), 9 kbps burst**

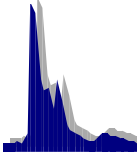


TM Background spectra (BSPEC)

- | 128 energy channels
- | 8 s time resolution
- | All detectors

TM Background timing (BTIME)

- | 4 energy channels
- | 0.256 s time resolution
- | All detectors



Burst Data

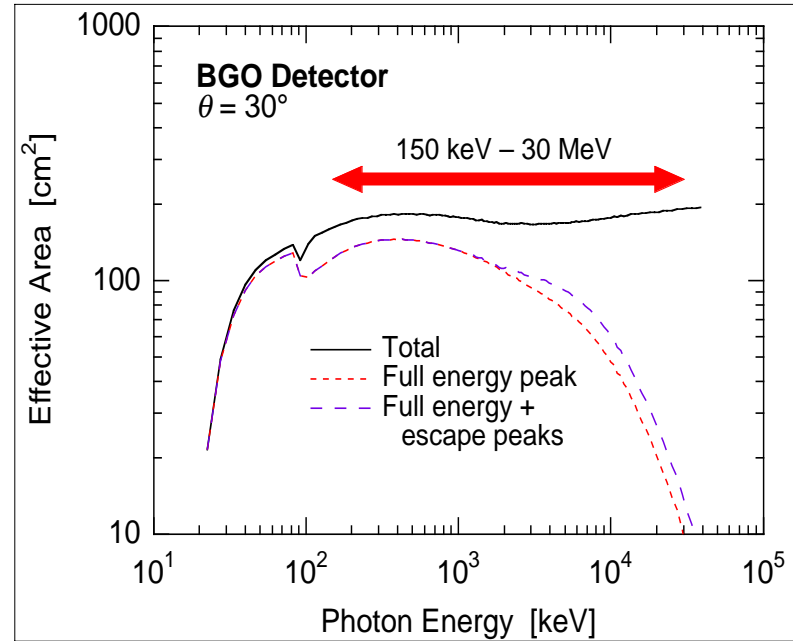
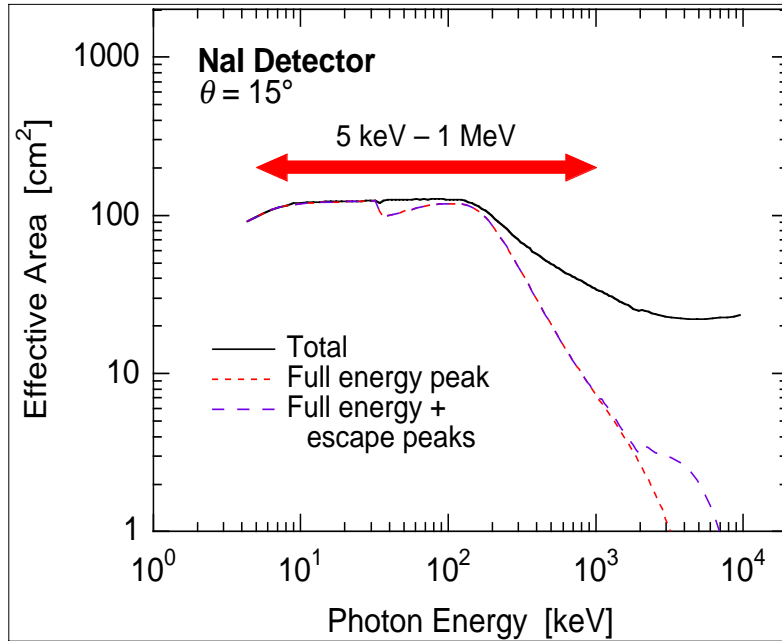
TM Time-Tagged Event (TTE)

- | 128 energy channels
- | 5 μ s time resolution
- | $\sim 10^6$ events
- | ~ 50 s pretrigger
- | selected detectors
- | bursts only

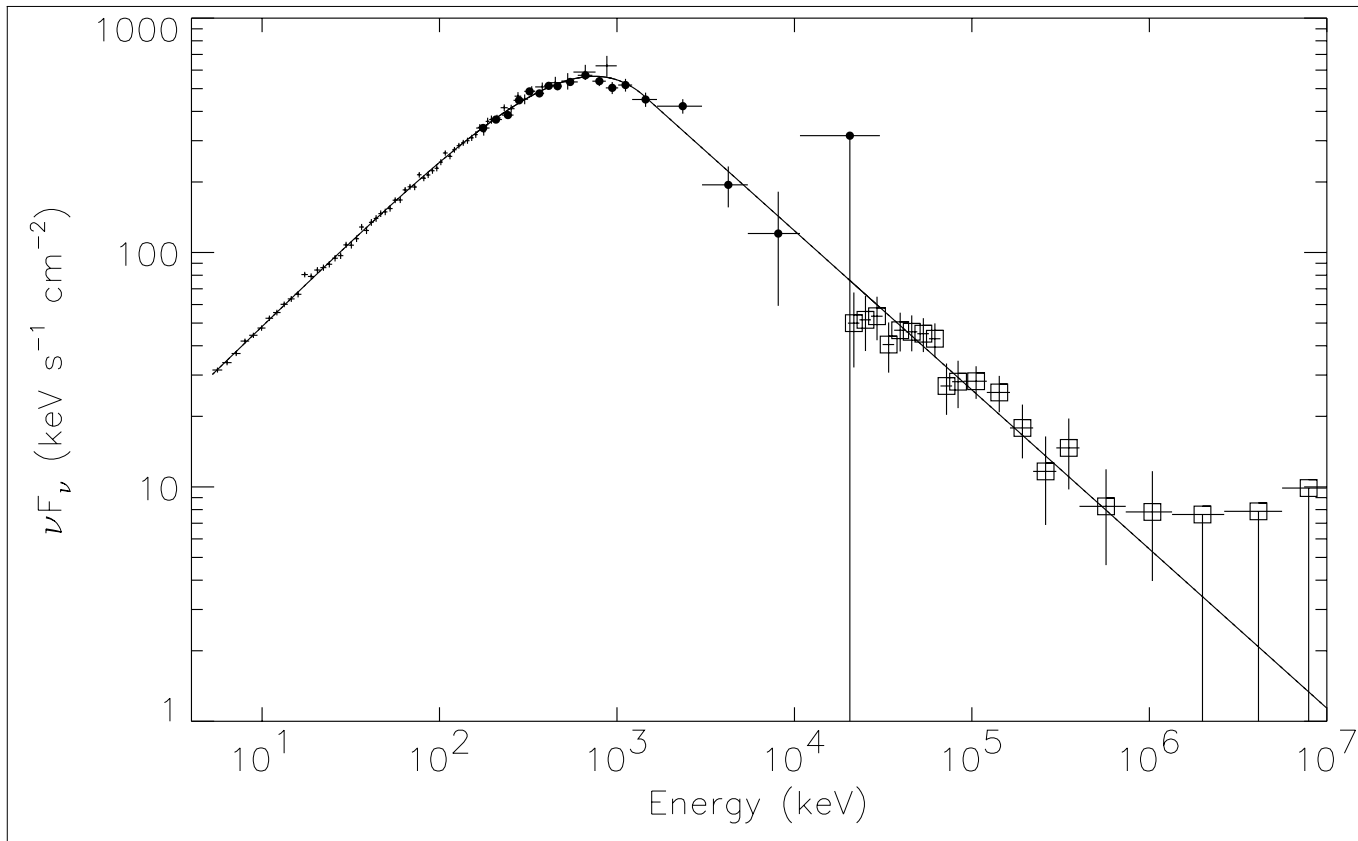
TM Trigger Data (TRIGDATA)

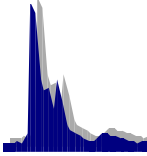
- | Onboard and real-time telemetry link
- | Locations
- | Spectral information
- | Other information as required by the LAT
- | Detector rates and ancillary data for automated ground locations

Simulated Instrument Performance

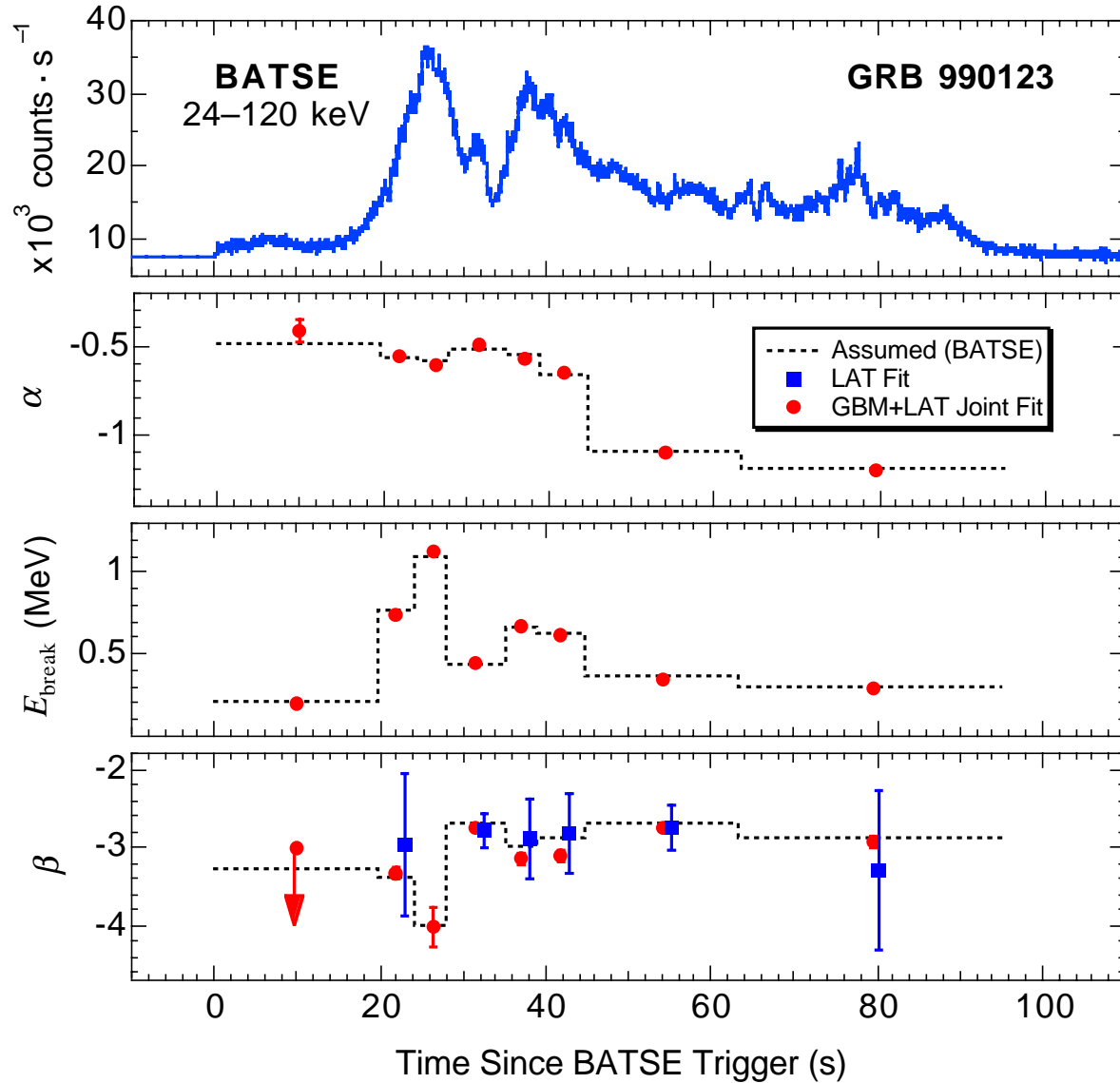


Simulated Spectrum of GRB 940217





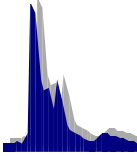
GRB 990123 Simulation: LAT + GBM





Science Investigation

- ™ Time-resolved spectroscopy of GBM triggered bursts using GBM and LAT data.**
- ™ Generation of GRB locations within seconds for repointing, detection in LAT, and dissemination to other observers.**
- ™ Production of a burst catalog.**
- ™ Untriggered burst search.**



- ™ GBM sensitivity/FOV trade.**
- ™ Policy on repointing LAT.**
- ™ Data to be provided on-board to LAT.**
- ™ Coordination of rapid alerts.**
- ™ Coordination of analyses of joint spectra.**