

Fermi GBM Updates

4th TDAMM Workshop



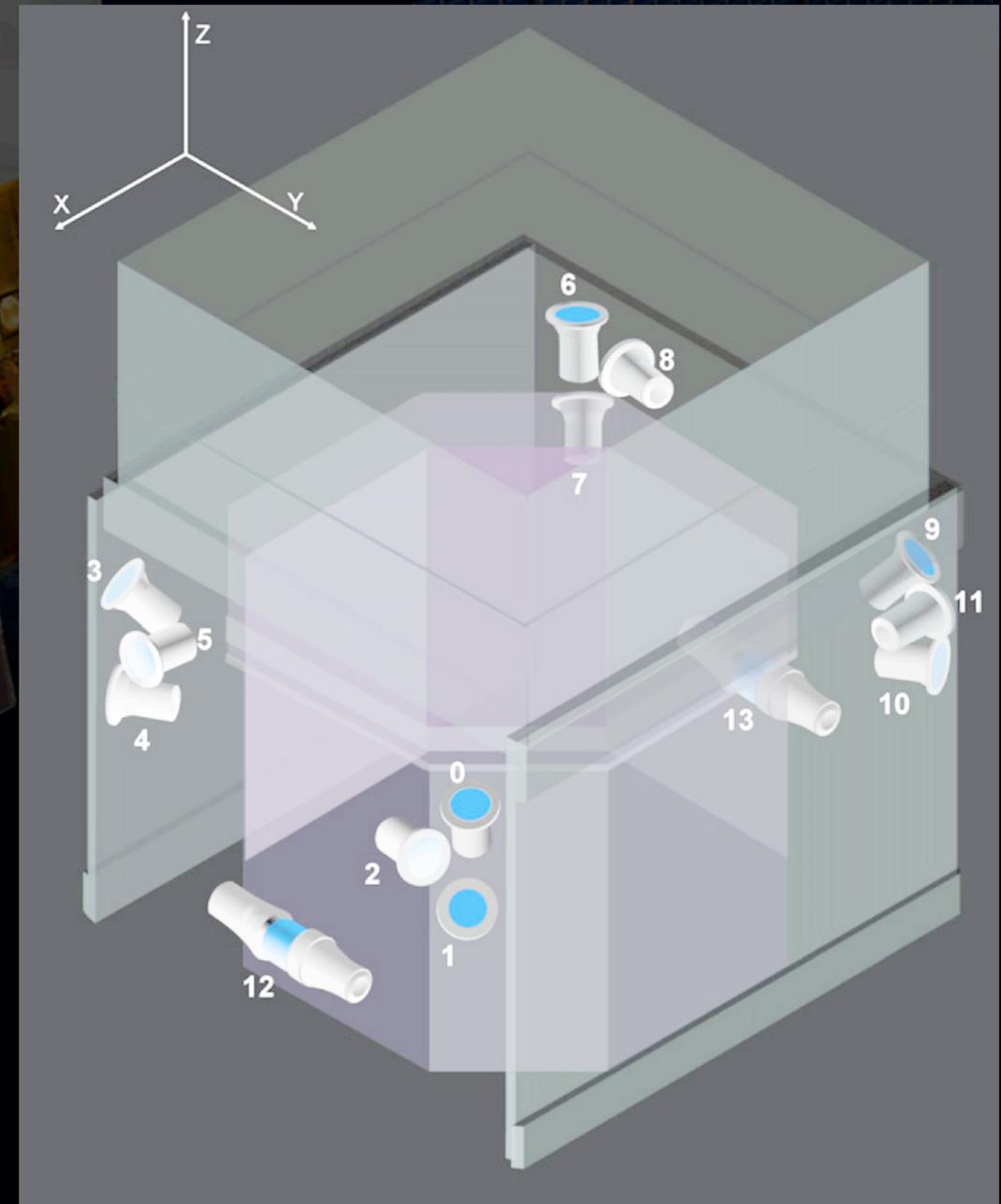
Adam Goldstein
USRA

On behalf of the Fermi GBM Team

The Fermi Gamma-ray Burst Monitor



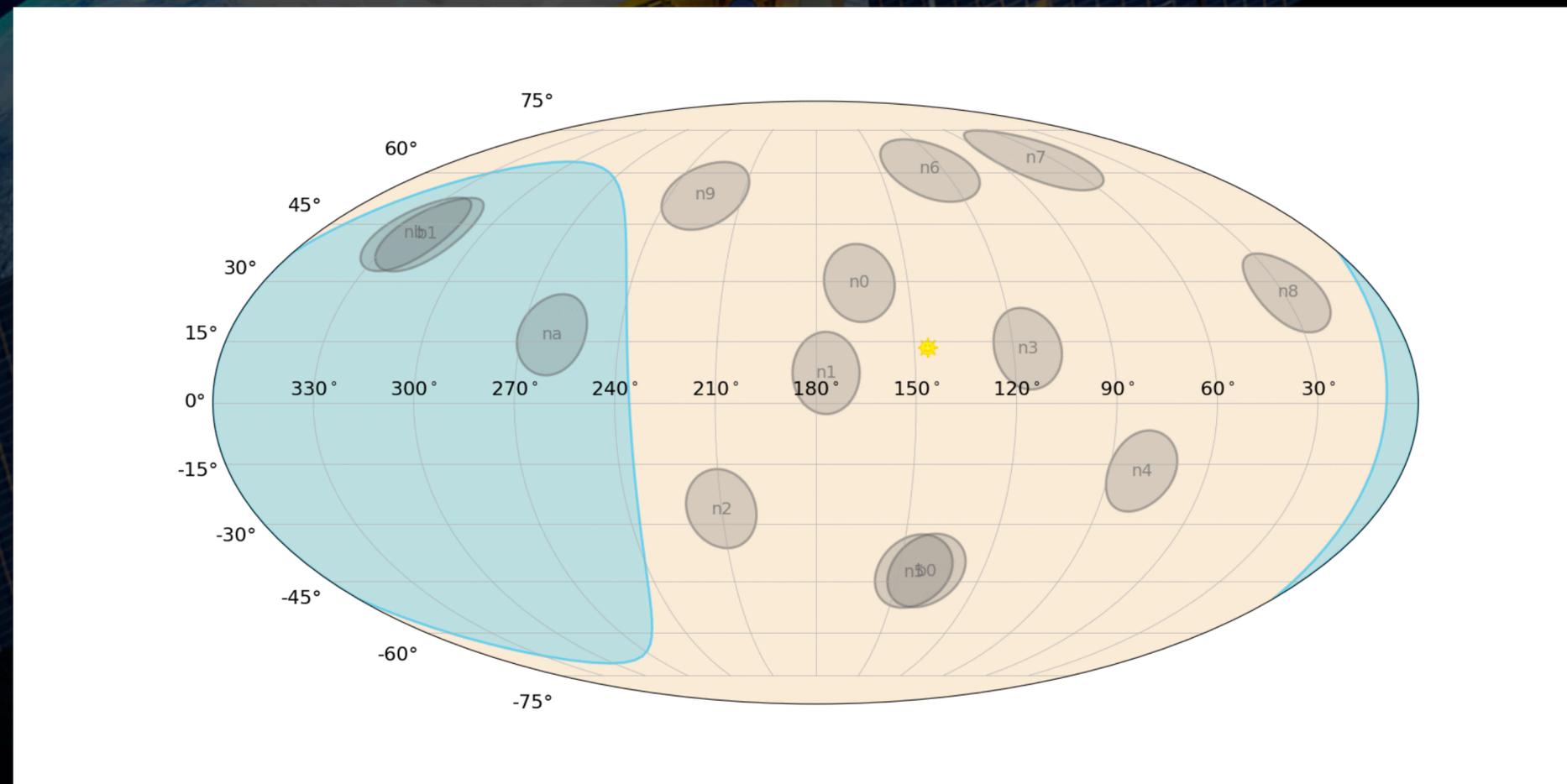
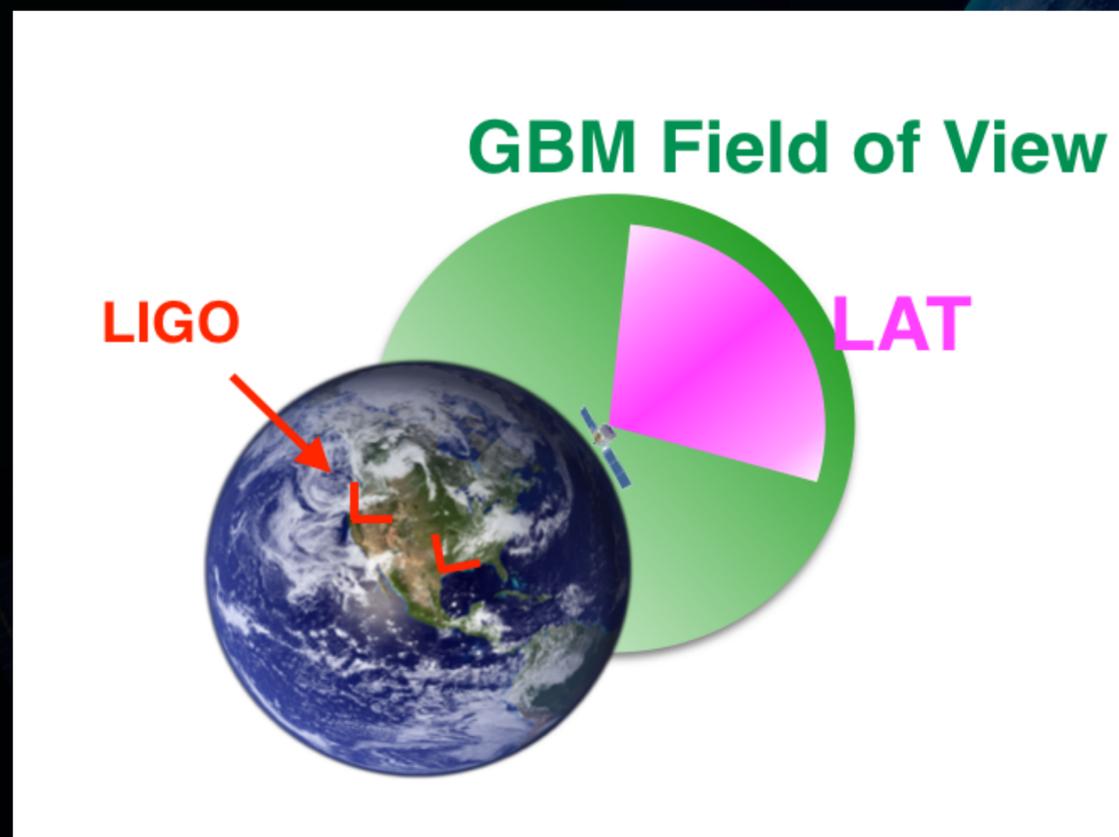
- 8 keV—40 MeV
- $2 \mu\text{s}$ resolution
- Localizes transients to a few degrees



Meegan+ 2009

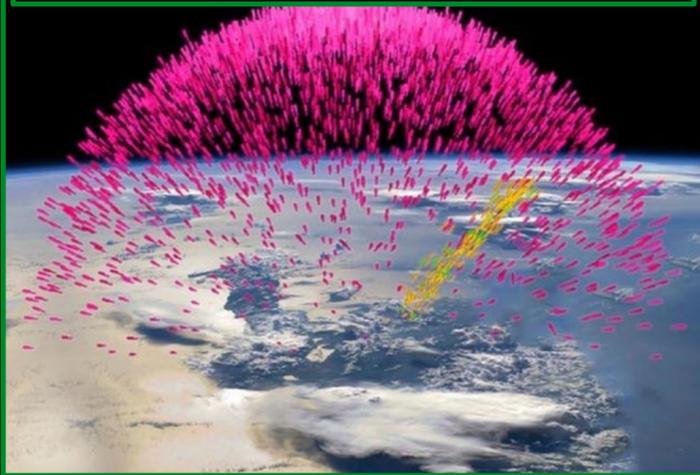
The Fermi Gamma-ray Burst Monitor

- Instantaneously observes ~70% of the sky
- Observing duty cycle of ~85%

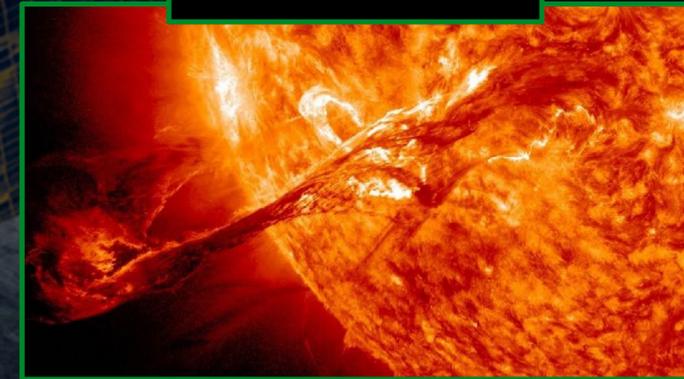


What does Fermi GBM see (besides GRBs)?

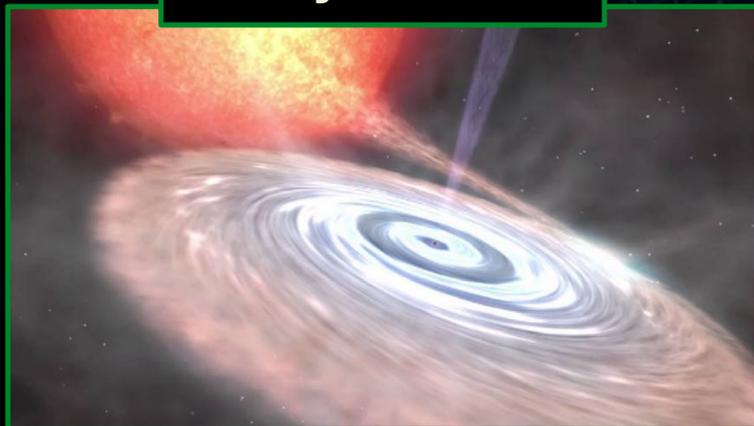
Terrestrial Gamma-ray Flashes



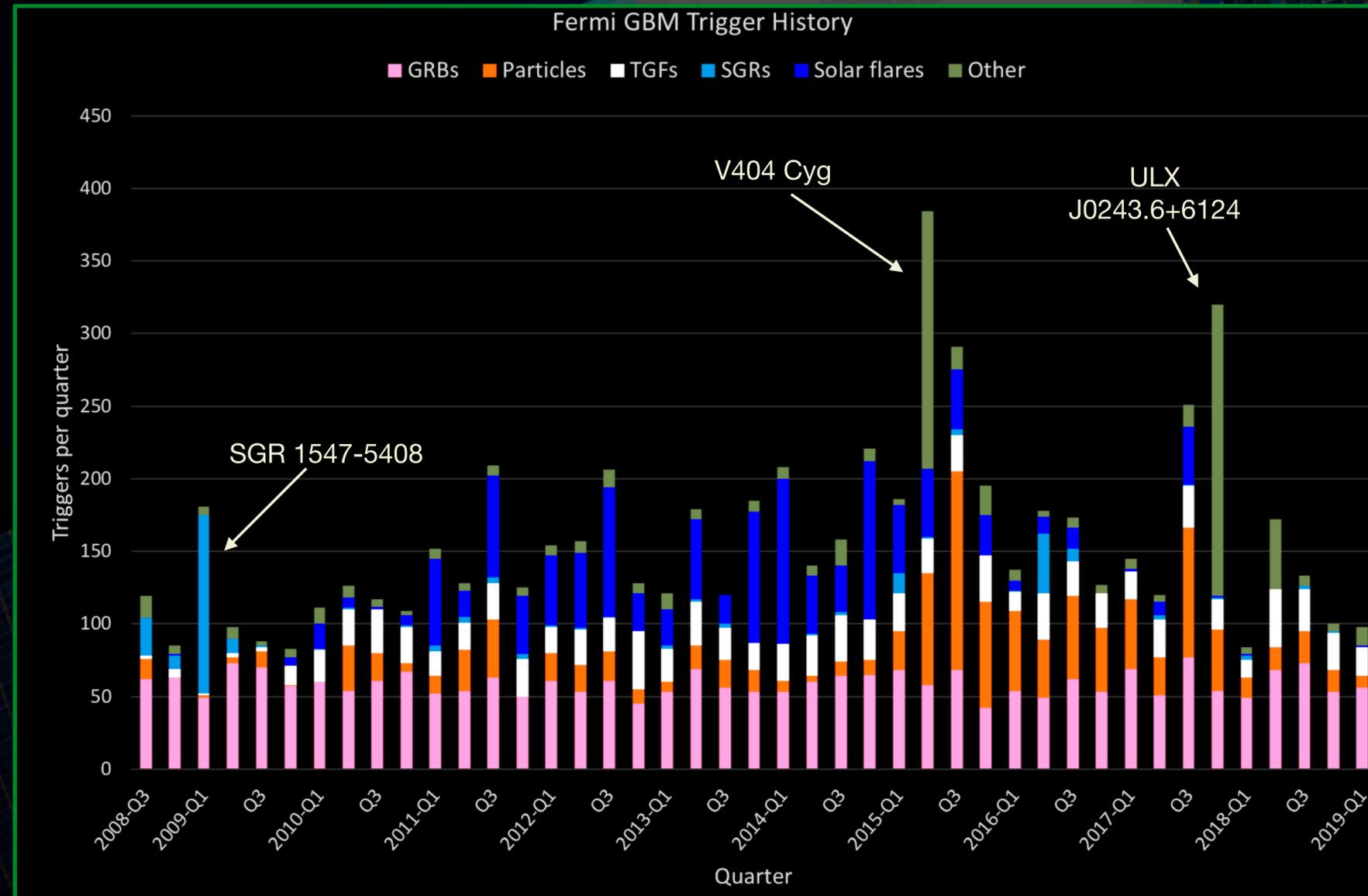
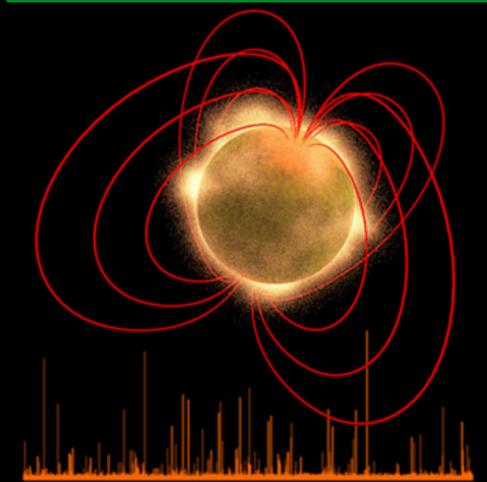
Solar Flares



X-ray Binaries



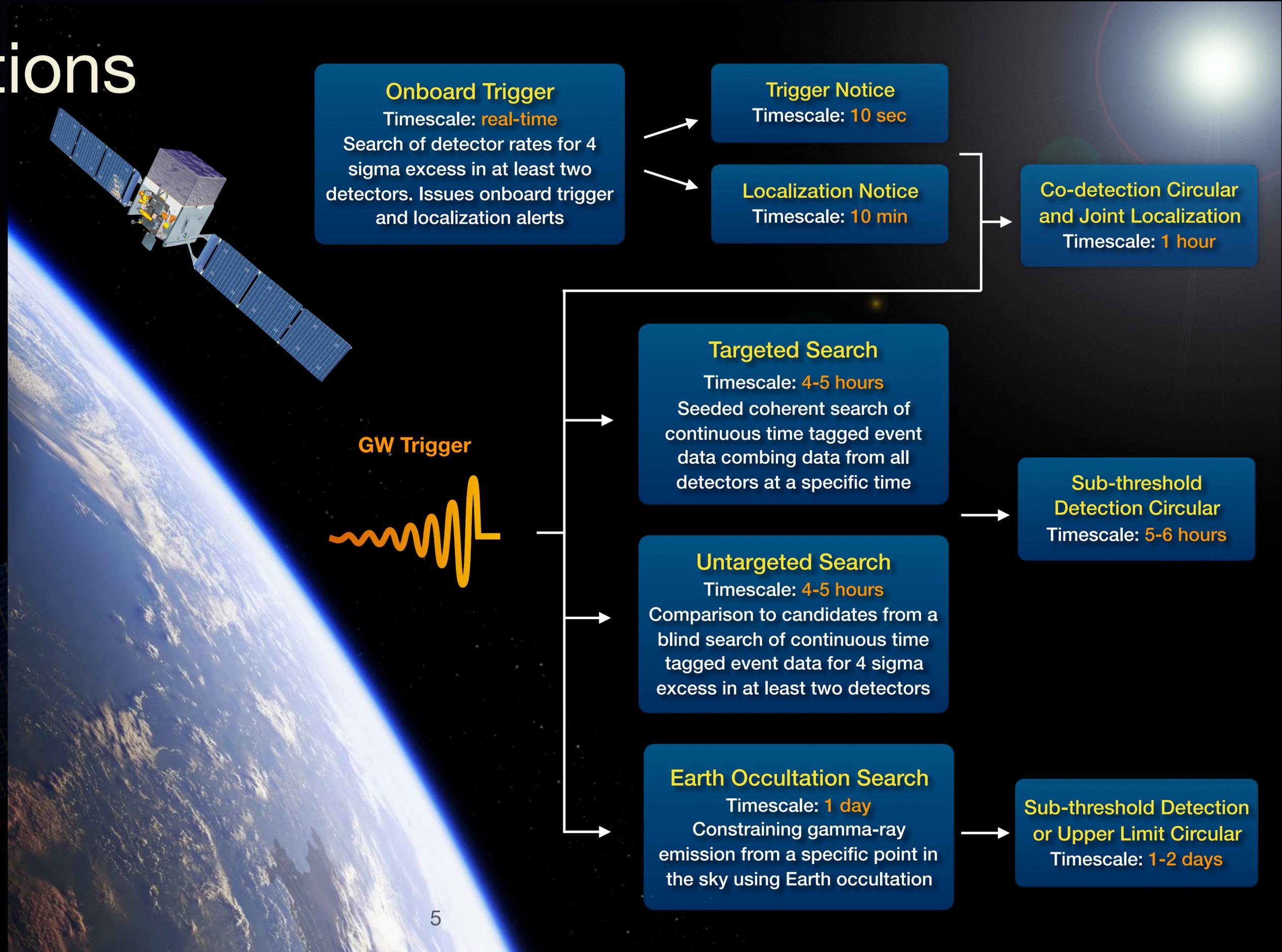
Soft Gamma-ray Repeaters



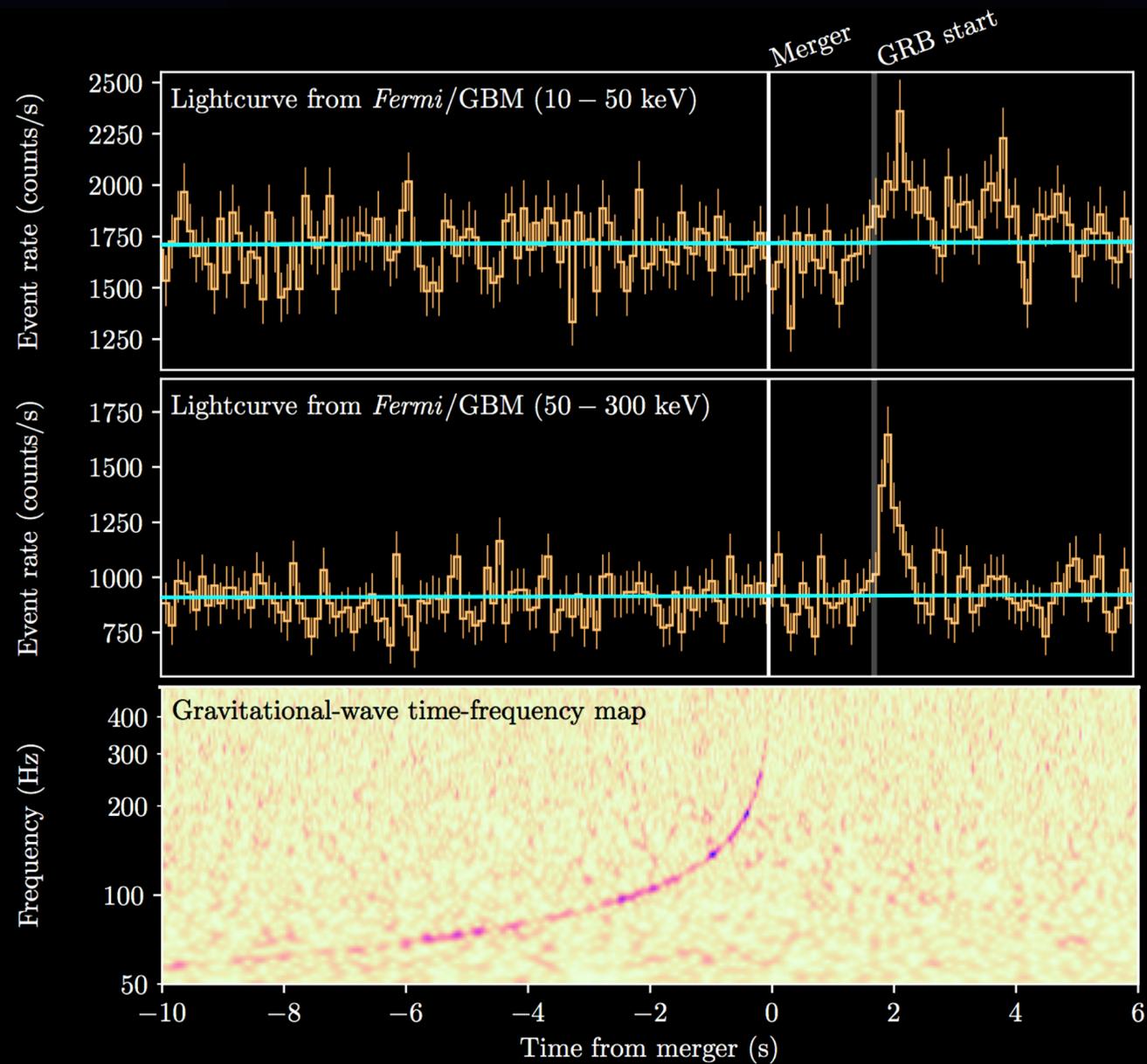
GBM Operations

Sub-threshold Follow-up:

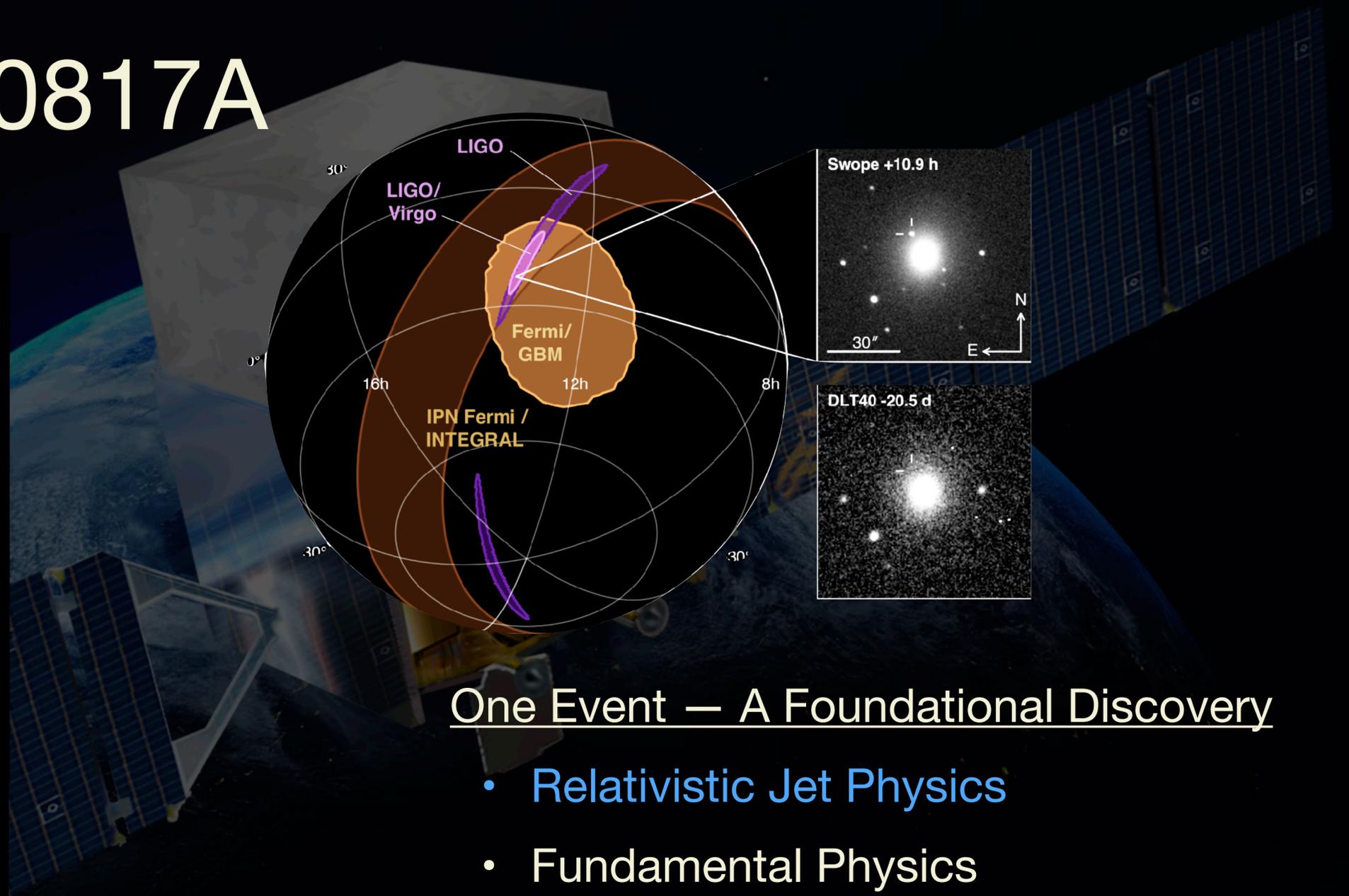
- LVK
- IceCube
- CHIME
- Swift
- Einstein Probe
- SVOM



GW170817 — GRB 170817A



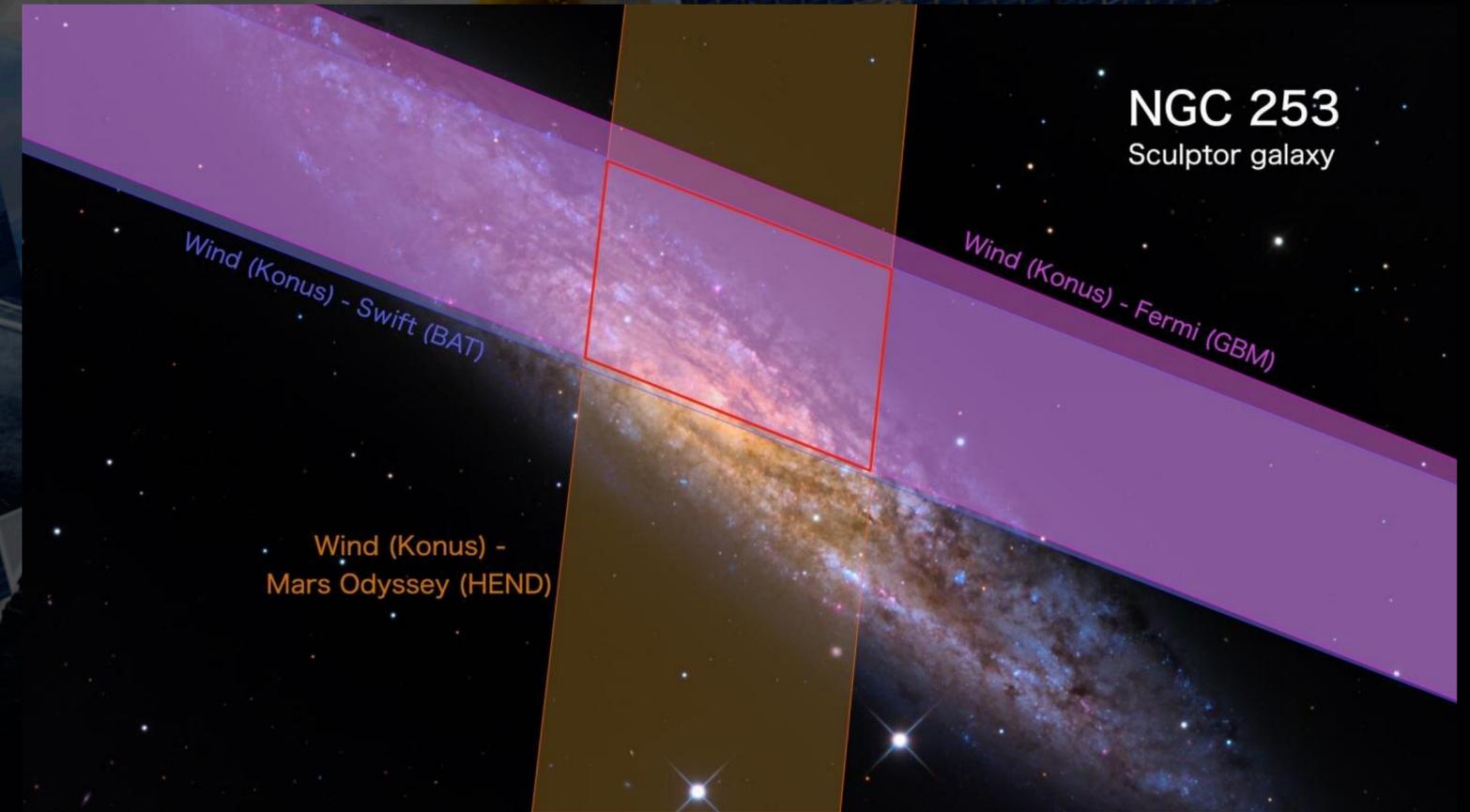
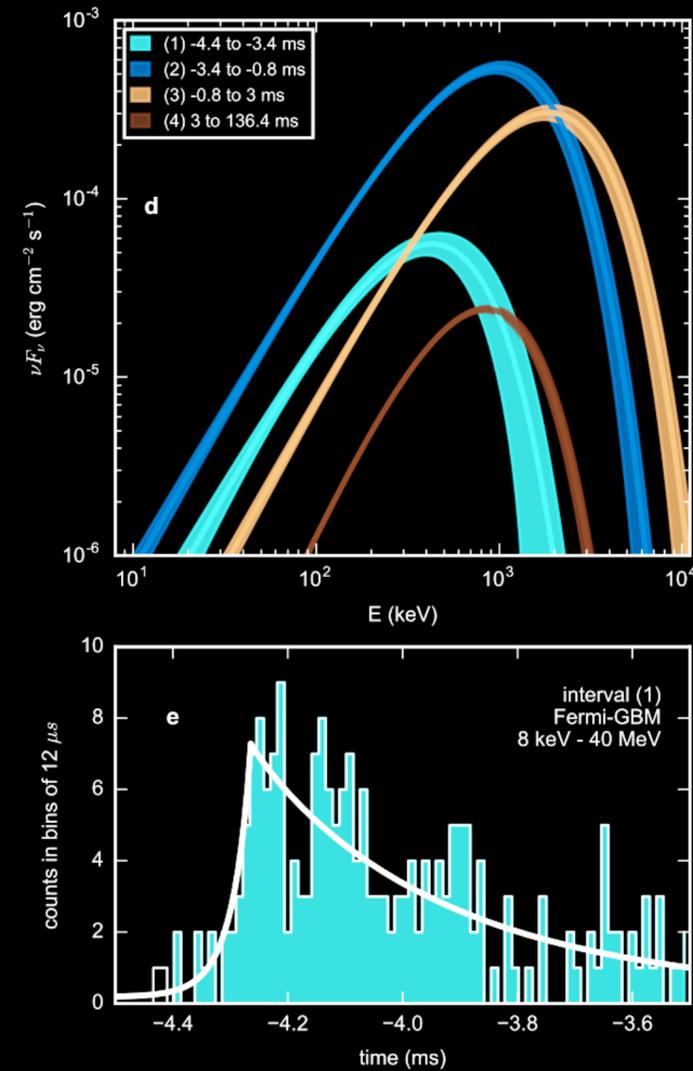
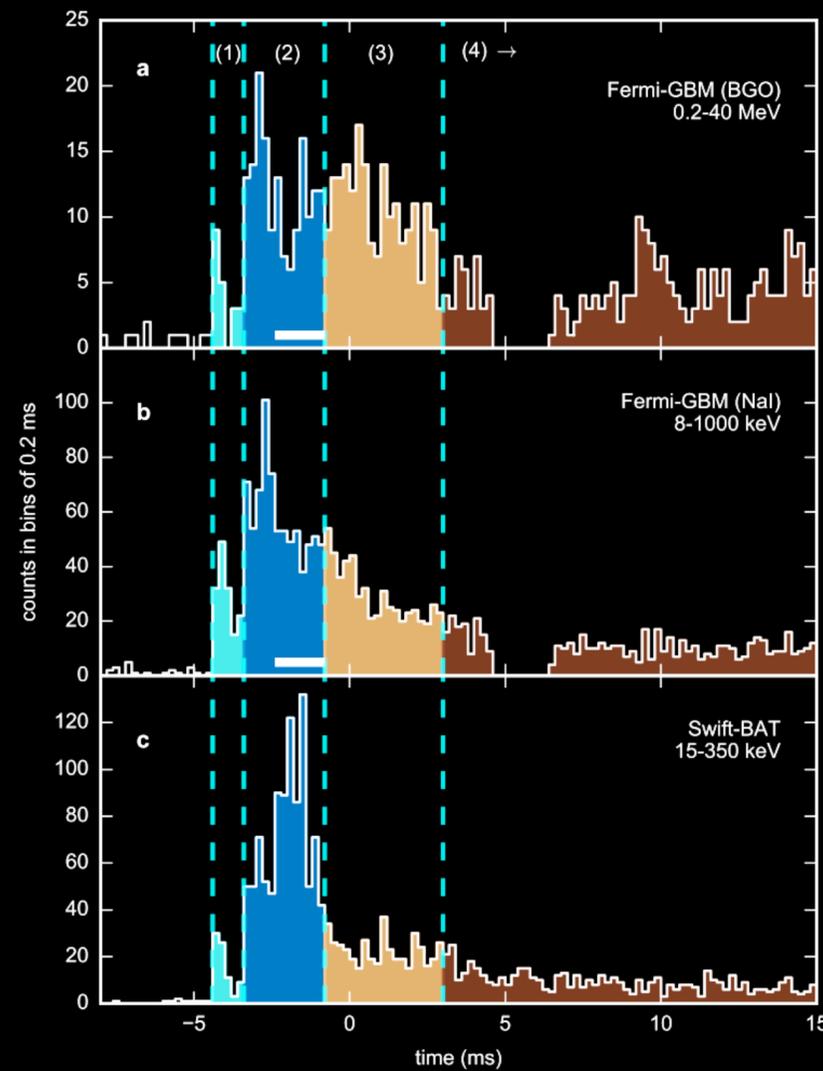
Abbott+ 2017
Goldstein+ 2017



One Event — A Foundational Discovery

- Relativistic Jet Physics
- Fundamental Physics
- General Relativity
- Stellar Populations
- Condensed Matter Physics
- Cosmology
- Nucleosynthesis

GRB 200415A – An Extragalactic Magnetar Giant Flare



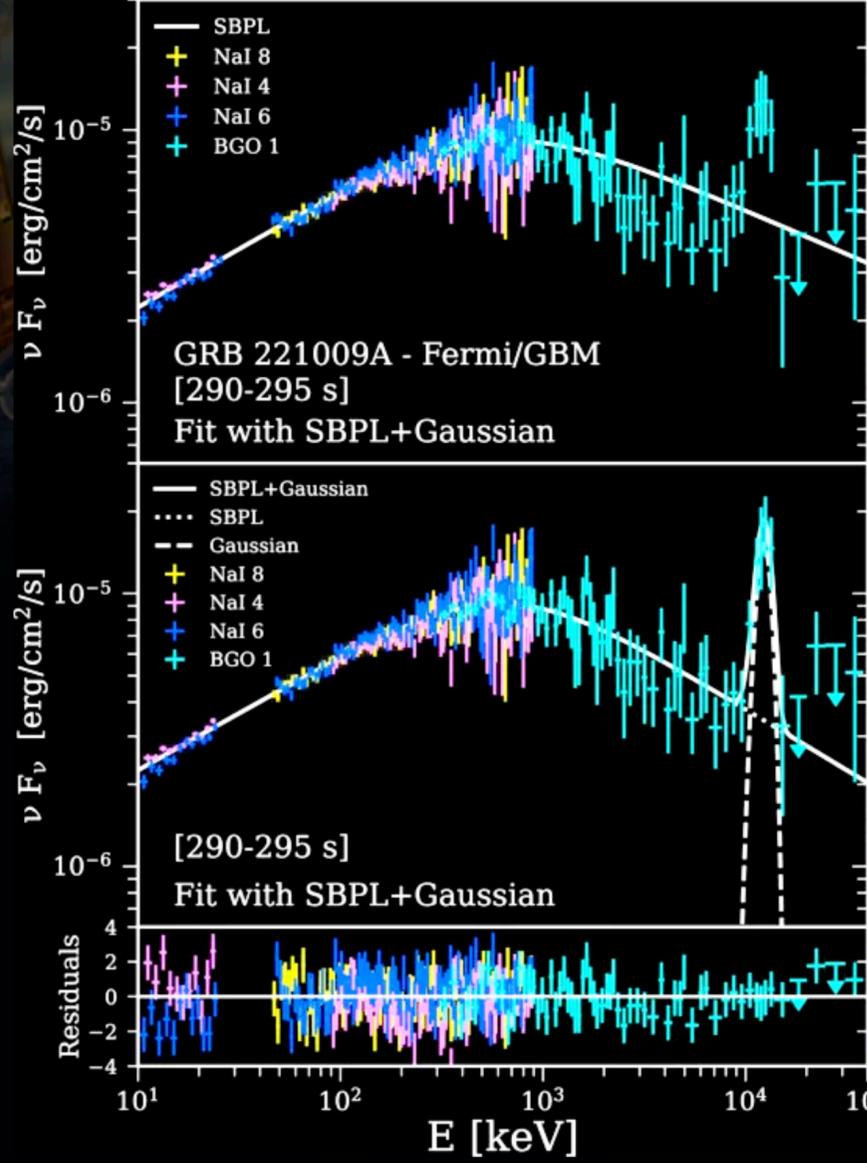
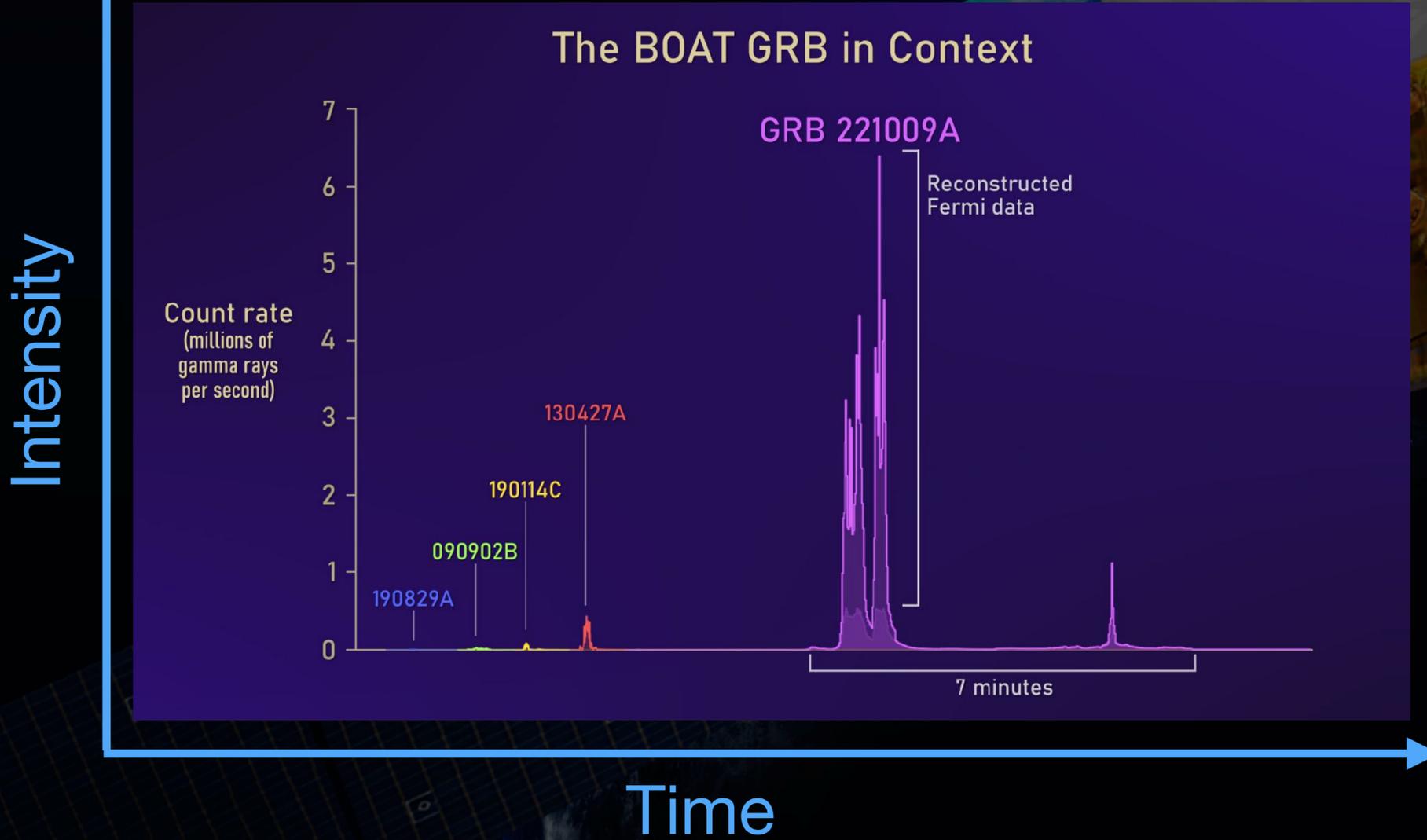
NASA GSFC / Adam Block / Mount Lemmon Sky Center / University of Arizona

Roberts+ 2021

GRB 221009A — The BOAT

The Brightest Of All Time...

...and a spectral line!

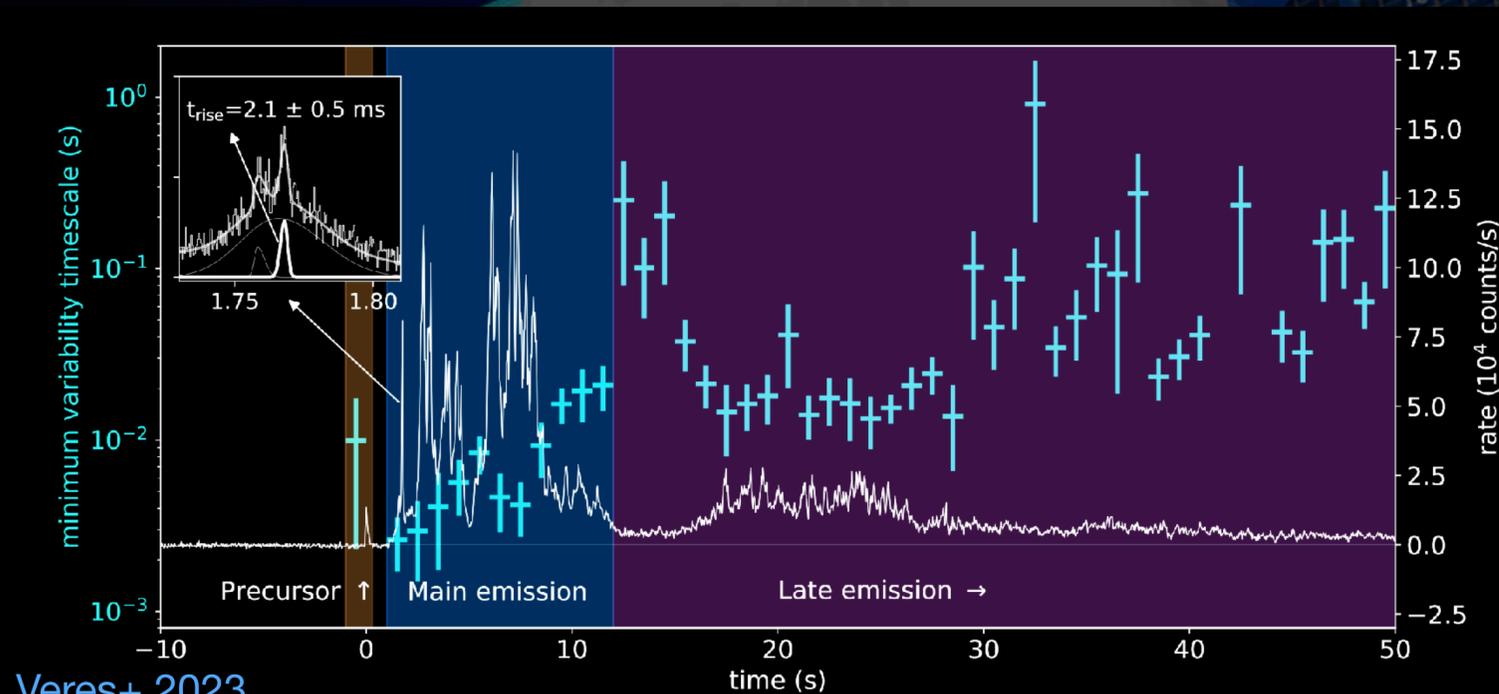


NASA GSFC / Adam Goldstein (USRA)
Lesage+ 2023

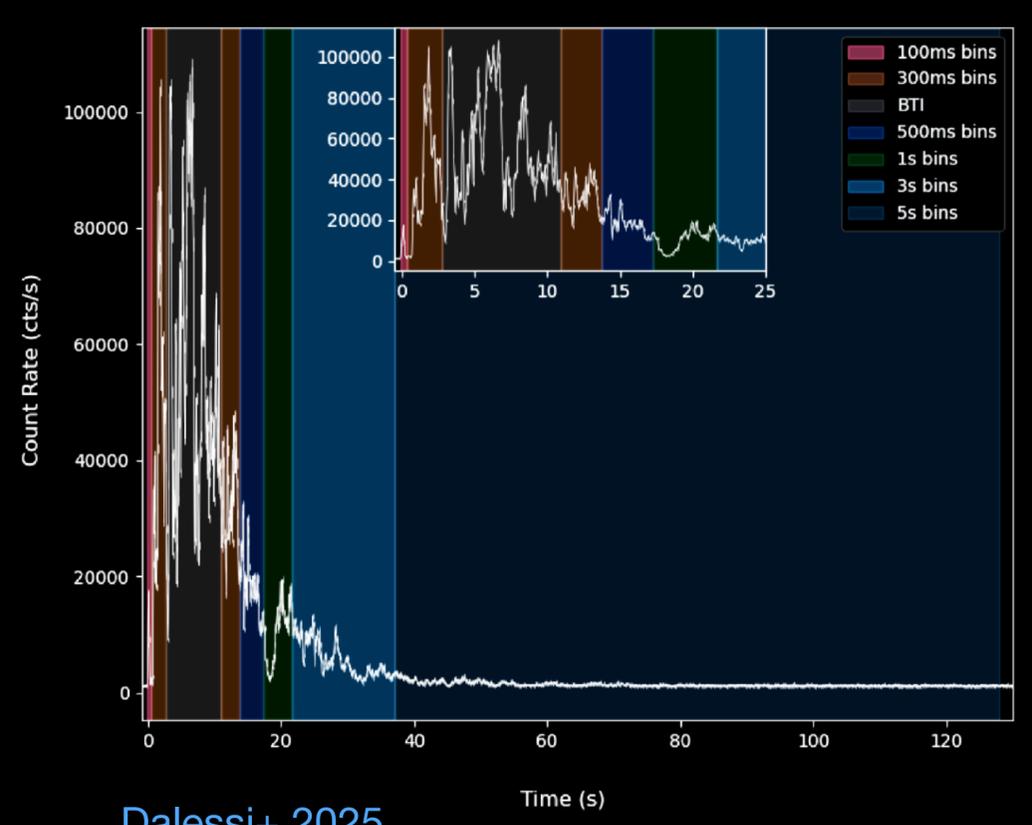
Ravasio+ 2023

GRBs 230307A & 211211A—Long GRBs from NS mergers?

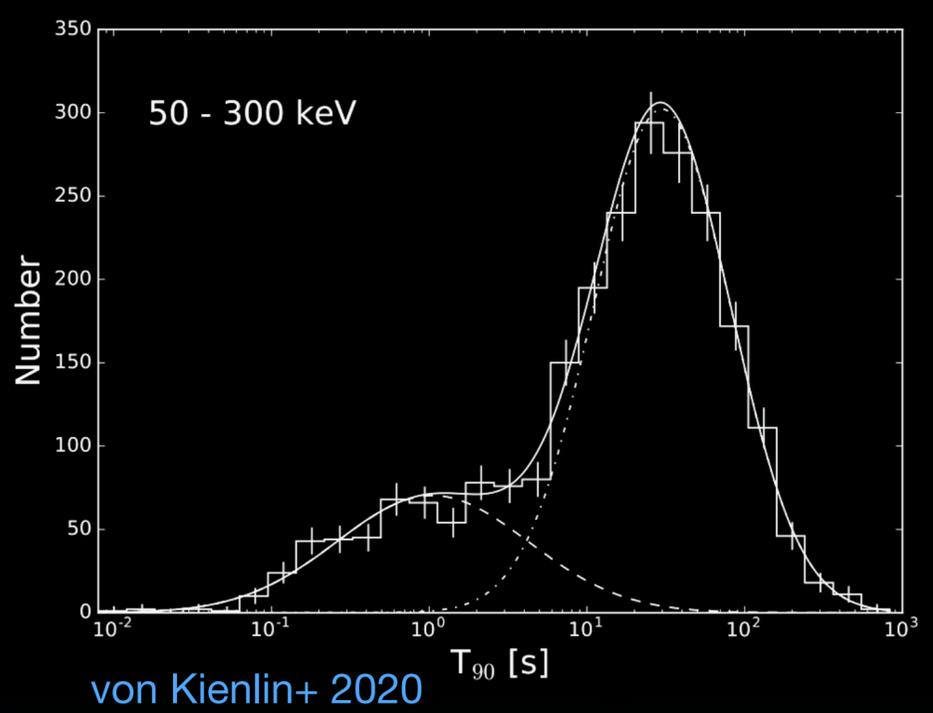
GRB 211211A



GRB 230307A

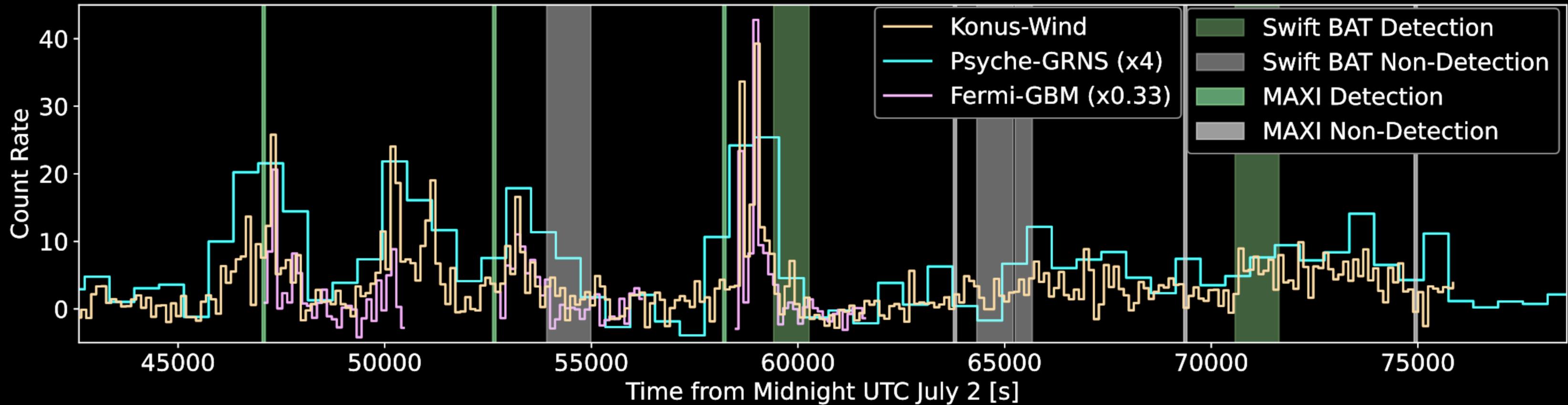


T90 Distribution



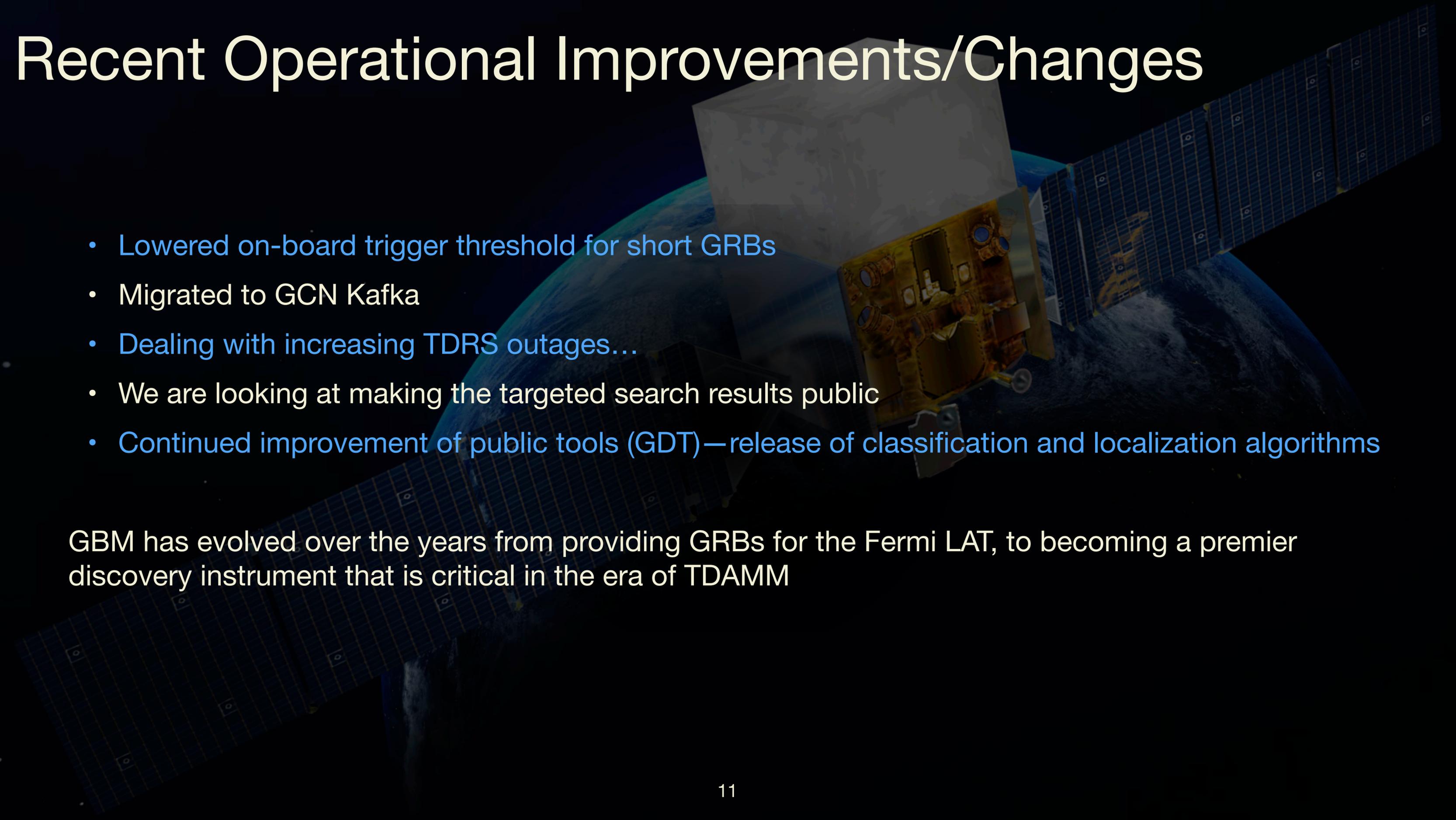
GRB 250702B – The longest ultra-long GRB?

What was the progenitor???



Neights+ submitted

Recent Operational Improvements/Changes

A satellite is shown in space, with its solar panels extended. The Earth is visible in the background. The satellite has a white rectangular panel and a gold-colored instrument panel. The solar panels are blue with a grid pattern.

- Lowered on-board trigger threshold for short GRBs
- Migrated to GCN Kafka
- Dealing with increasing TDRS outages...
- We are looking at making the targeted search results public
- Continued improvement of public tools (GDT)—release of classification and localization algorithms

GBM has evolved over the years from providing GRBs for the Fermi LAT, to becoming a premier discovery instrument that is critical in the era of TDAMM