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,
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Principal Investigator:

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

Additional Key Personnel

- **MSFC**
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  - Mr. Stephen Elrod (Project Manager)

- **UAH**
  - Dr. Michael Briggs
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- **MPE**
  - Dr. Roland Diehl
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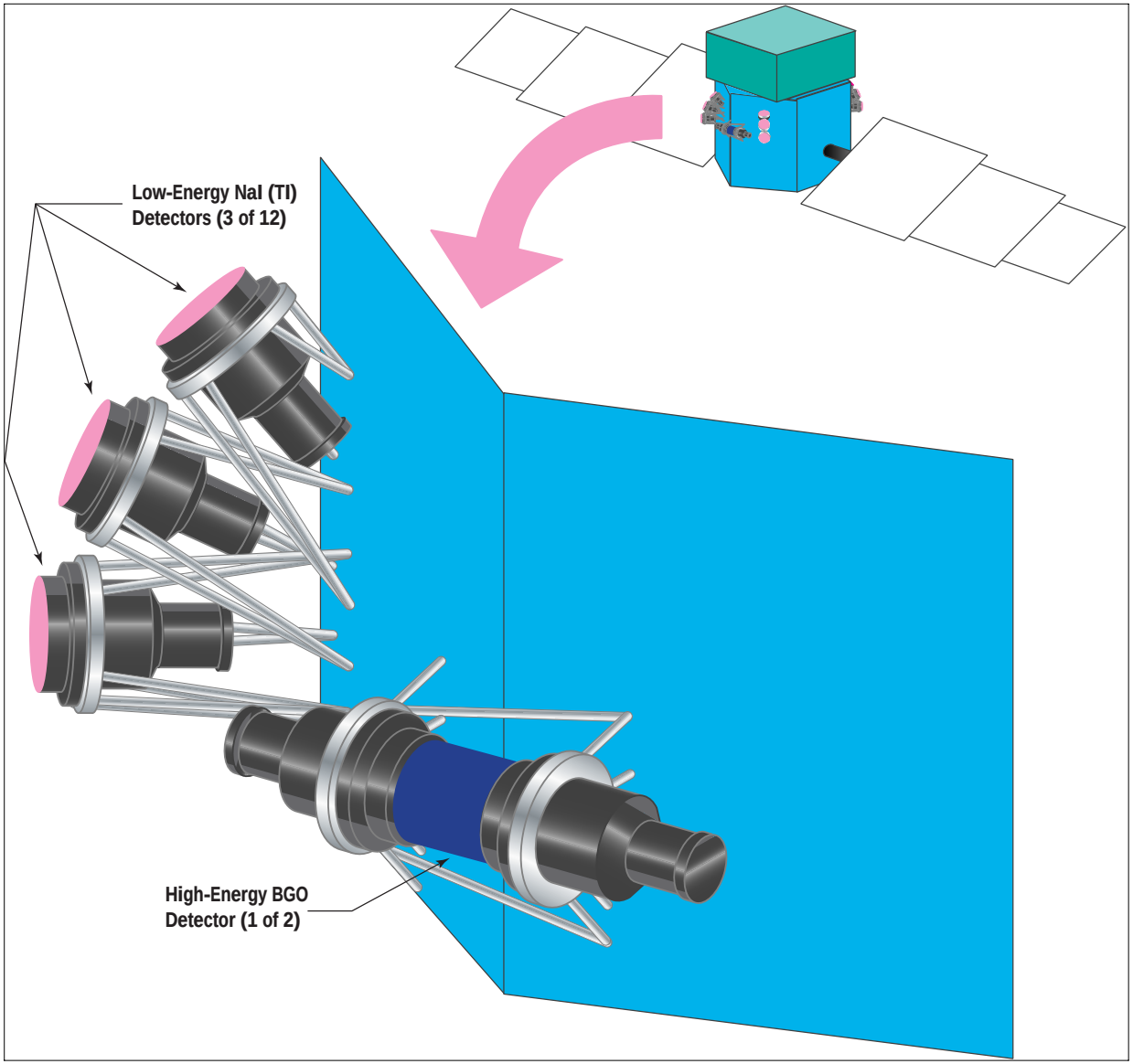
  - Dr. Andreas von Kienlin
  - Prof. Dr. Volker Schoenfelder

Burst Monitor Approach

- Place main emphasis on the unique capability of GLAST for spectral observations.
- Have very large FOV (>>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

- **On-Board**
  - Available in several seconds
  - Sufficient accuracy to repoint LAT
  - Other data as necessary to make repoint decision
- **On-Ground Automated**
  - Uses real-time telemetry link
  - GCN notifications
  - Two or more levels of time/accuracy
- **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 5σ 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

Continuous Data

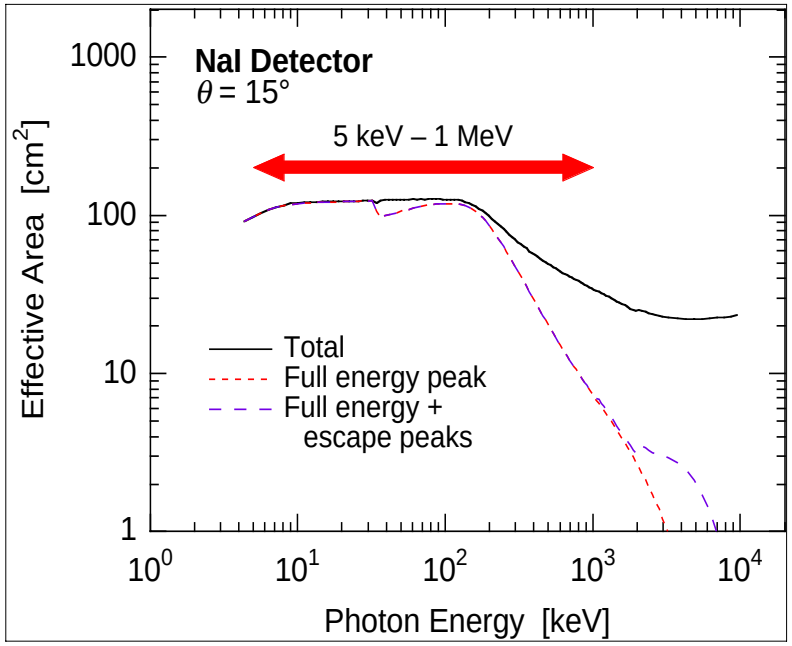
- **Background spectra (BSPEC)**
  - 128 energy channels
  - 8 s time resolution
  - All detectors

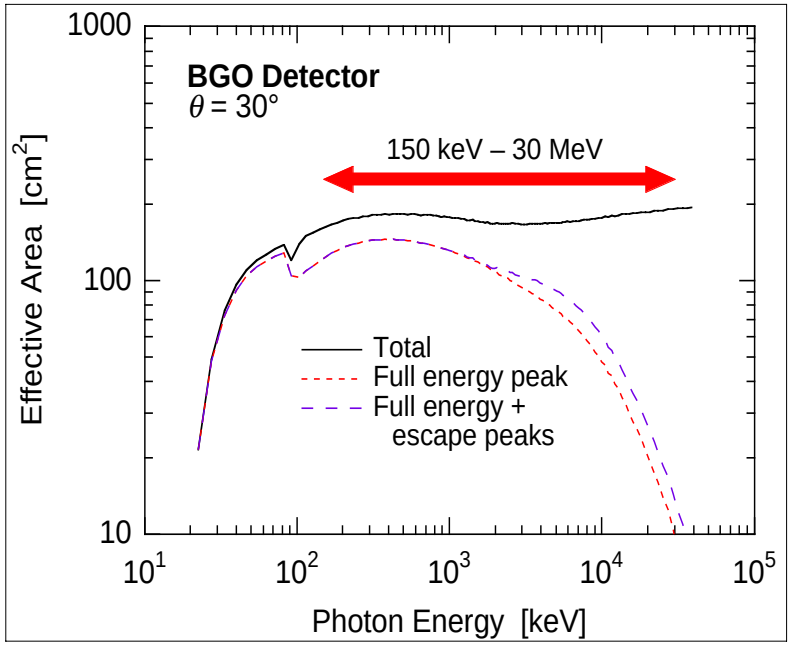
- **Background timing (BTIME)**
  - 4 energy channels
  - 0.256 s time resolution
  - All detectors

Burst Data

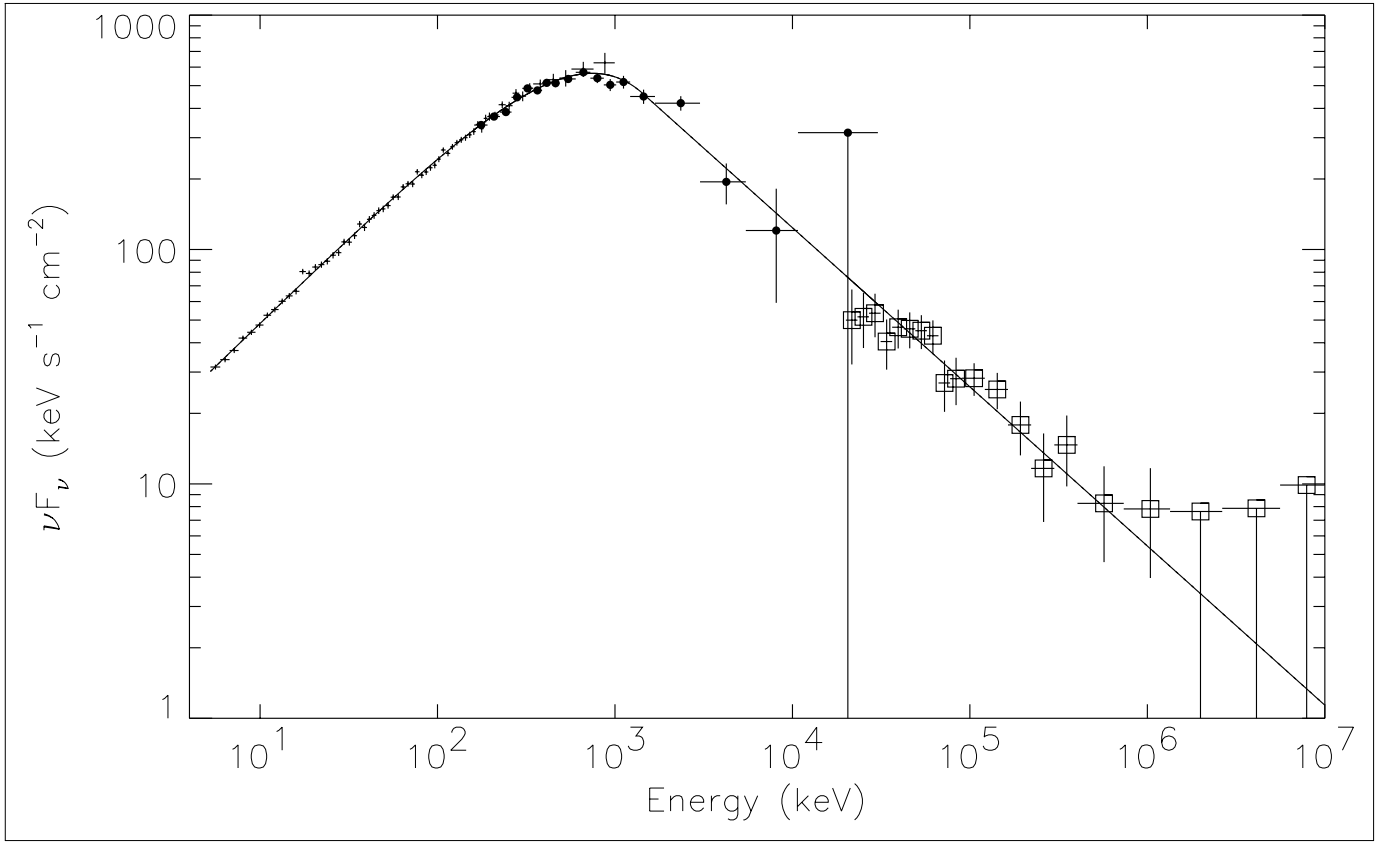
- **Time-Tagged Event (TTE)**
  - 128 energy channels
  - 5 μs time resolution
  - ~ 10^6 events
  - ~ 50 s pretrigger
  - selected detectors
  - bursts only
- **Trigger Data (TRIGDATA)**
  - Onboard and real-time telemetry link
  - Locations
  - Spectral information
  - Other information as required by the LAT
  - Detector rates and ancillary data for automated ground locations

Simulated Instrument Performance

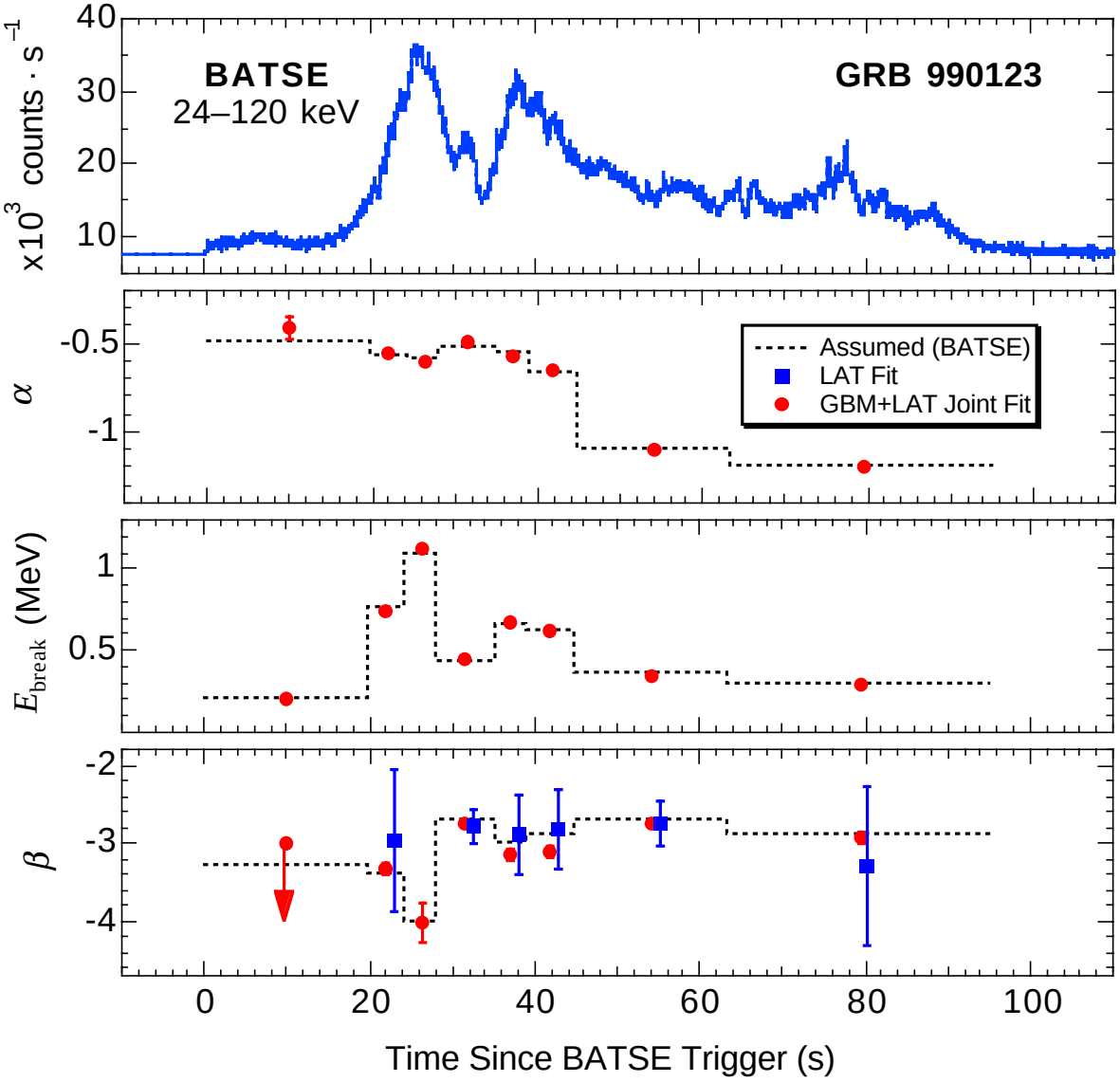




Simulated Spectrum of GRB 940217



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.

SWG Issues

- 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.