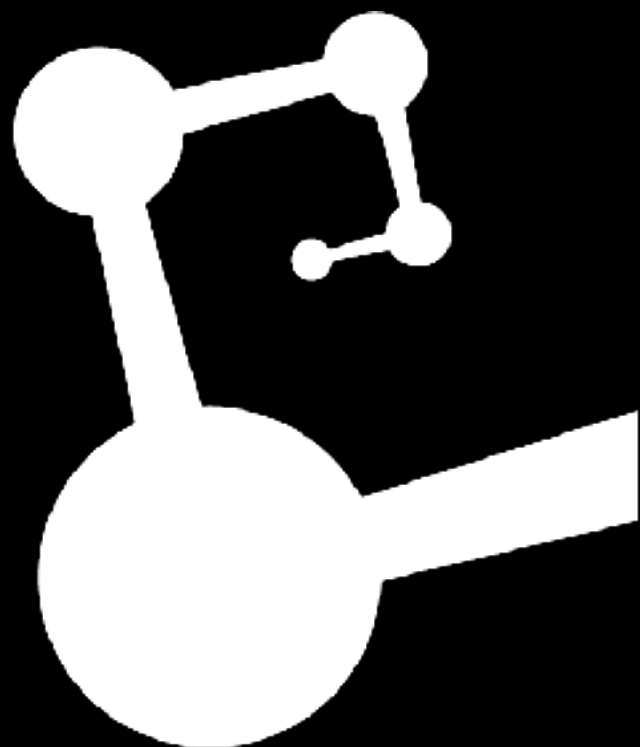# What we know from the transient sky (GRBs) and plans for the future

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COLIBRI Workshop,
Fréjus, May 10th, 2023

Outline

- Introduction of GRBs

- Summary of the telescopes: COATLI, TAROT and RATIR

- Analysis carried out: defining the sample.

- Average light curves: observational and rest frame.

- Luminosity function and redshift distribution.

- Plan for the future: Integring what we currently know and the arrival of COLIBRÍ.
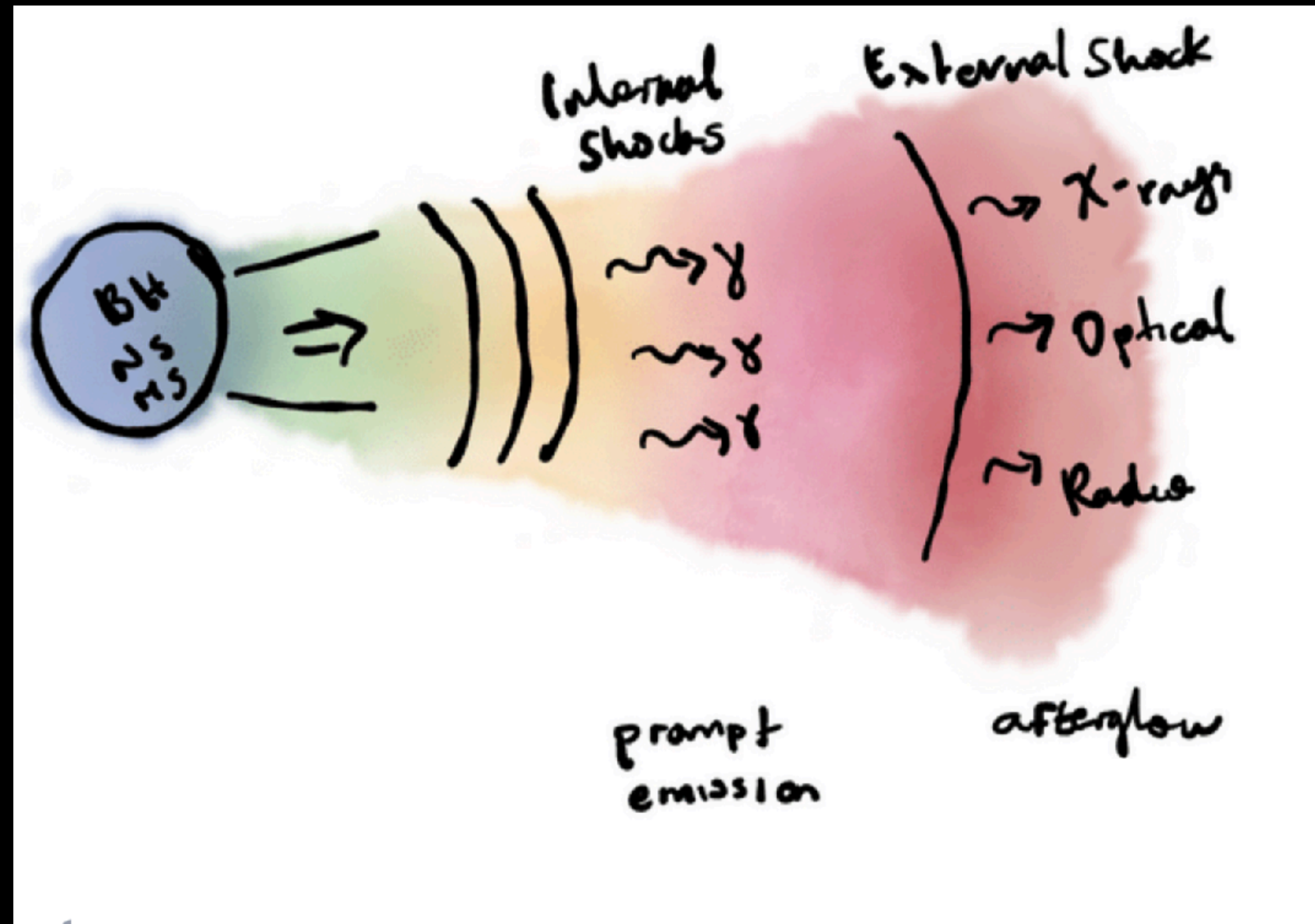
Collaboration

- Fabio De Colle

- Alan Watson

- Alain Klotz

- Jean-Luc Atteia

- Dafne Guetta

- William Lee

- Keneth García
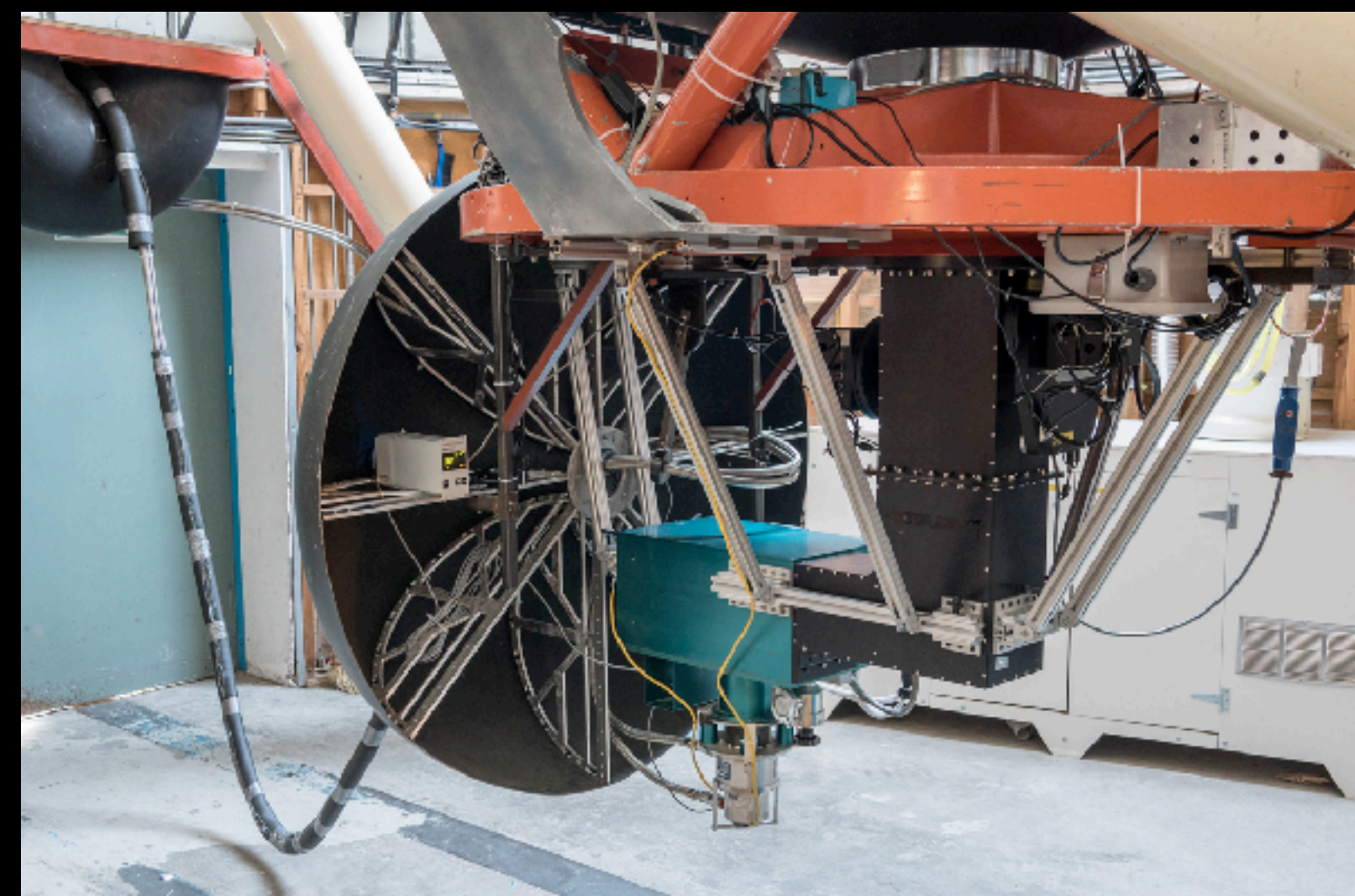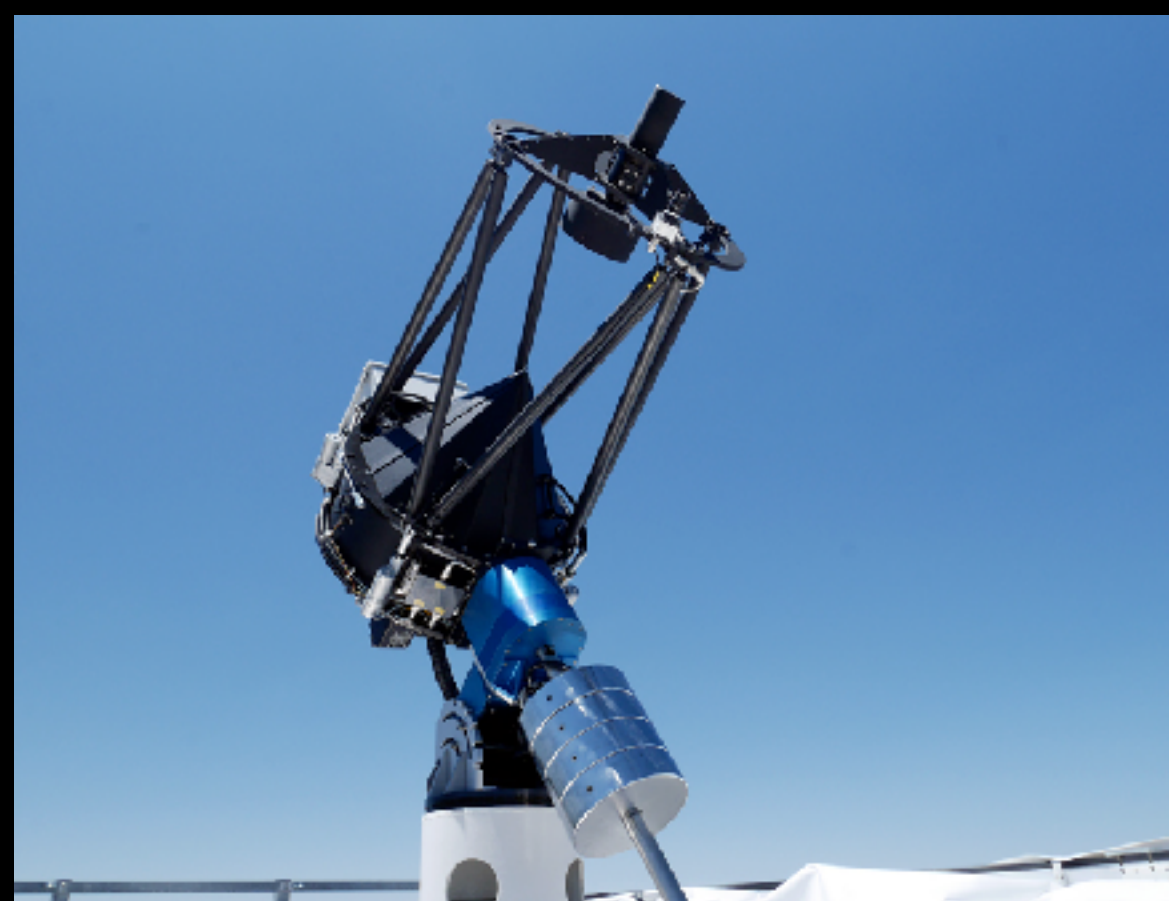
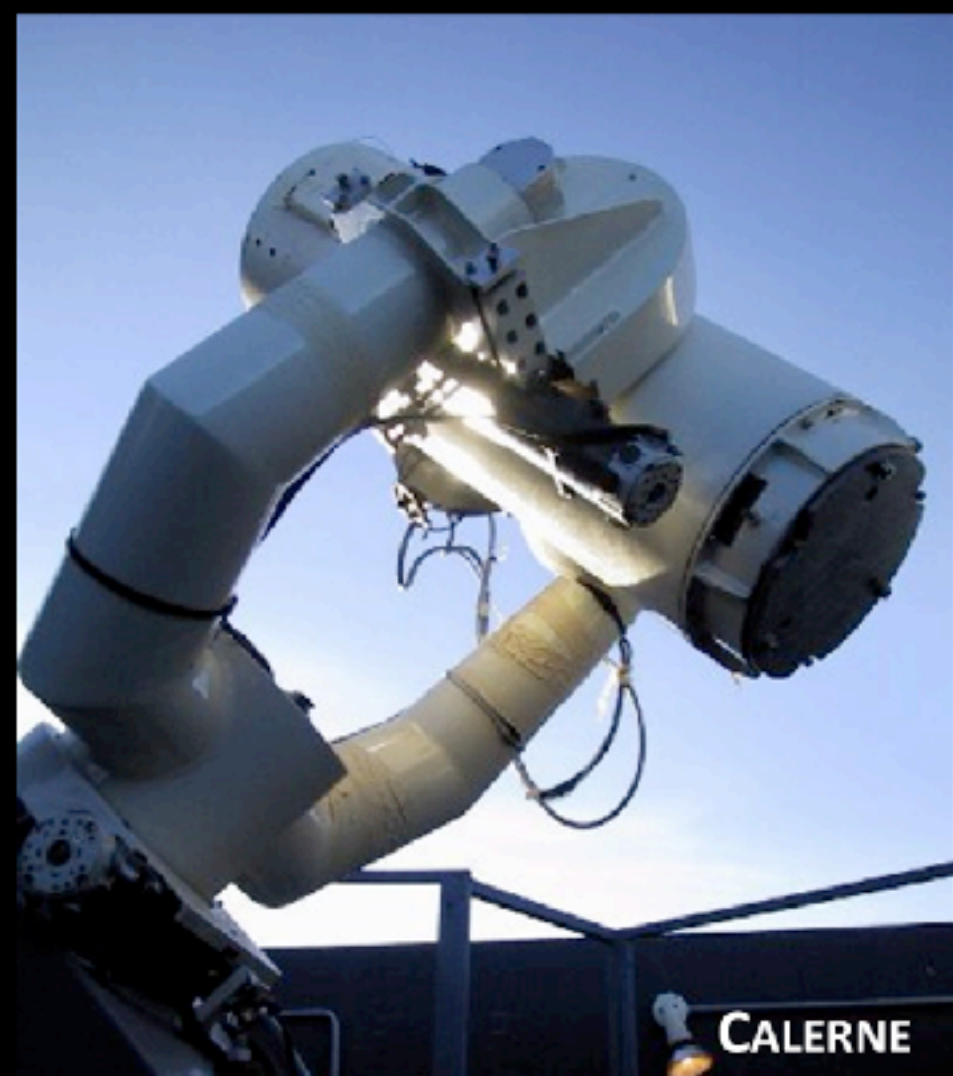- Margarita Pereyra

- Camila Angulo

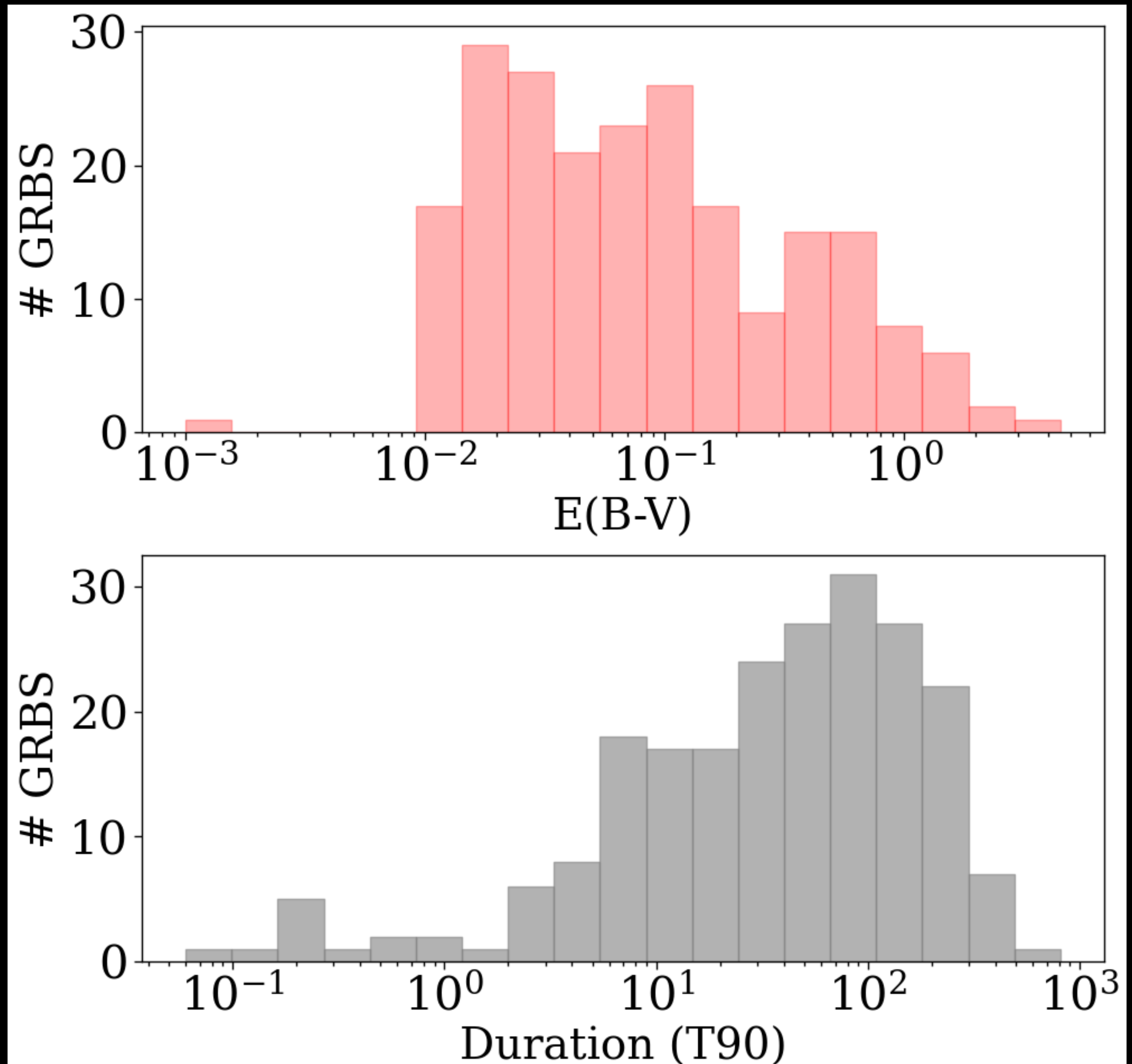+TAROT

+RATIR

+COATLI

What is a Gamma-Ray Burst?

Our current toys :)
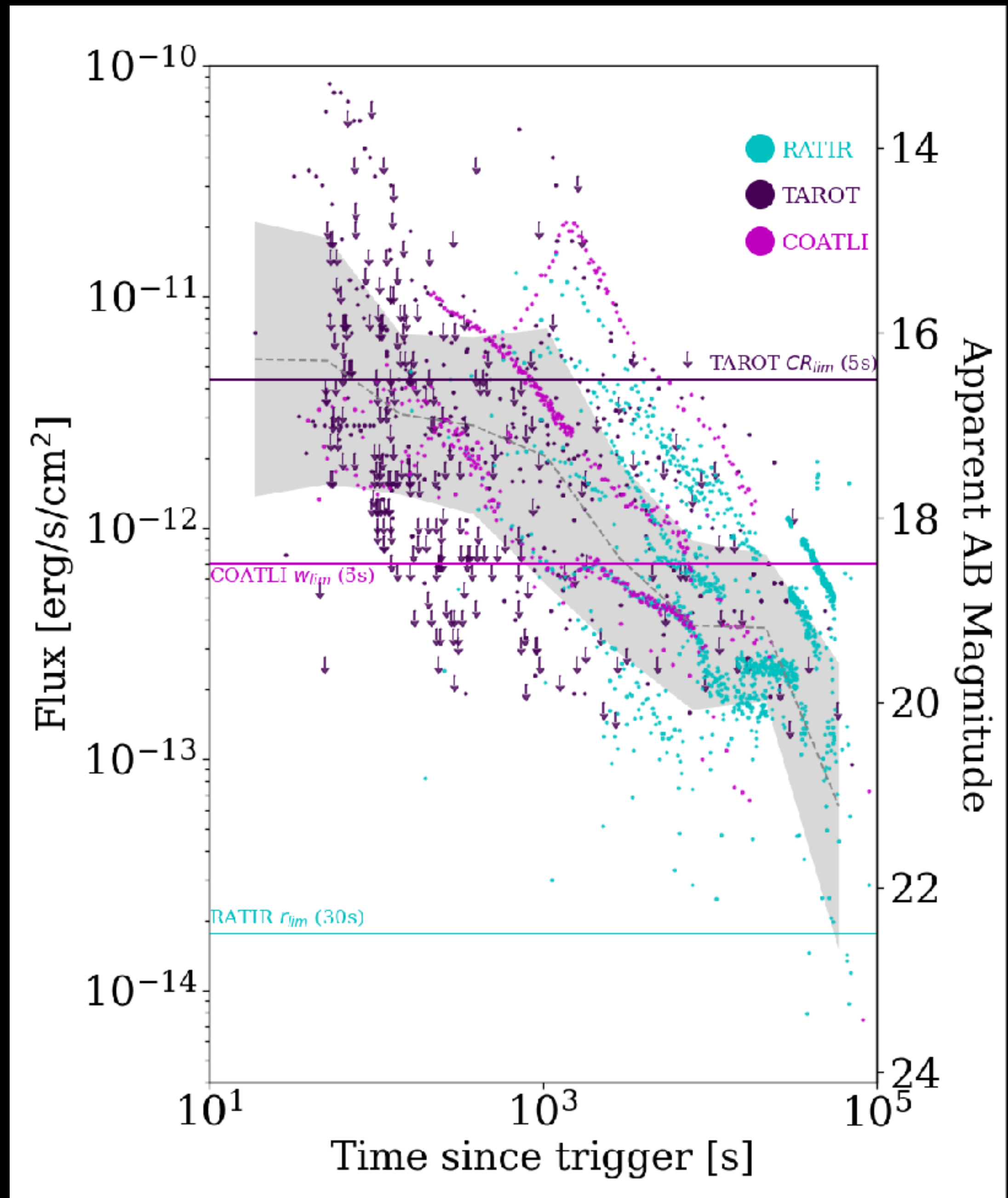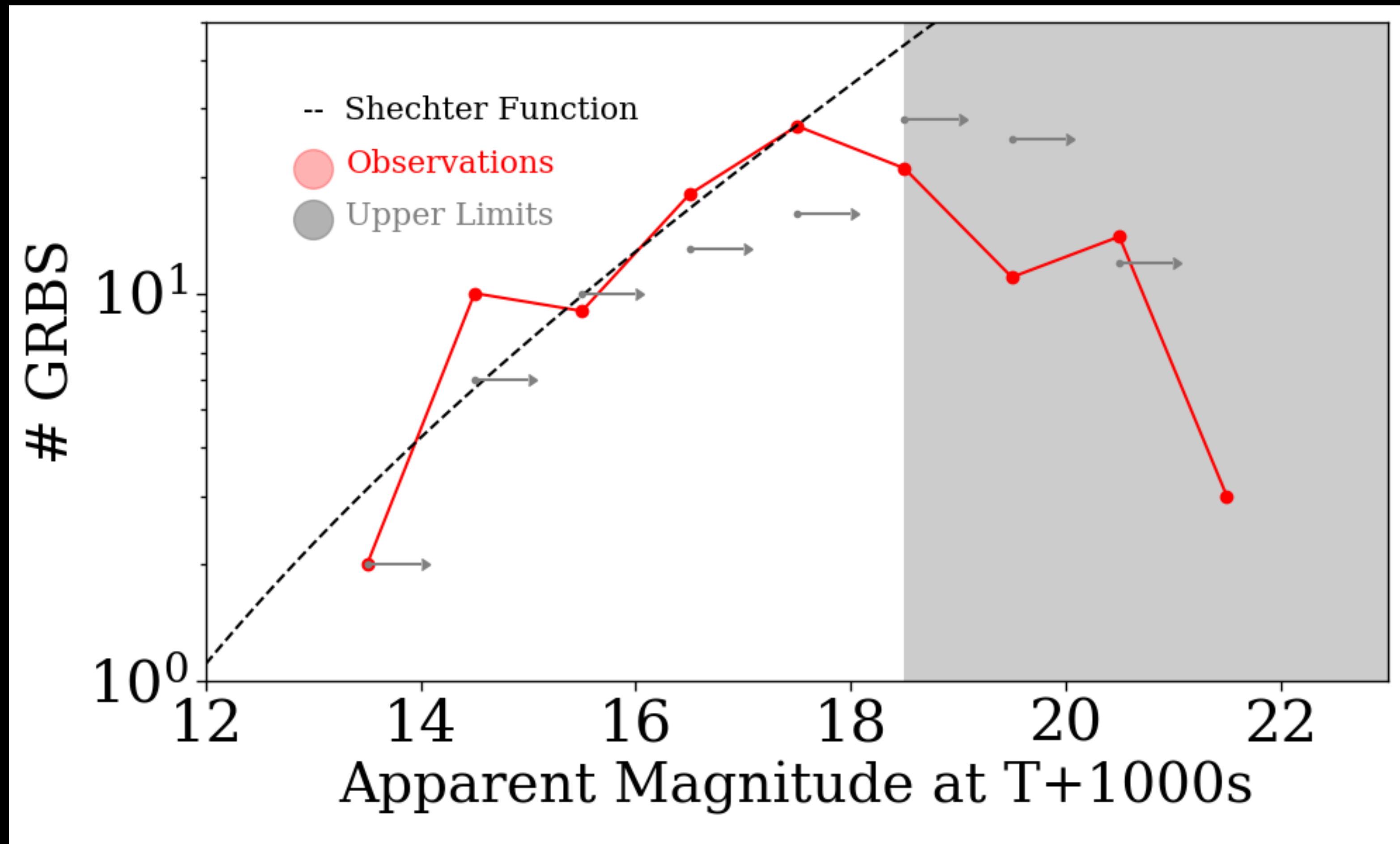
Our sample

- 224 GRBs

- R/r/w data

- Duration (T90)

- Redding values

In the observer frame

Becerra et al. 2023b (in prep.)
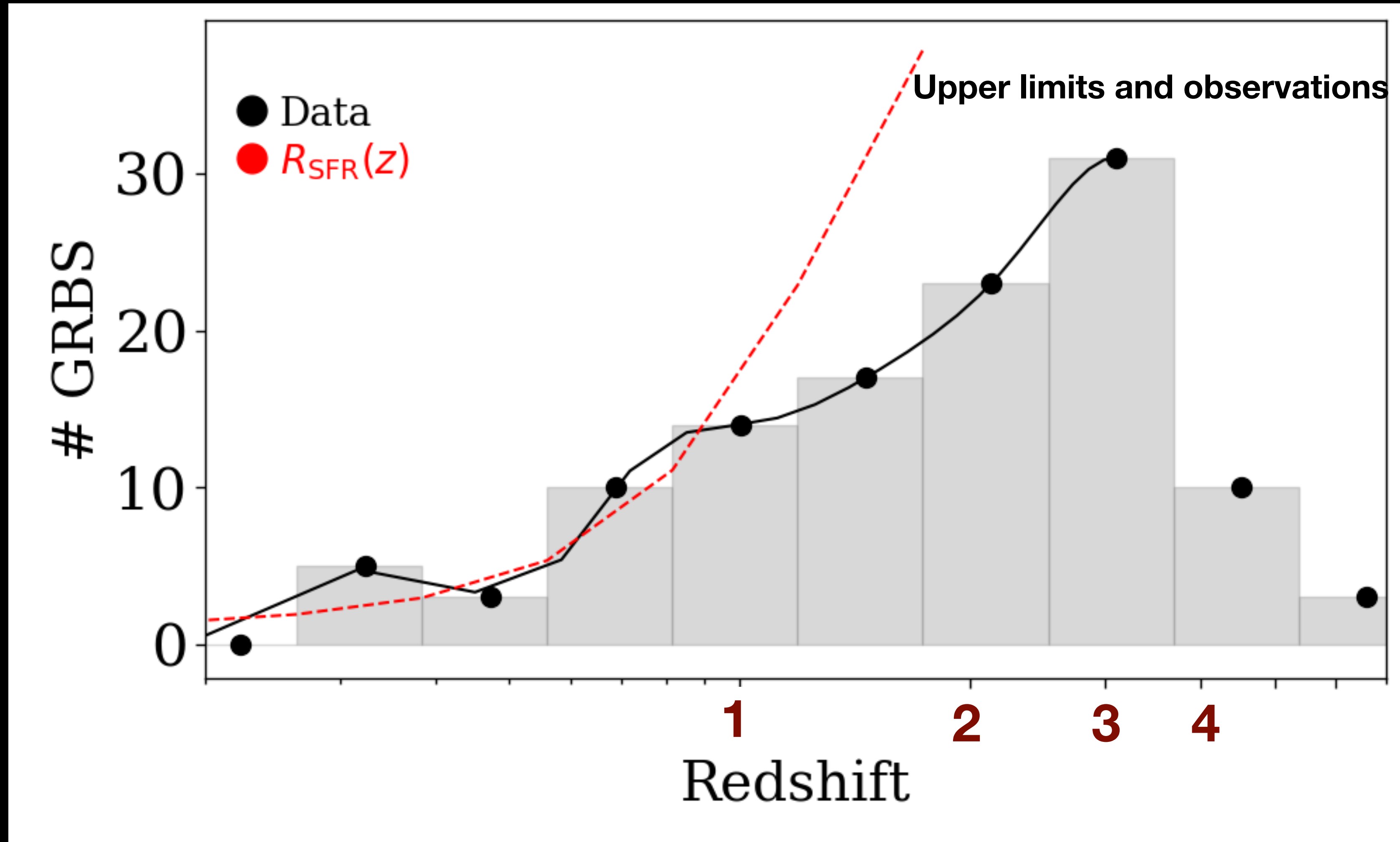
Luminosity Function

- For observers: what is the bright of GRBs found with these facilities

Apparent Magnitudes at T+1000 s after the trigger

Redshift distribution

Upper limits and observations

Legend:
● Data
● $R_{SFR}(z)$
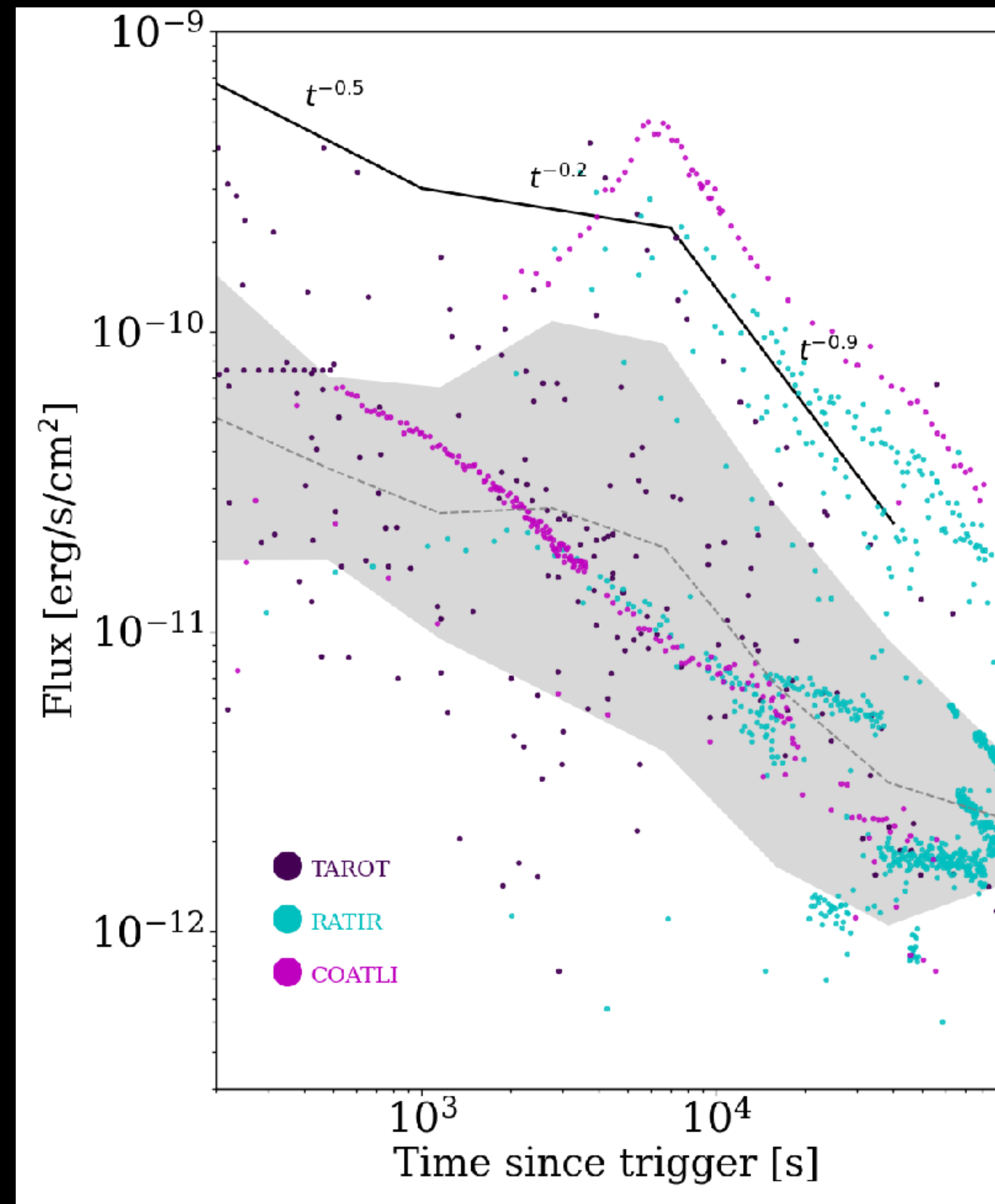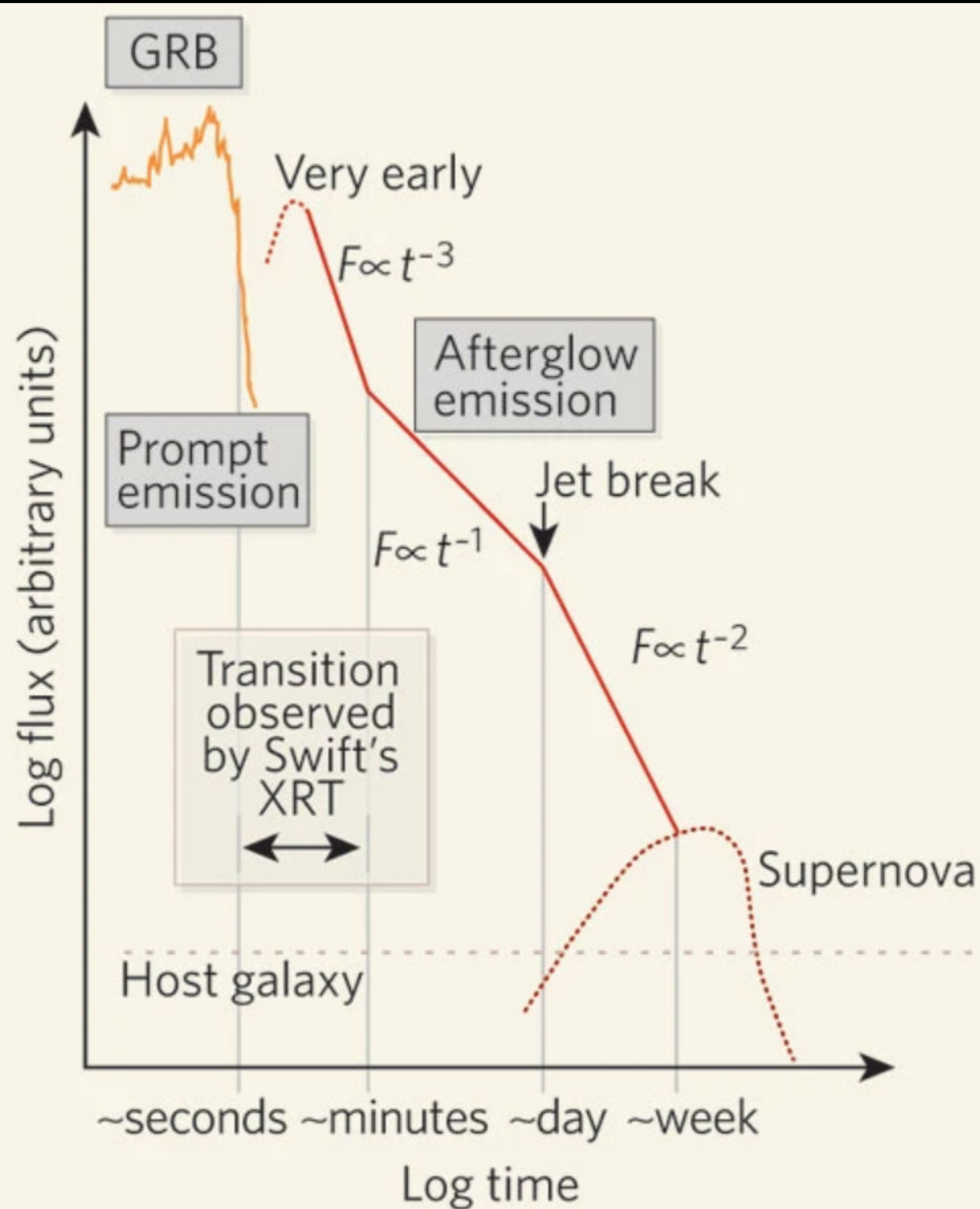
- What is the rate of GRBs?

Histogram of redshift distribution 52% of our sample. Detections and upper limits

Rest frame

Becerra et al. 2023b (in prep.)

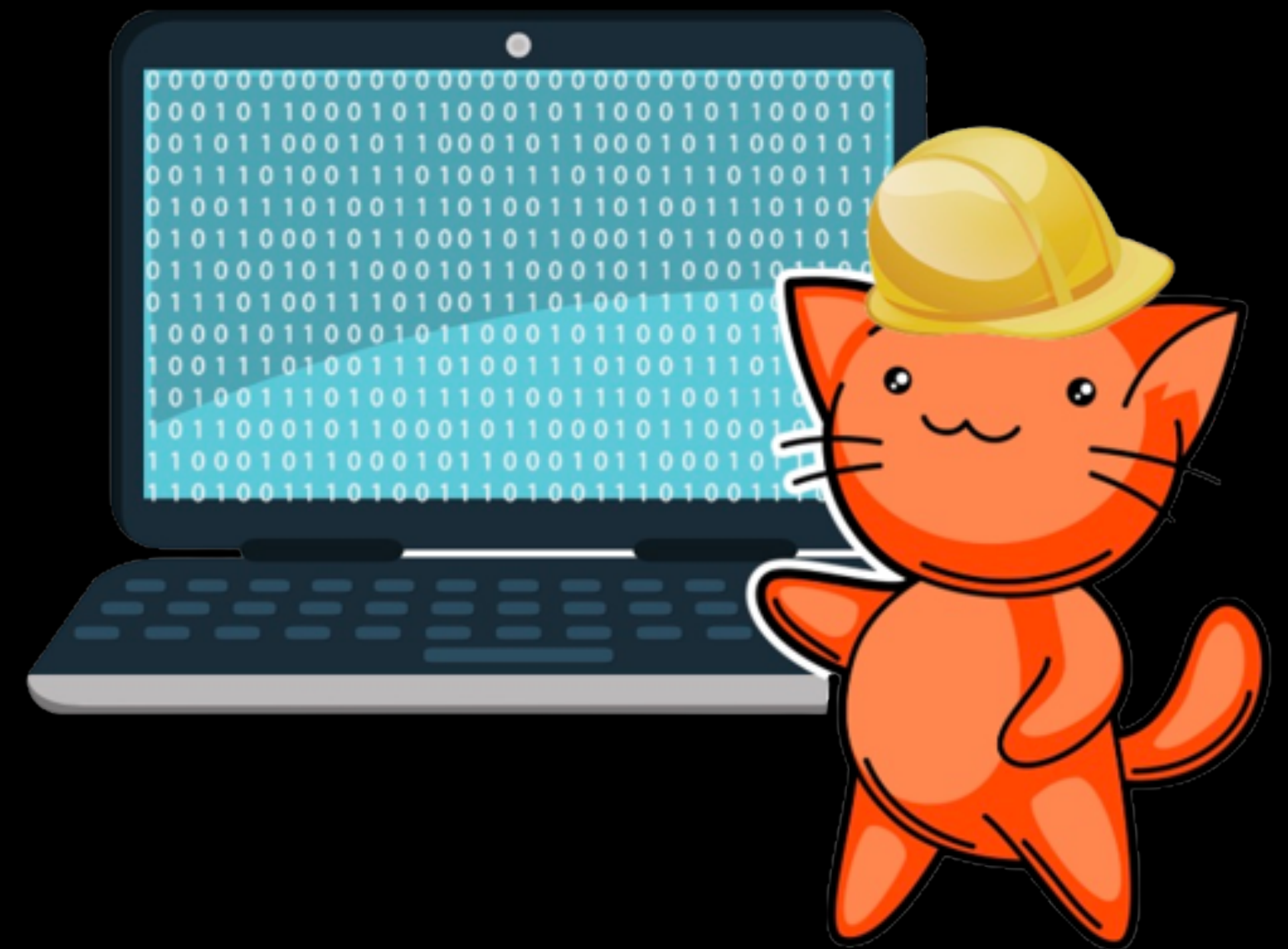# We were constraint to:

Brightness

Distance (near)

Plan for the arrival of SVOM-COLIBRÍ?

- SVOM trigger

- Follow-up by COLIBRÍ & others

Plan for the arrival of SVOM-COLIBRÍ?

- Let's take advantage of the technology

- Use all the data bases that we have

- Machine Learning

Plan for the arrival of SVOM-COLIBRÍ?

**See Keneth's presentation in a couple of hours
ClassiPyGRB**

- Analysis of gamma-ray light curves from SVOM using ML

- Comparison in real time (BAT—> SVOM)
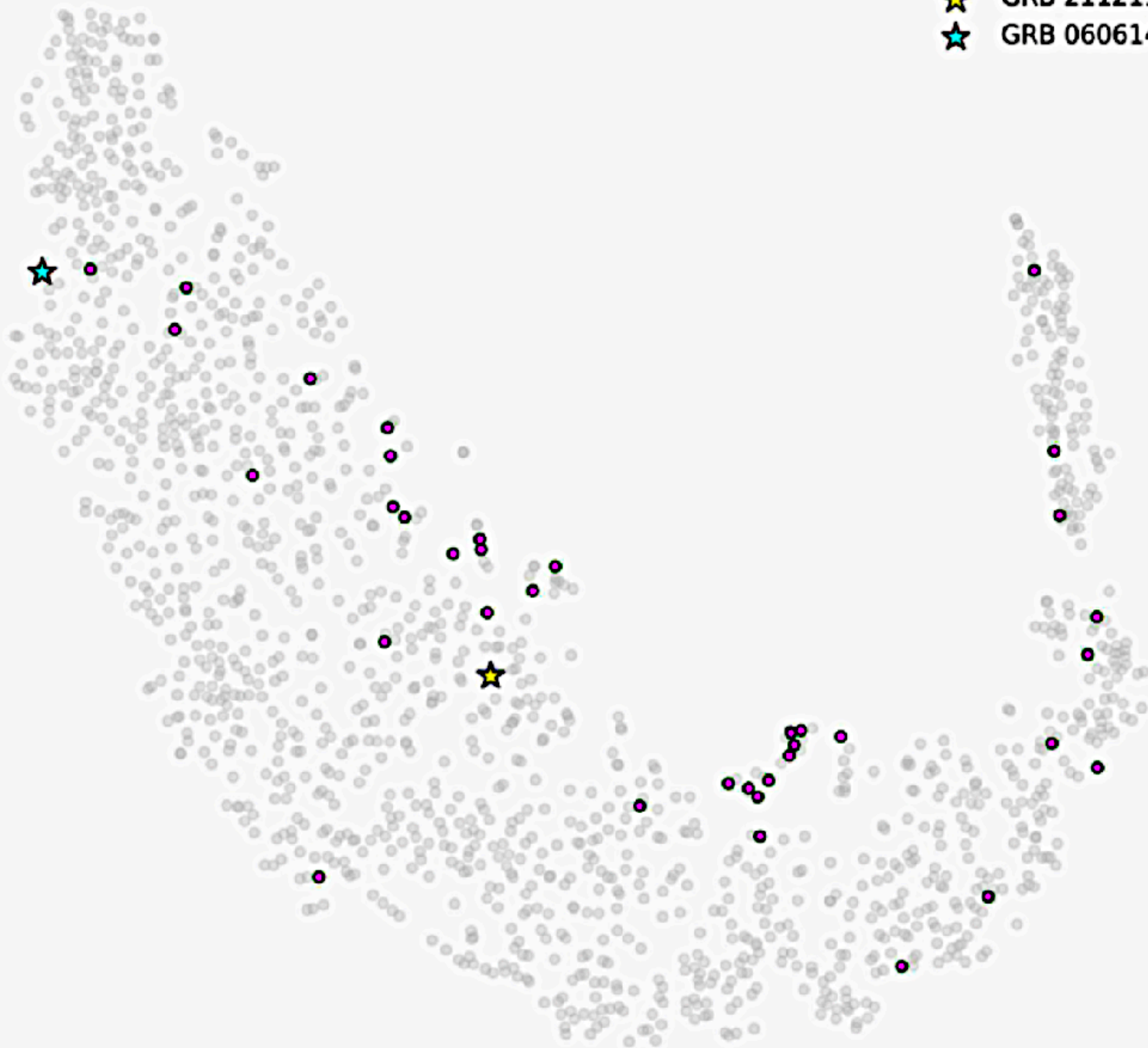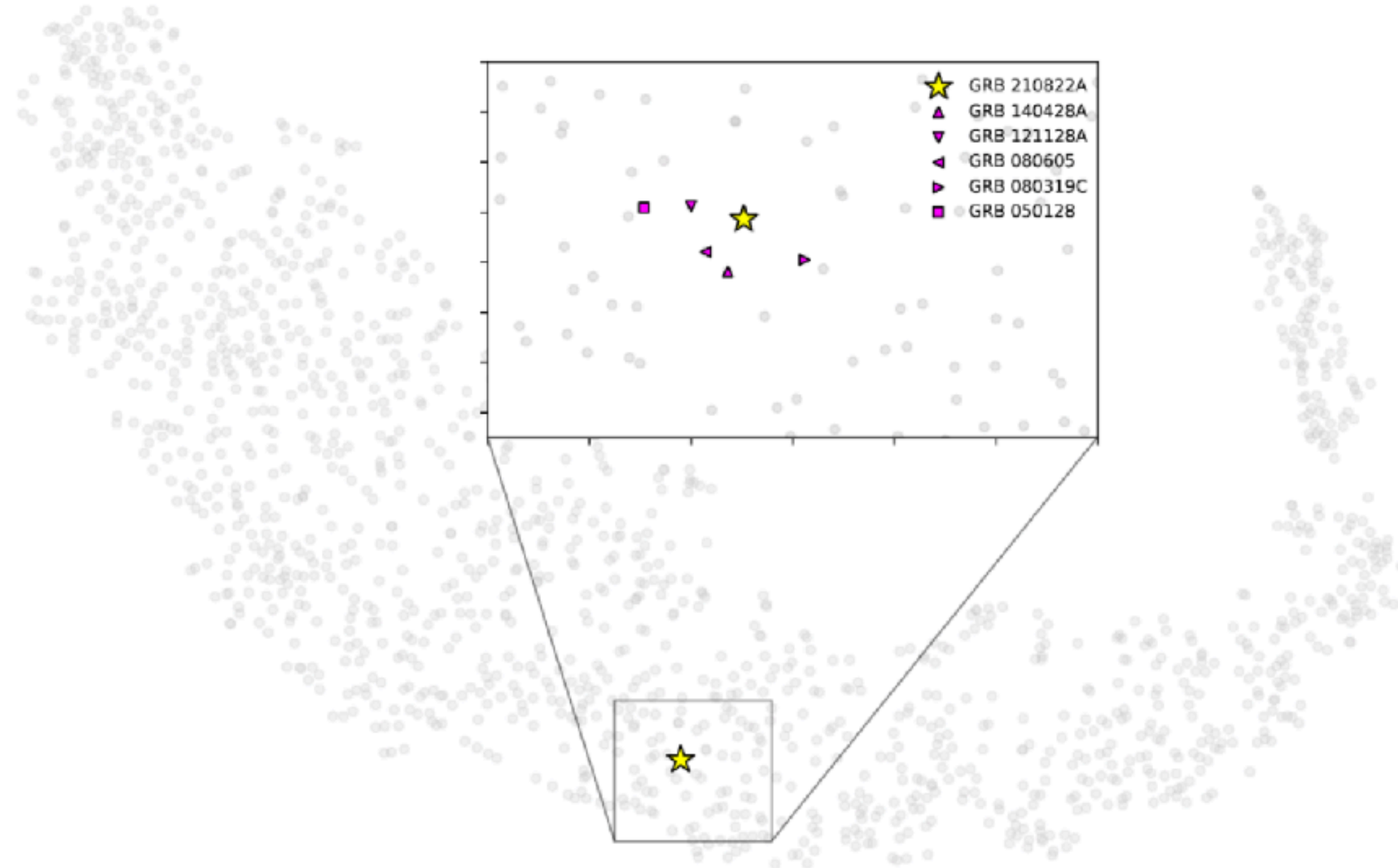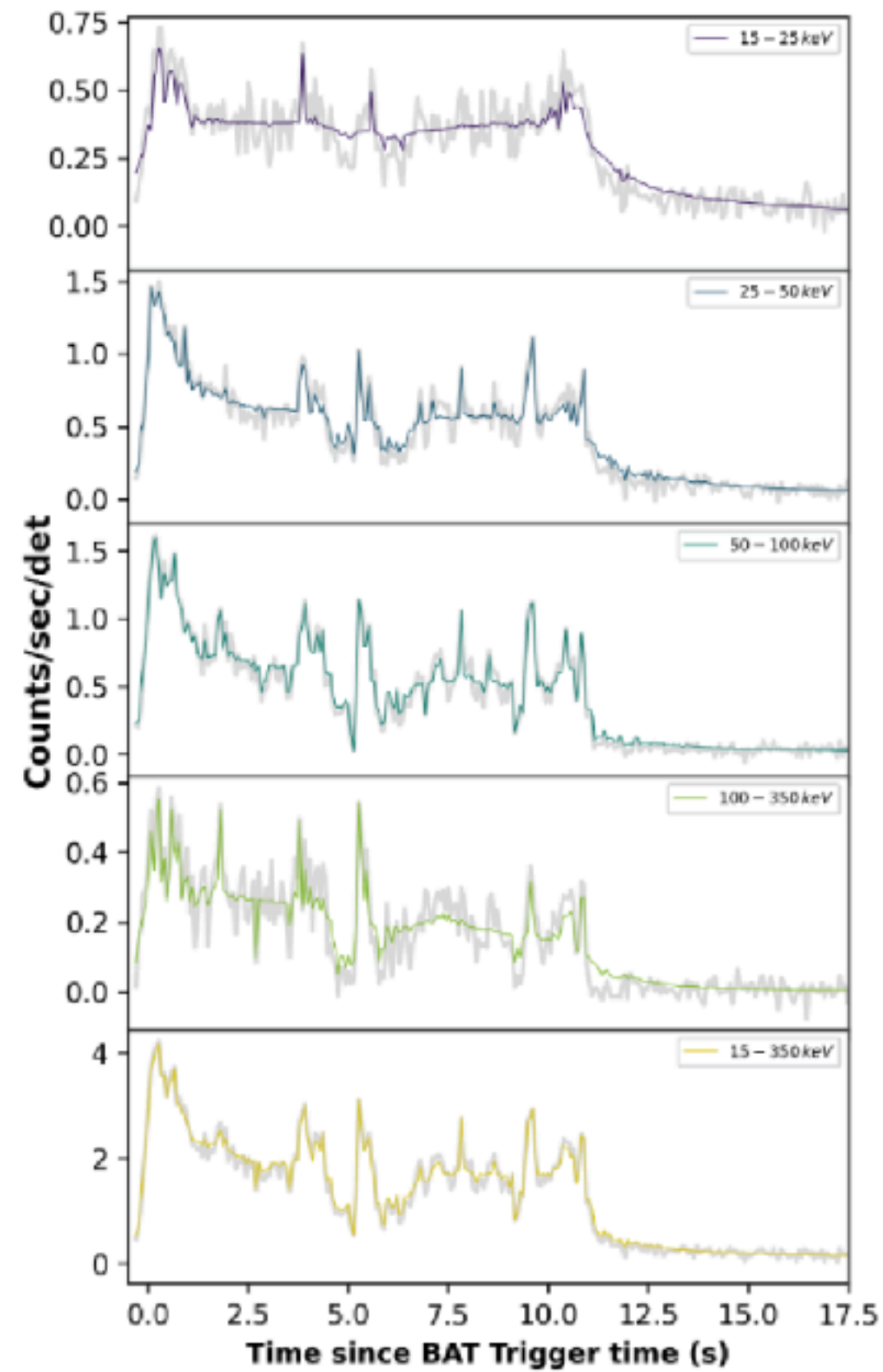
Example

- Identification of extended emission GRBs candidates by distance between other events.
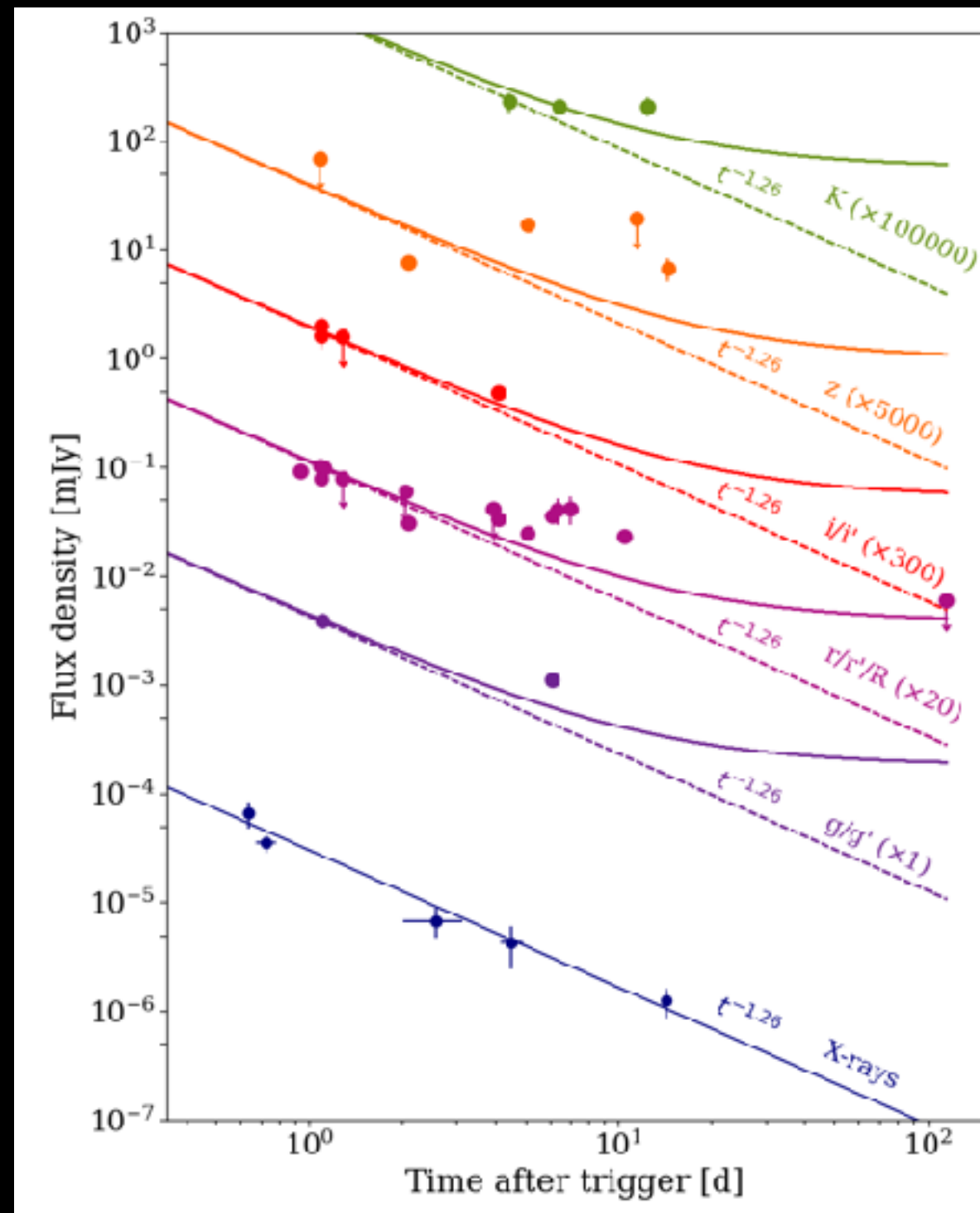
- Remove the human error of classification

Garcia-Cifuentes et al. 2023

Plan for the arrival of SVOM-COLIBRÍ?

Angulo-Valdez et al. 2023 (in prep)

- Mapping every event we find similarities

Interesting sources

GRB 210704A
Exotic origin
Ambigús classification

Becerra et al. 2023a
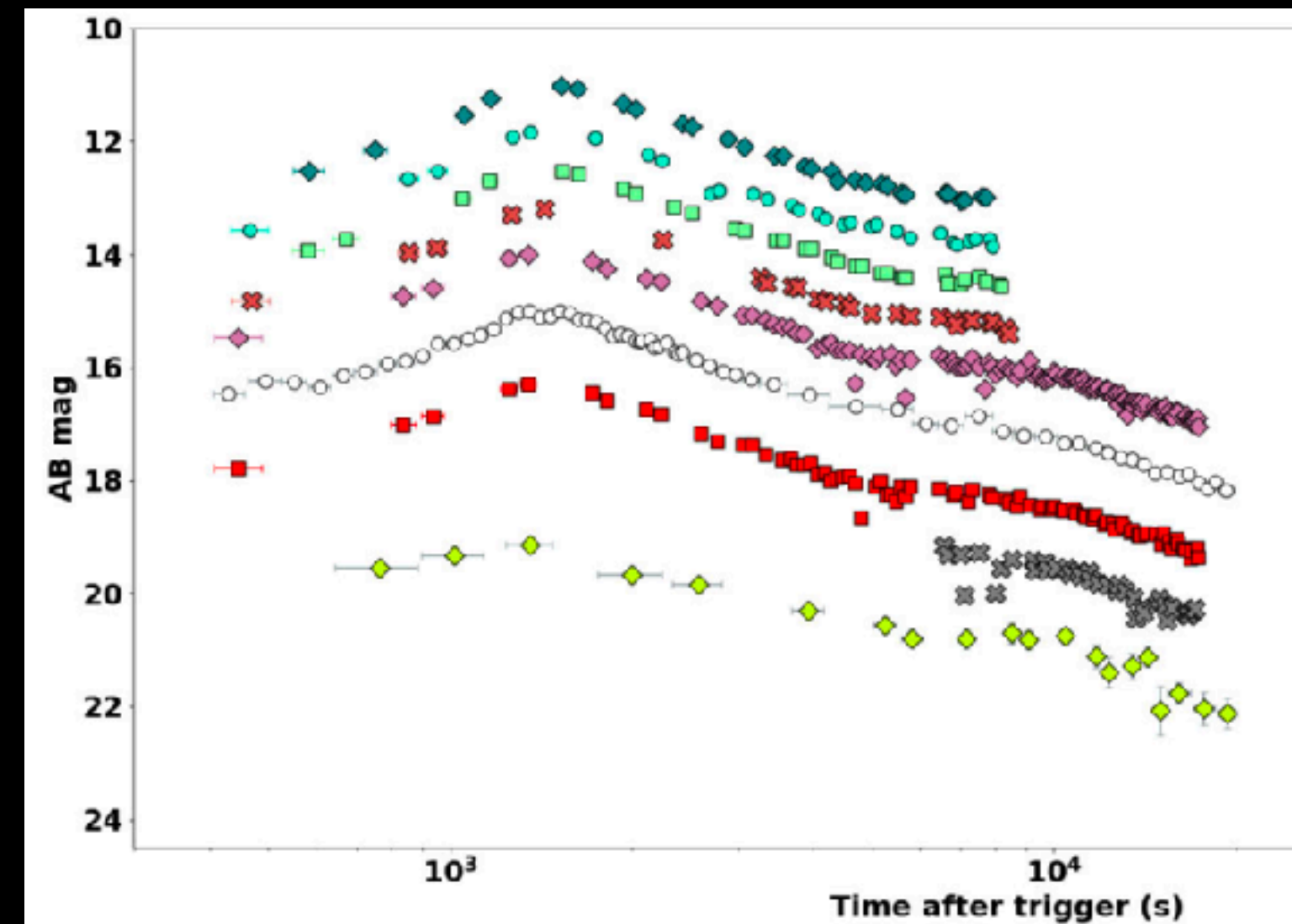
GRB 191016A
Very long late central activity

Pereyra et al. 2022
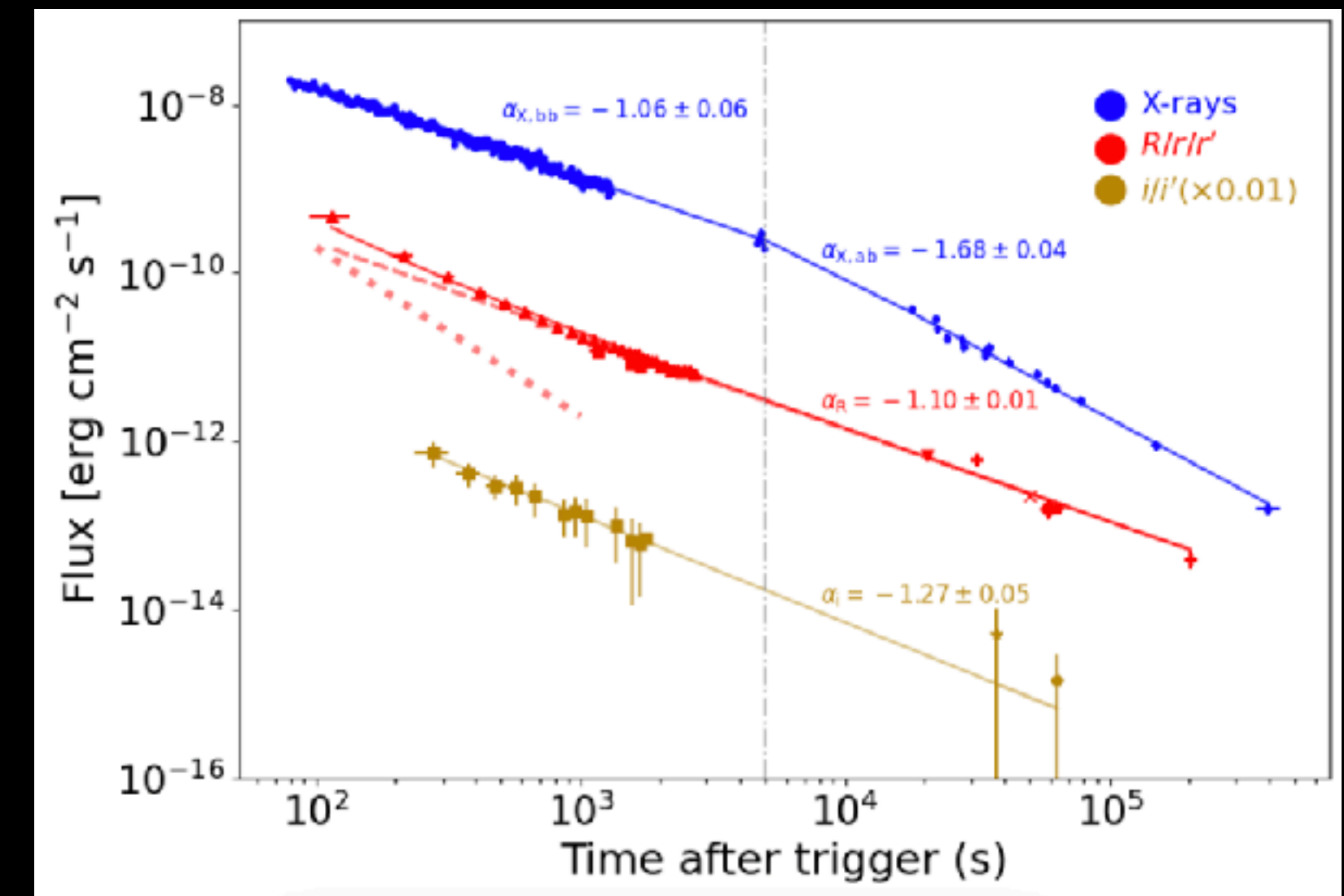
GRB 210704A
Very luminous event
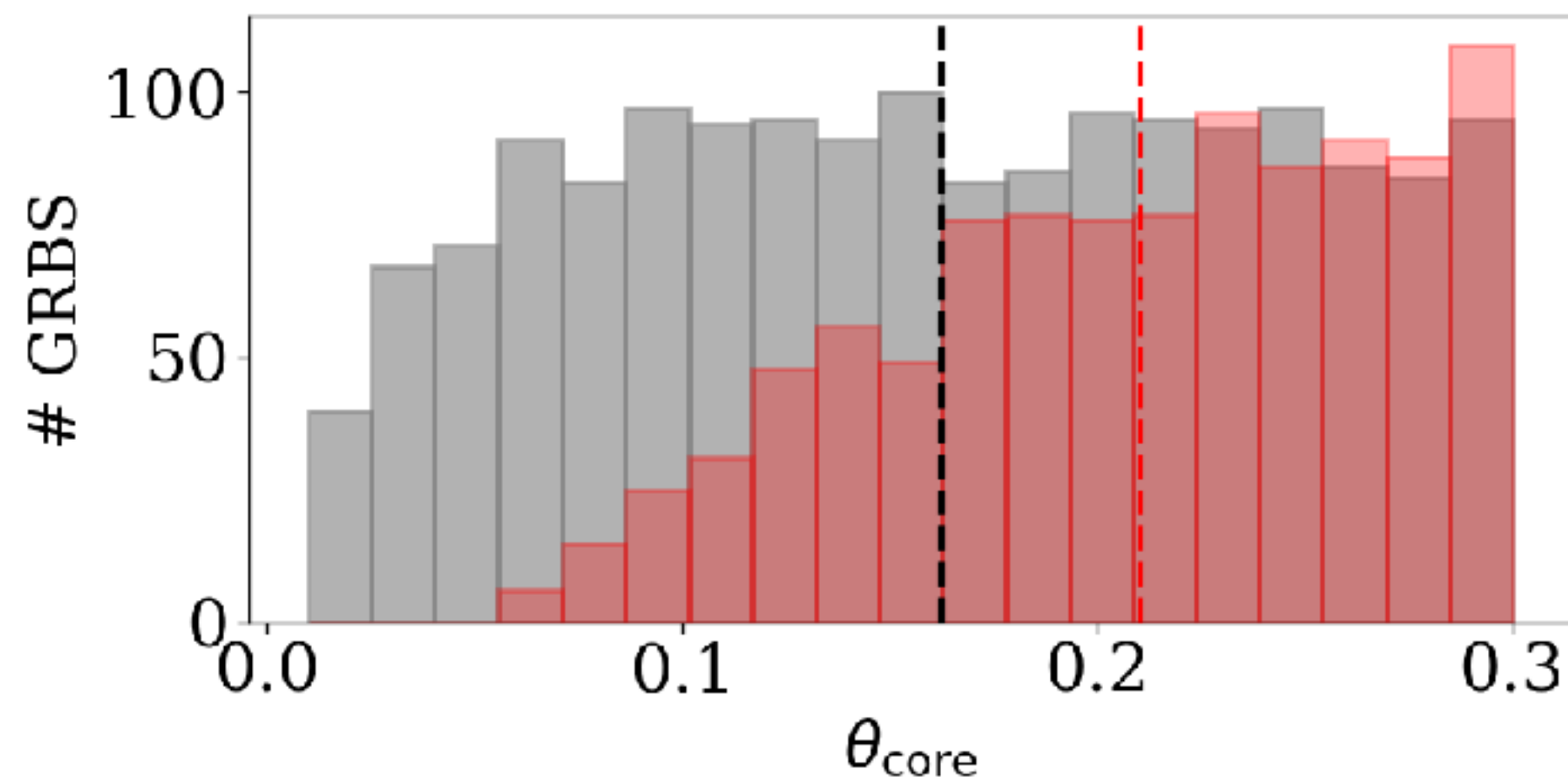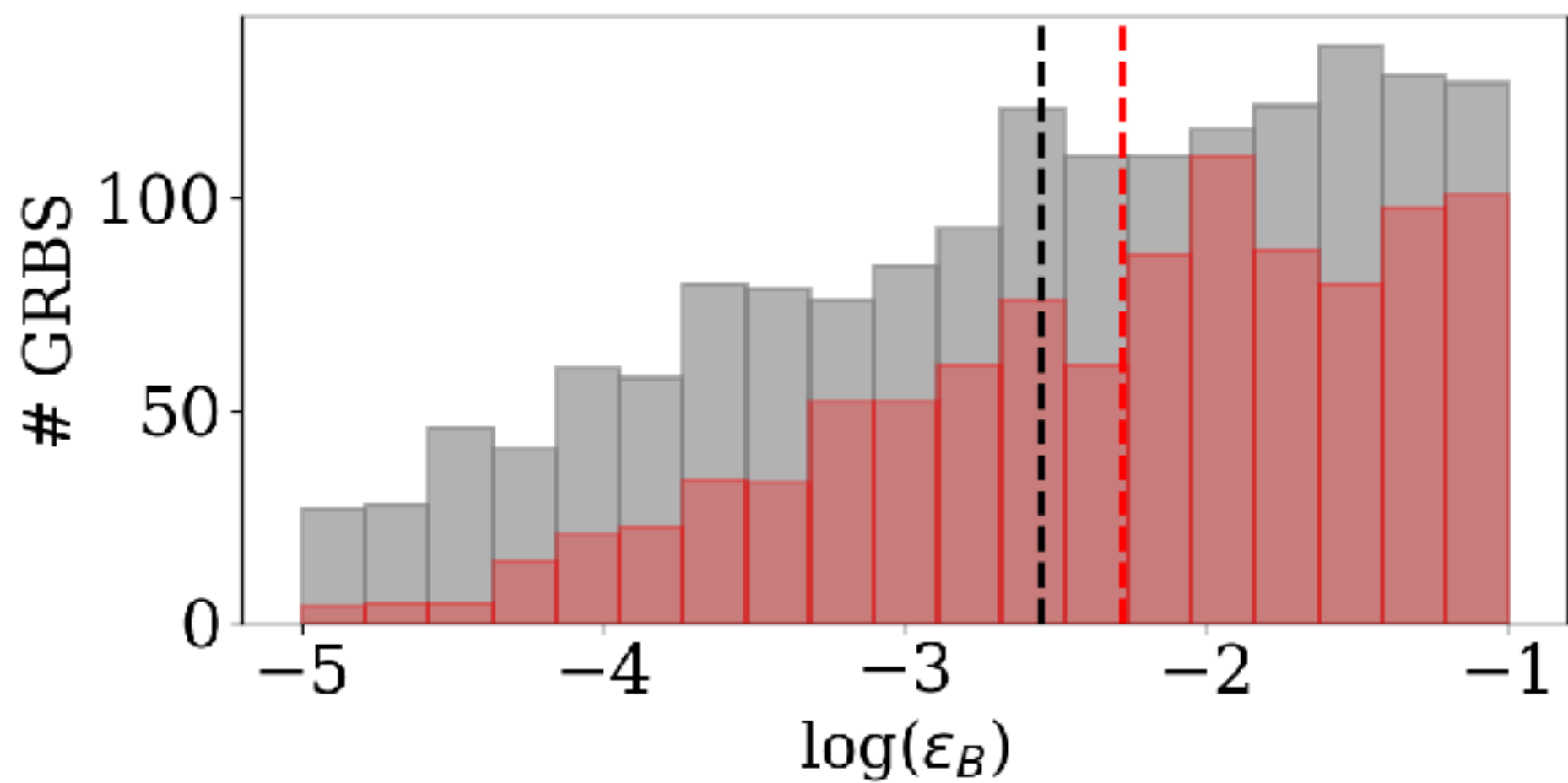**Reverse shock component**

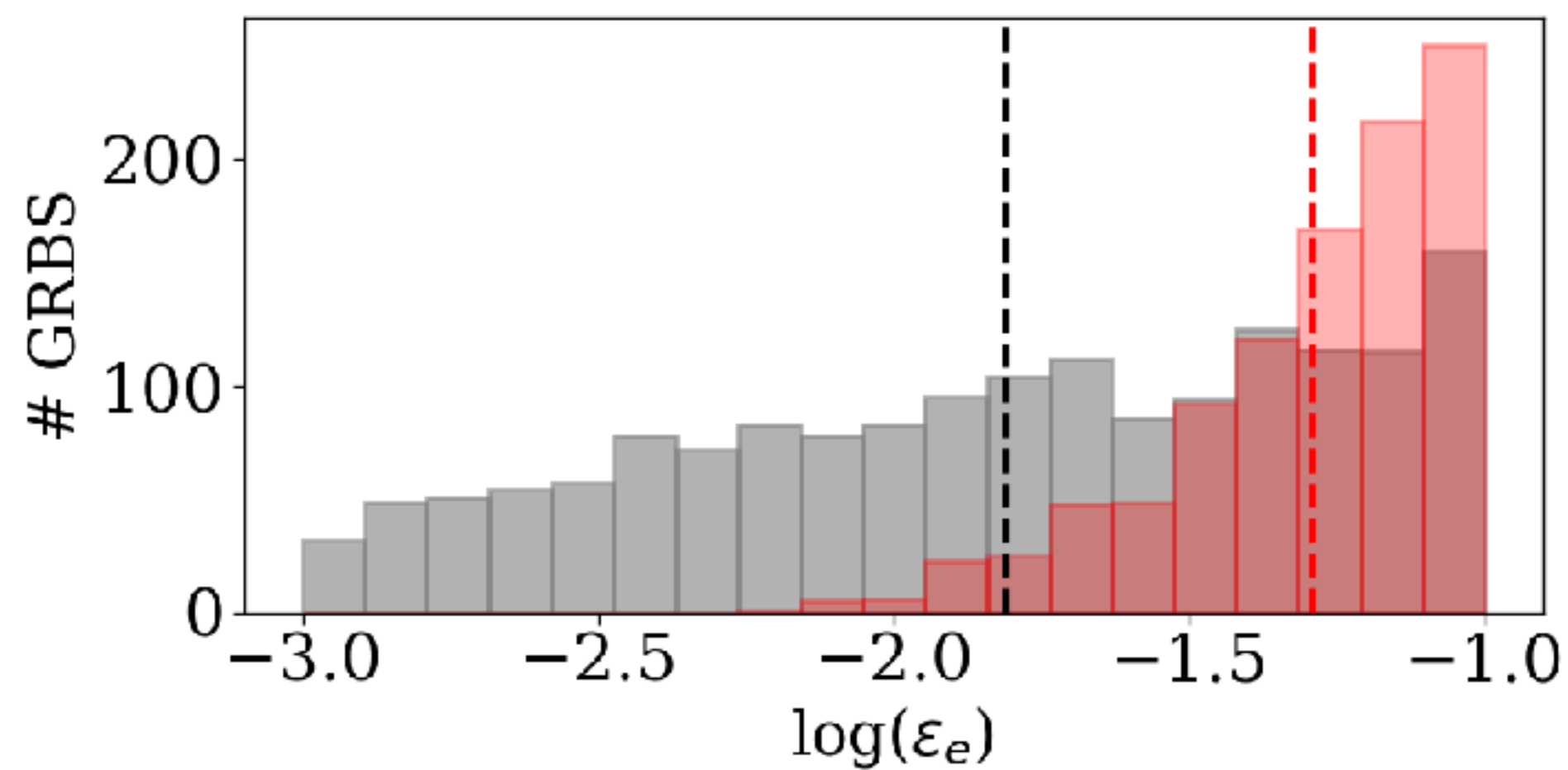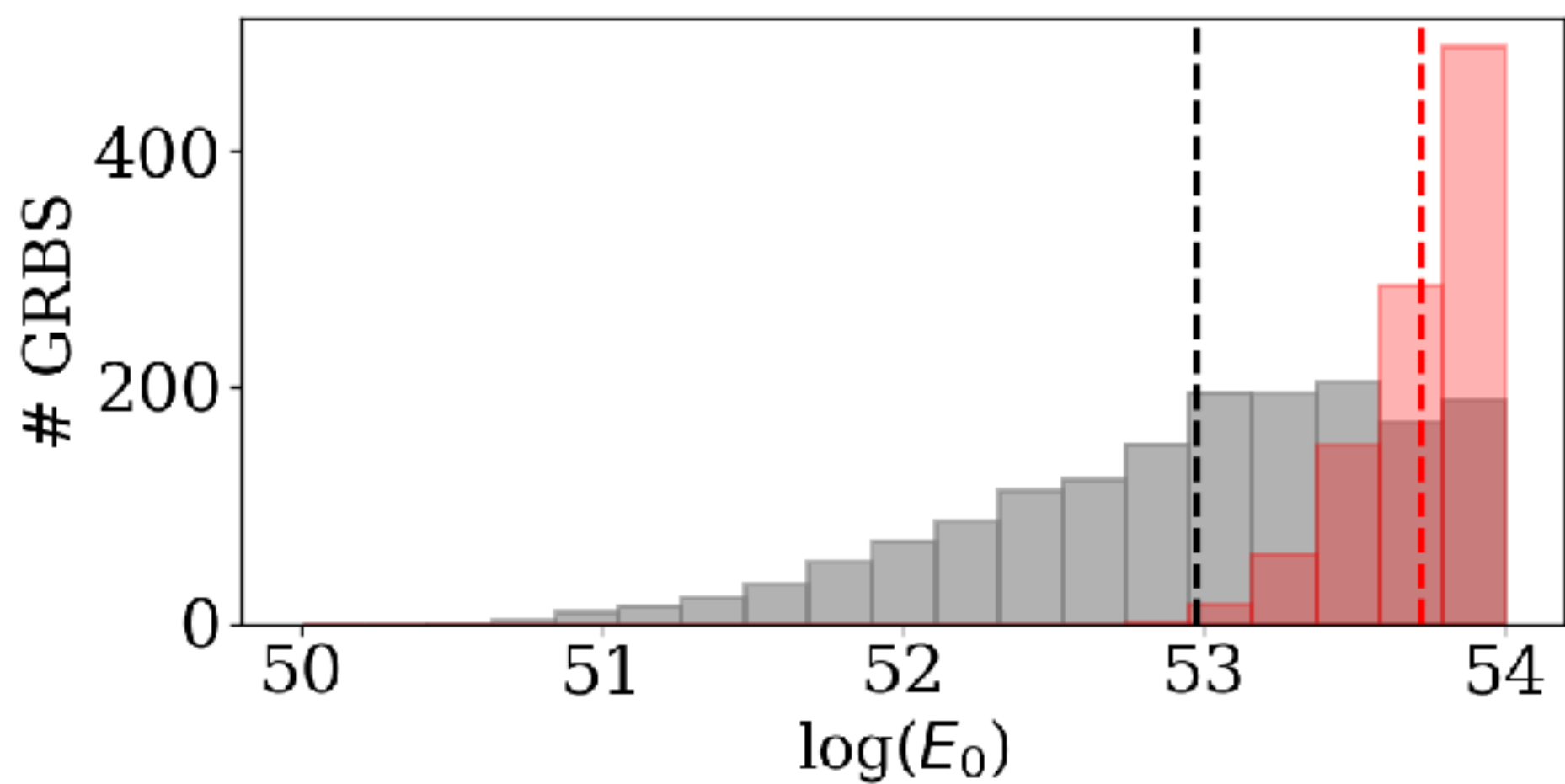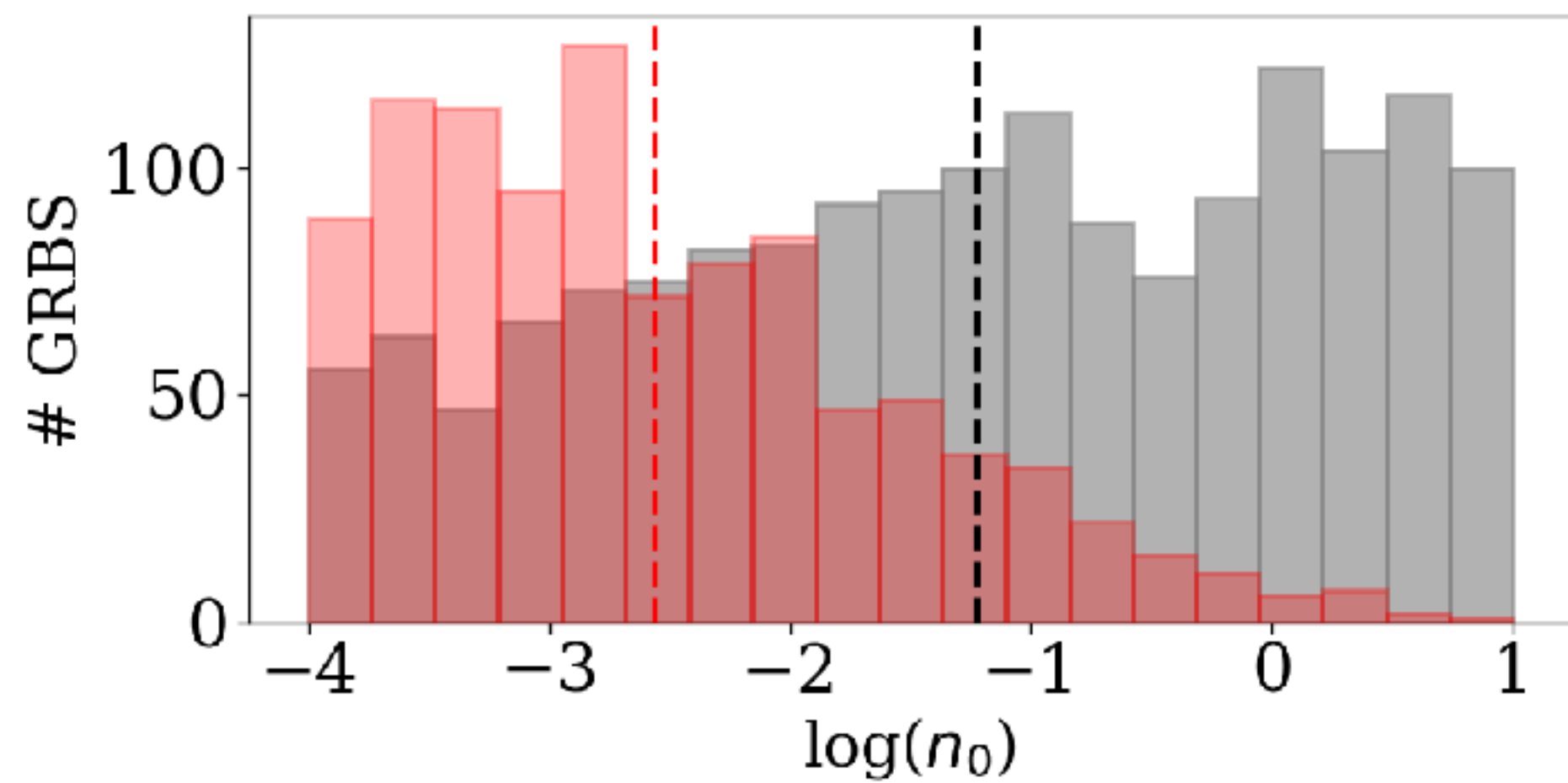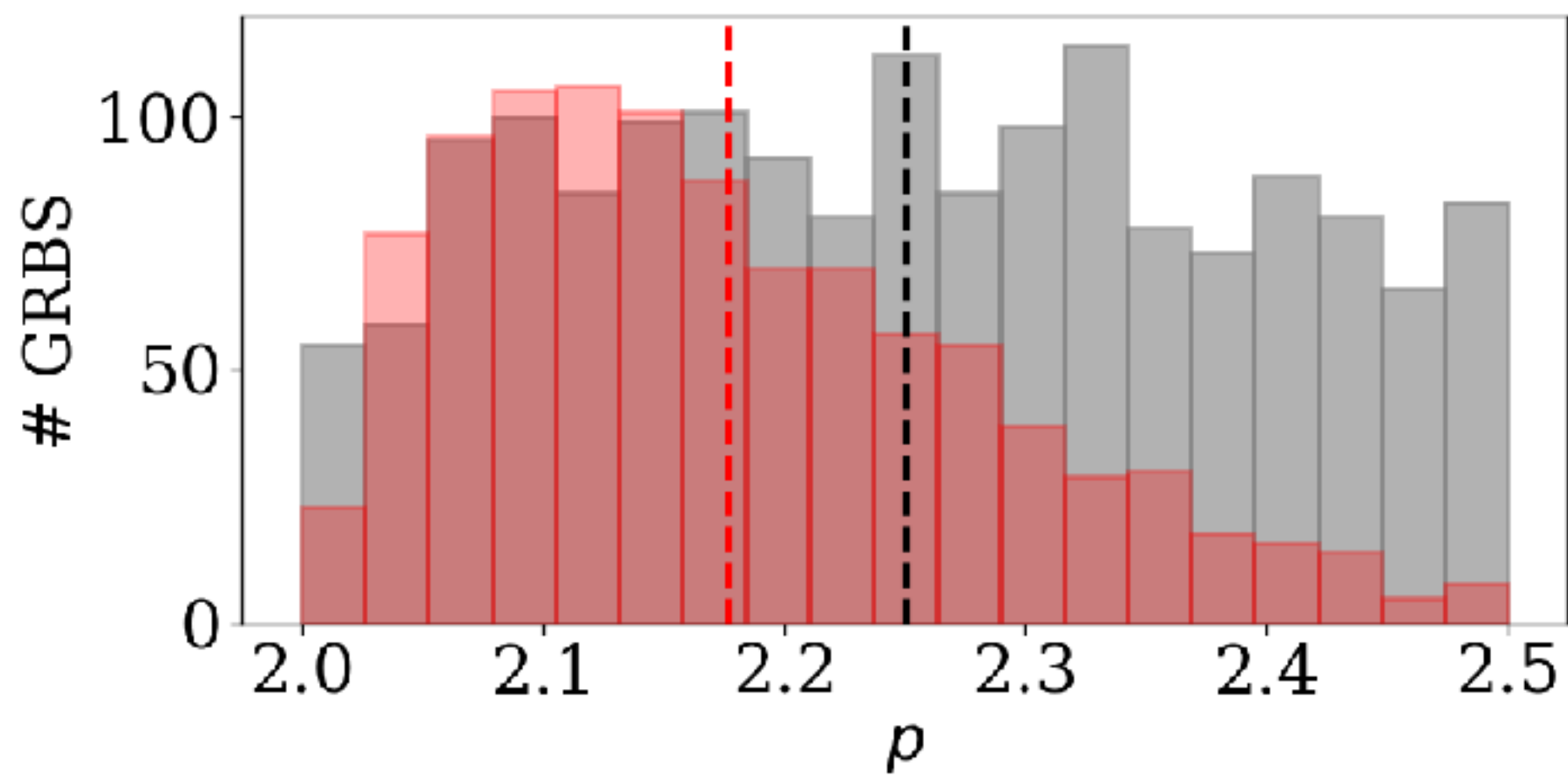**Angulo-Valdez et al. 2023 (in prep.)**

Plan for the arrival of SVOM-COLIBRÍ?

- Photometric analysis

- AFTERGLOWPY fit within the *Fireball Model*

M.Sc. Thesis: Analysis of optical photometry of GRBs

- What are the best set of parameters to describe a GRB?

Plan

- Trigger by SVOM

- Analysis of prompt emission (gamma-ray light curve) comparing with BAT

- Identification of similar events.

- Is this relevant?

- Determination of follow-up with other facilities (GTC/Chandra/LDT/Gemini/Suba

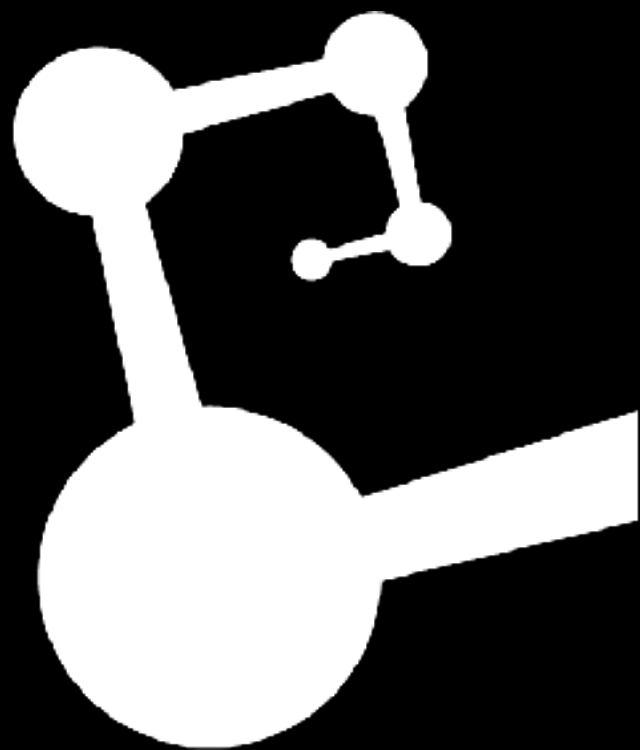- Characterization/analysis of specific GRBs

- Dark GRBs
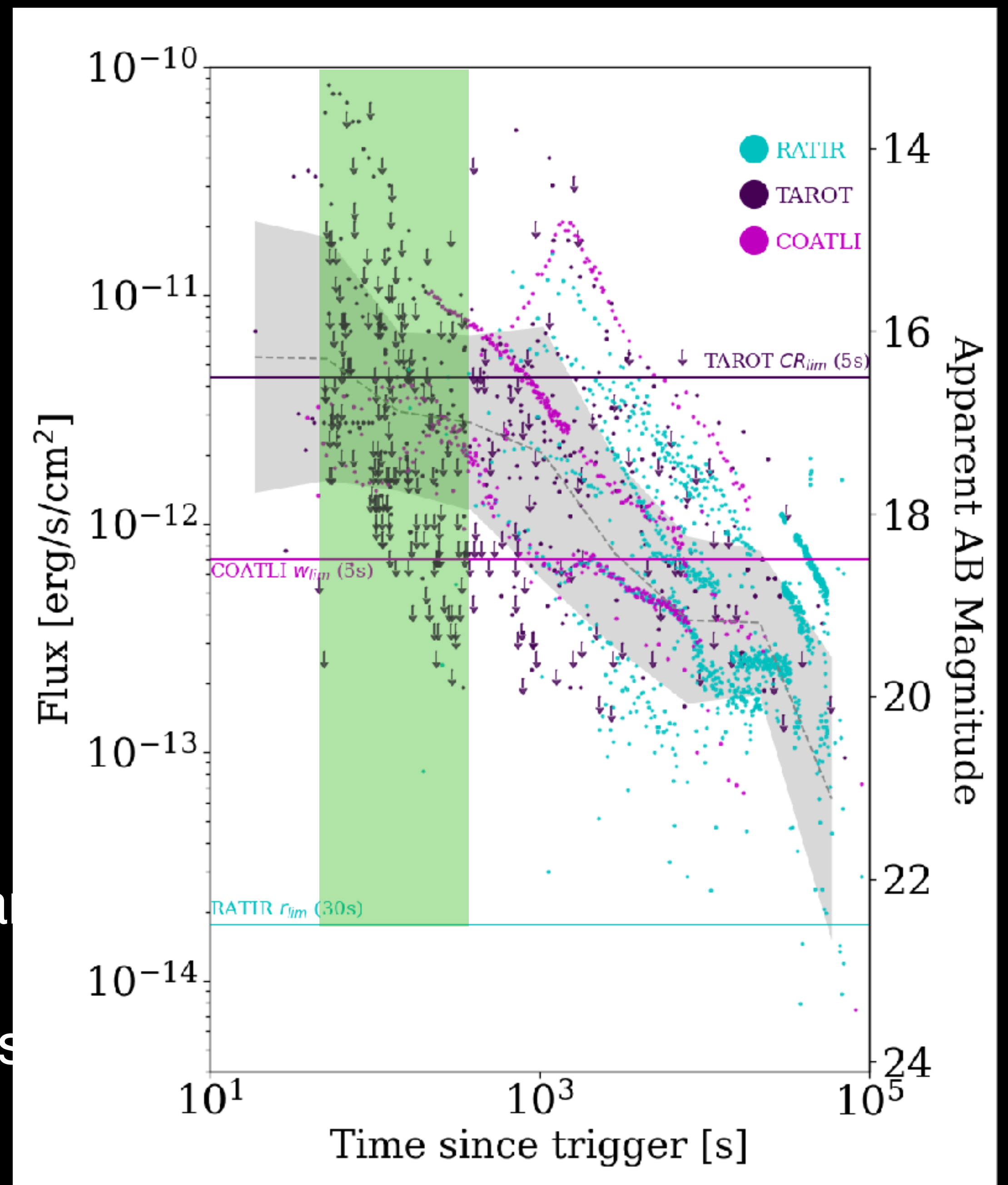
Thanks for your attention

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