



cherenkov  
telescope  
array

# GRB studies with the Cherenkov Telescope Array

## The POSYTIVE\* approach

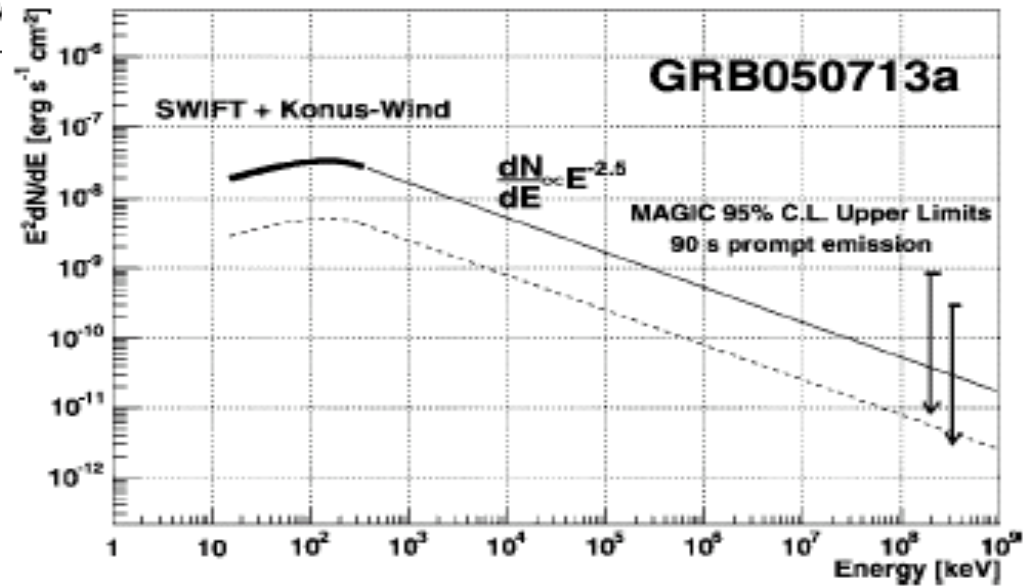
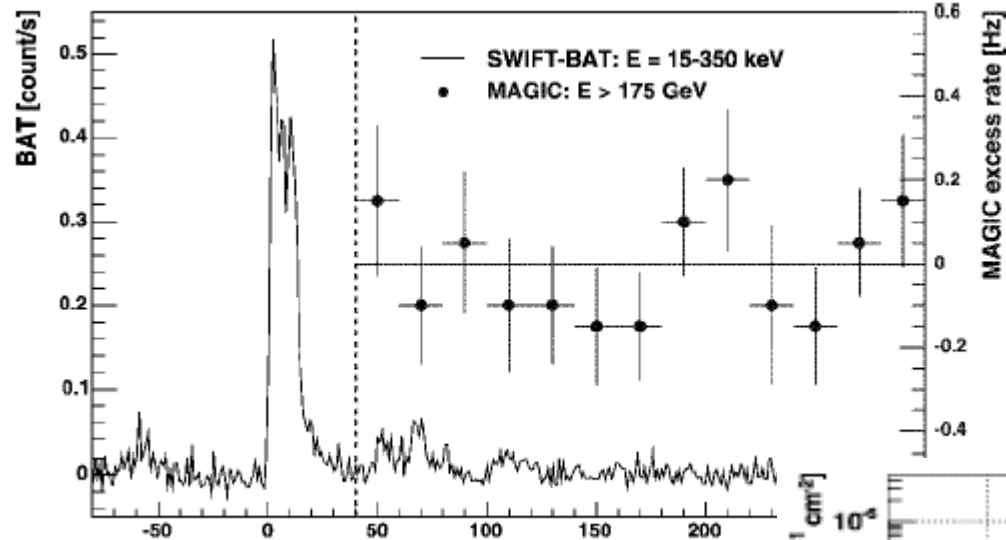
**Francesco Longo (Trieste)**

**on behalf of Ž. Bošnjak, G.Ghirlanda, L.Nava, T.Stolarczyk  
and the CTA consortium<sup>+</sup>**

- The POpulation SYnthesis Theory Integrated project for Very high-energy Emission  
+ This work was conducted in the context of the CTA Consortium.

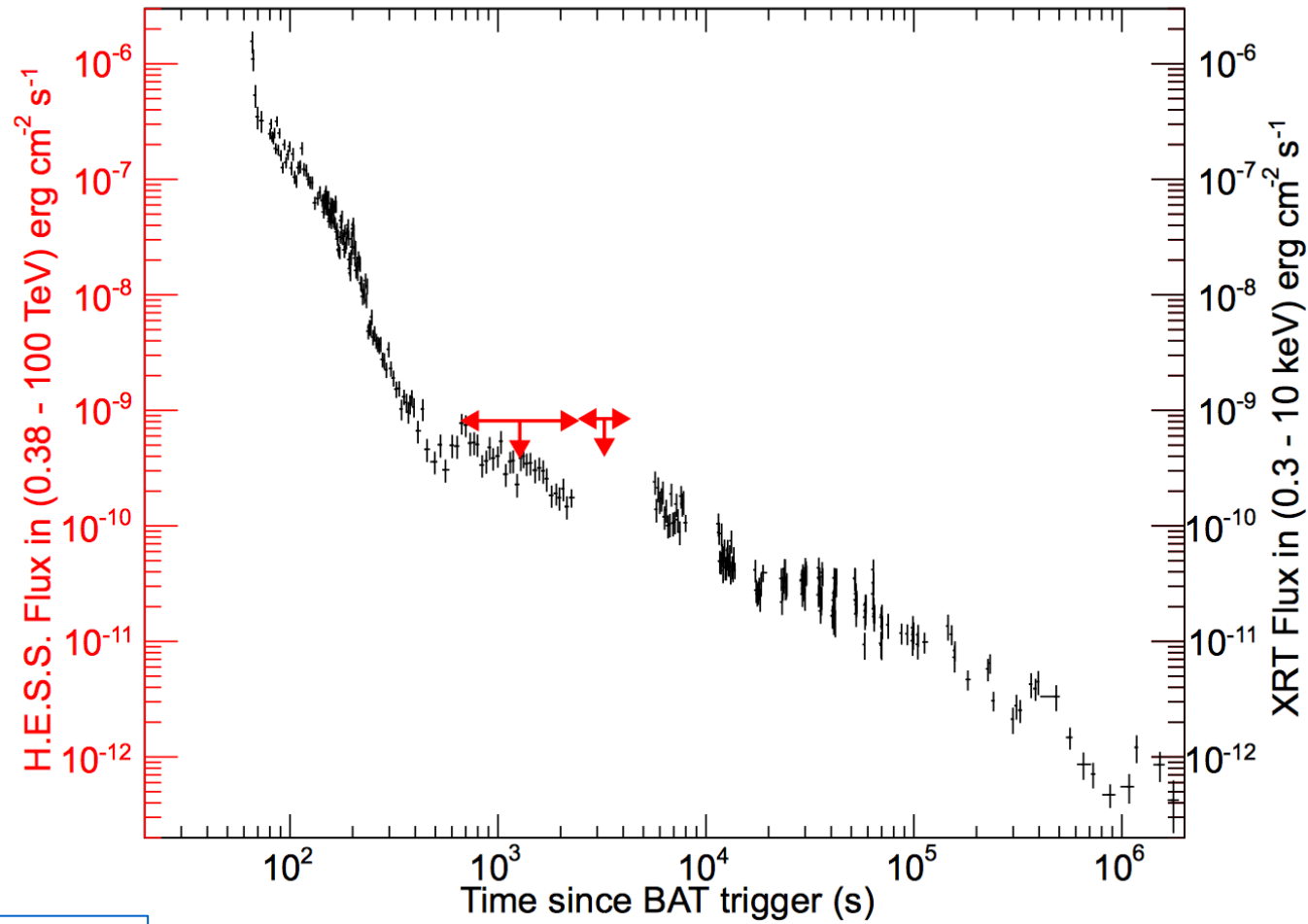
We gratefully acknowledge financial support from the agencies and organizations listed here:  
[http://www.cta-observatory.org/consortium\\_acknowledgments](http://www.cta-observatory.org/consortium_acknowledgments)

# MAGIC – I upper limits



Albert et al 2006

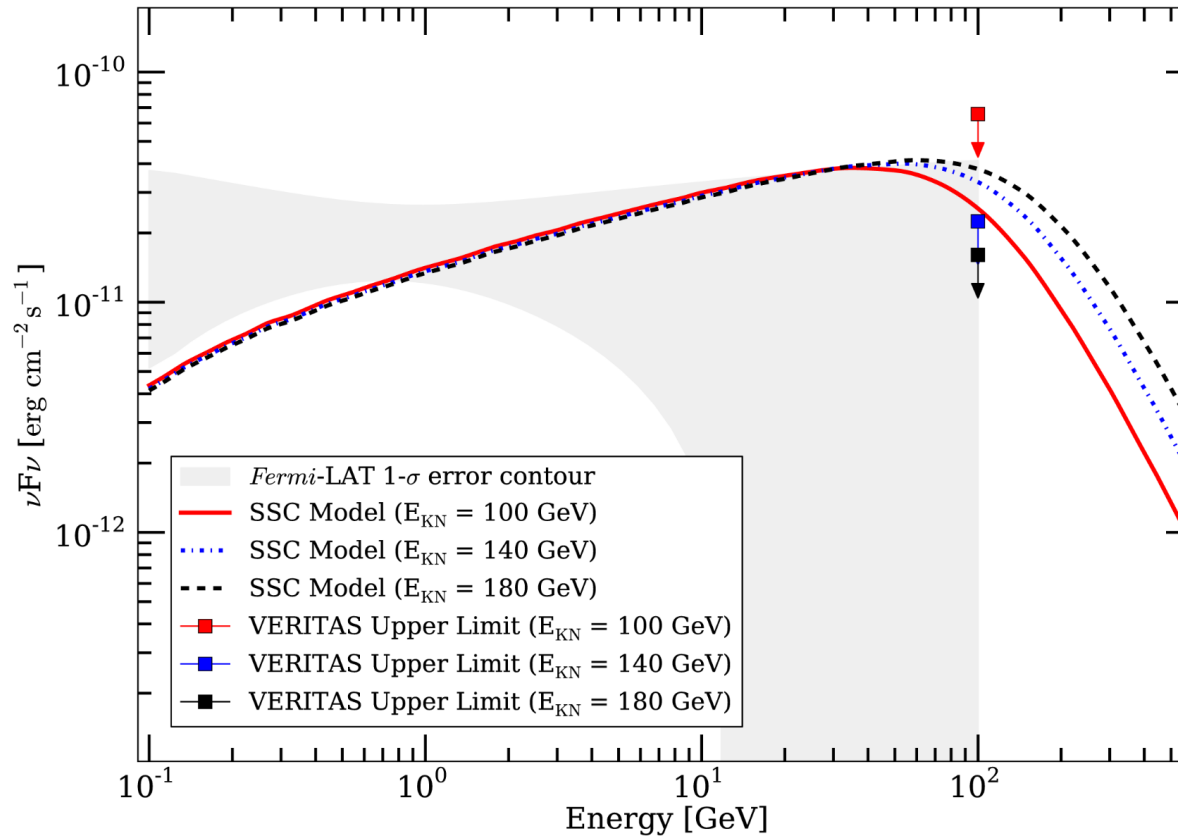
# HESS - I upper limits



GRB 100621A

Abramowski et al. 2014

# VERITAS upper limits



GRB 130427A

Aliu et al. 2014

# Transients Science with CTA



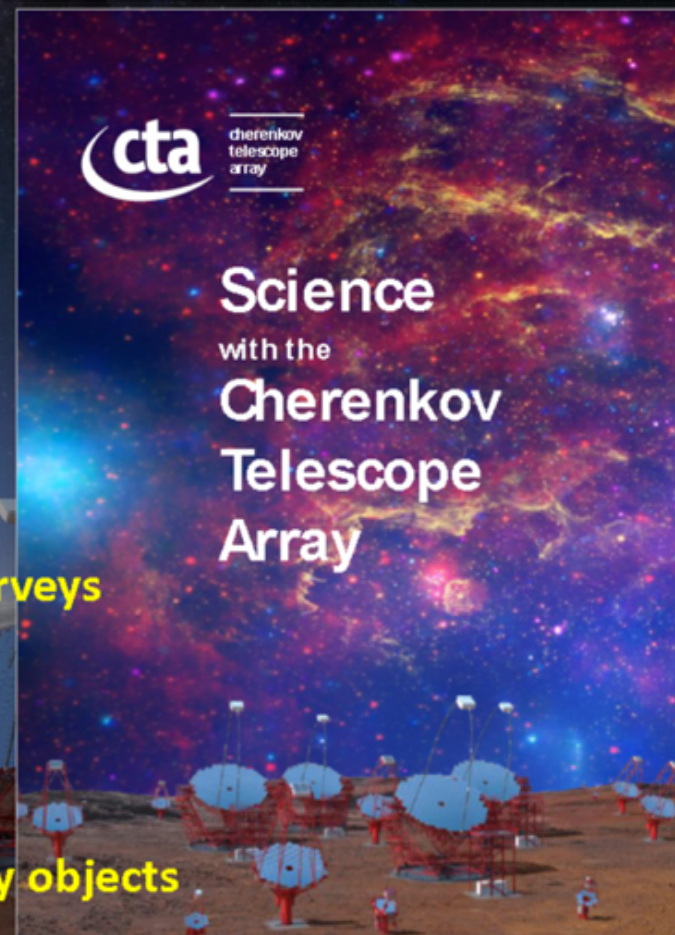
## KEY SCIENCE PROJECTS

provide legacy data sets and data products

1. Dark Matter Programme
2. Galactic Centre
3. Galactic Plane Survey
4. Large Magellanic Cloud Survey
5. Extragalactic Survey
6. Transients
7. Cosmic-ray PeVatrons
8. Star-forming Systems
9. Active Galactic Nuclei
10. Cluster of Galaxies
11. Beyond Gamma Rays

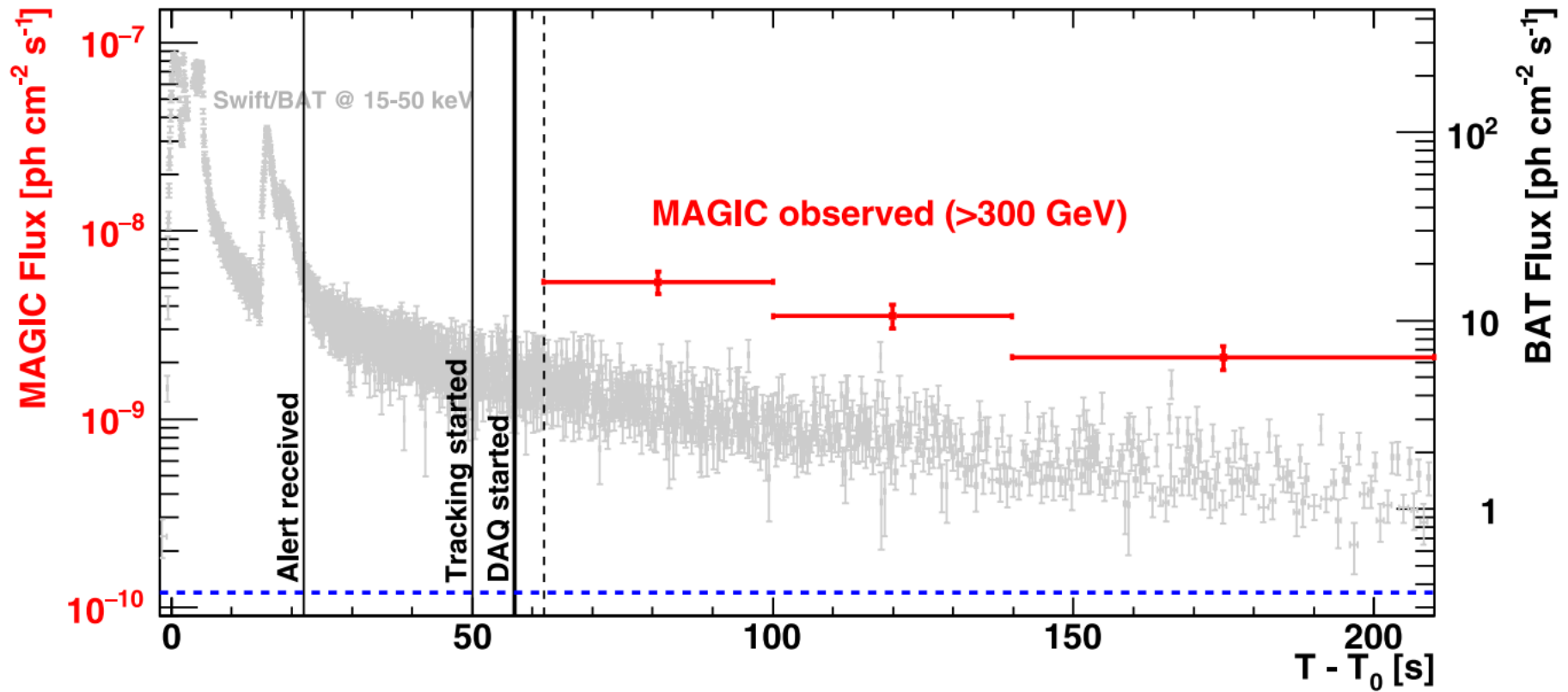
Surveys

Key objects



[www.worldscientific.com/worldscibooks/10.1142/10986](http://www.worldscientific.com/worldscibooks/10.1142/10986)

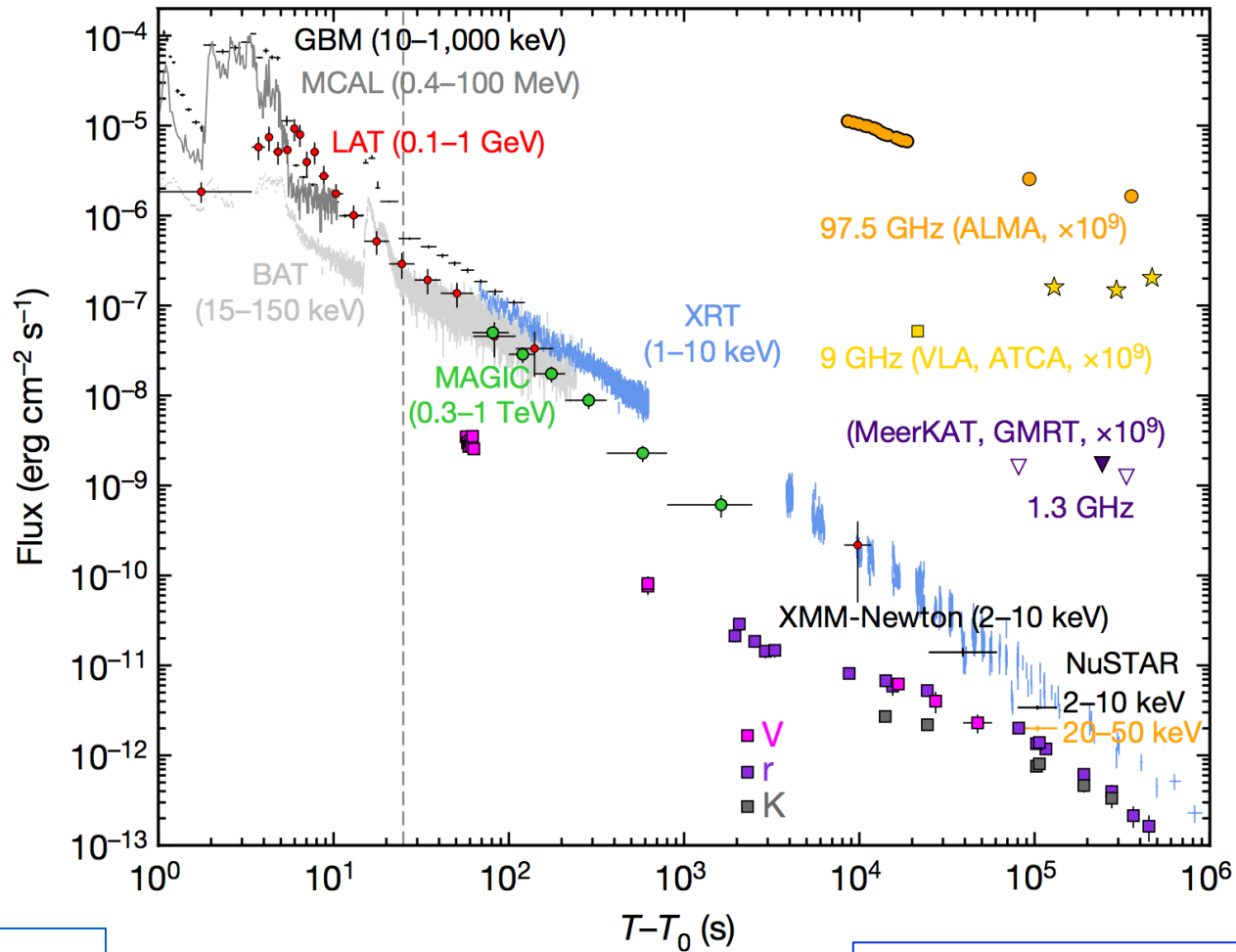
# MAGIC detection



GRB 190114C

Acciari et al. 2019a

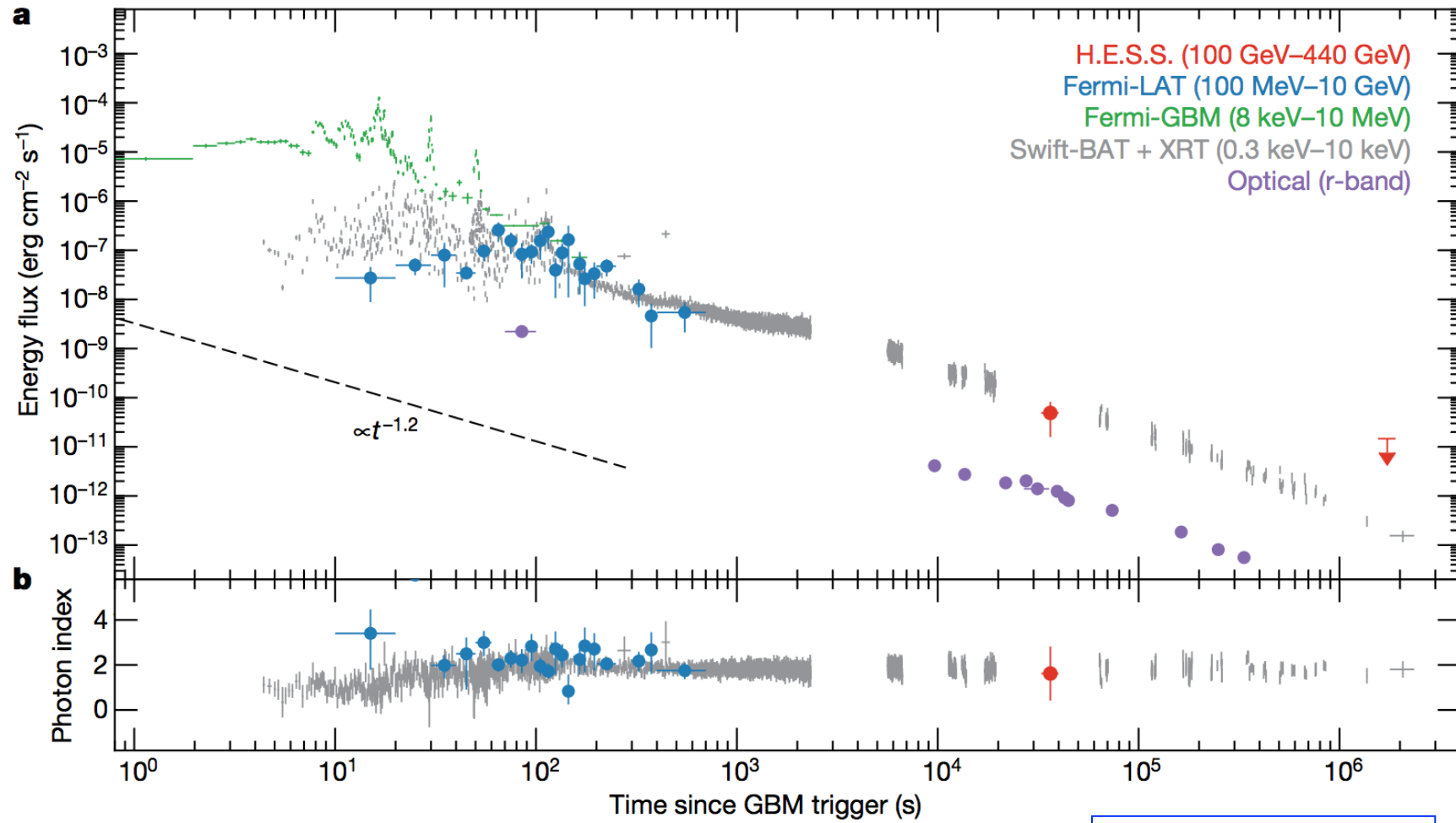
# MAGIC detection



GRB 190114C

Acciari et al. 2019b

# HESS detection

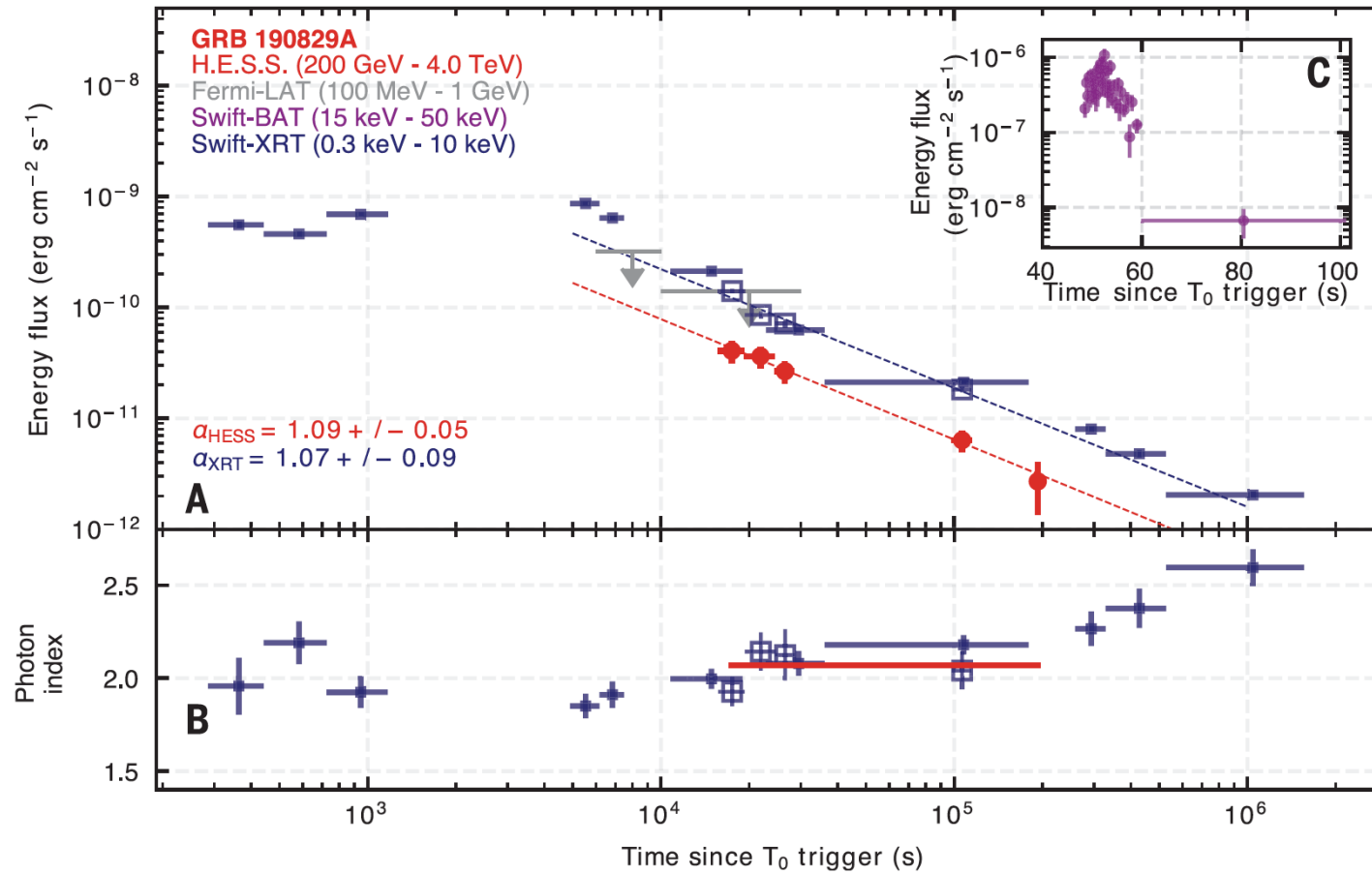


GRB 180720B

Abdalla et al. 2019



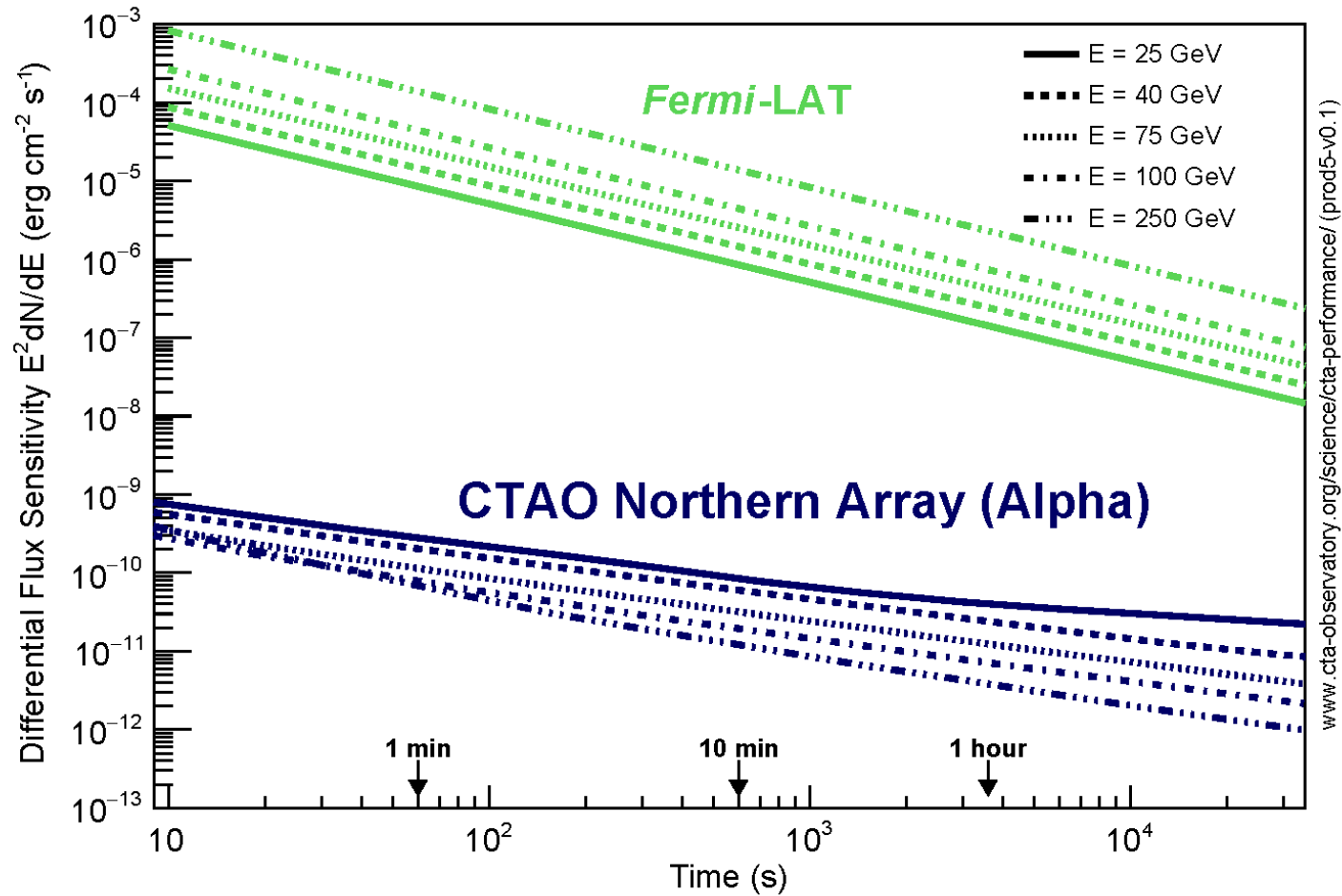
# HESS detection



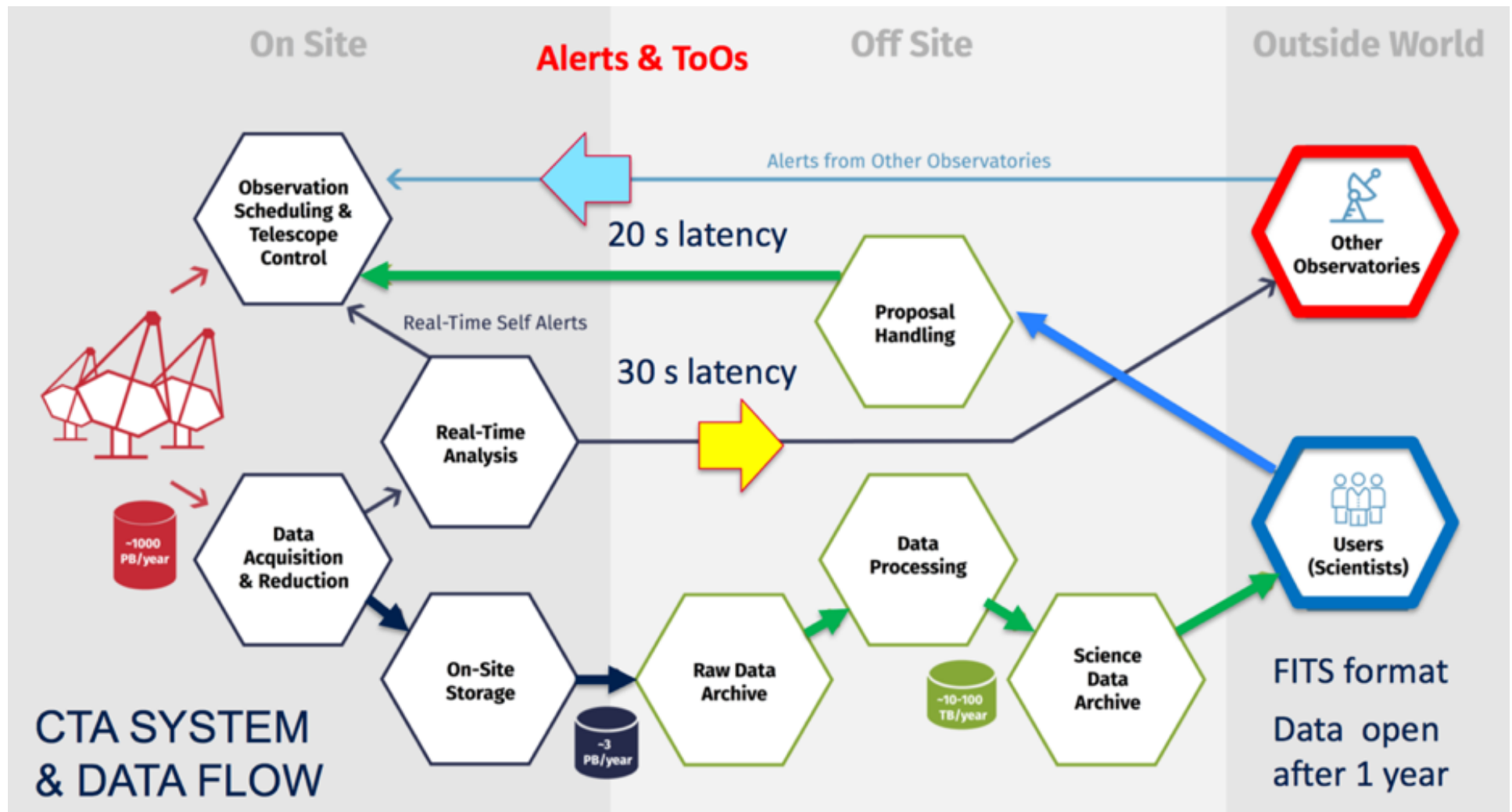
Abdalla et al. 2021

GRB 190829A

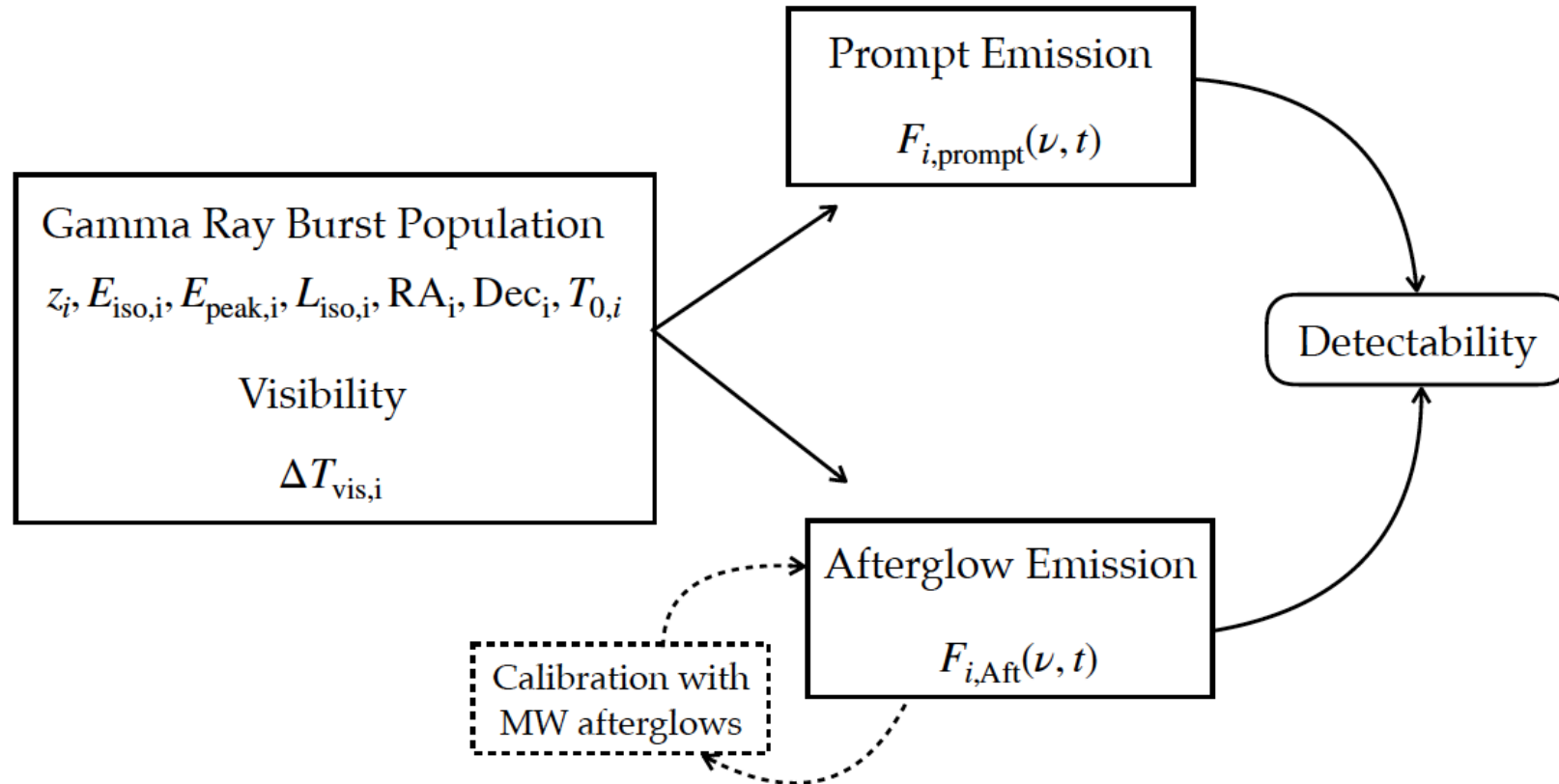
# Transients Science with CTA



# Transients Science with CTA



# GRB Science with CTA - POSYTIVE

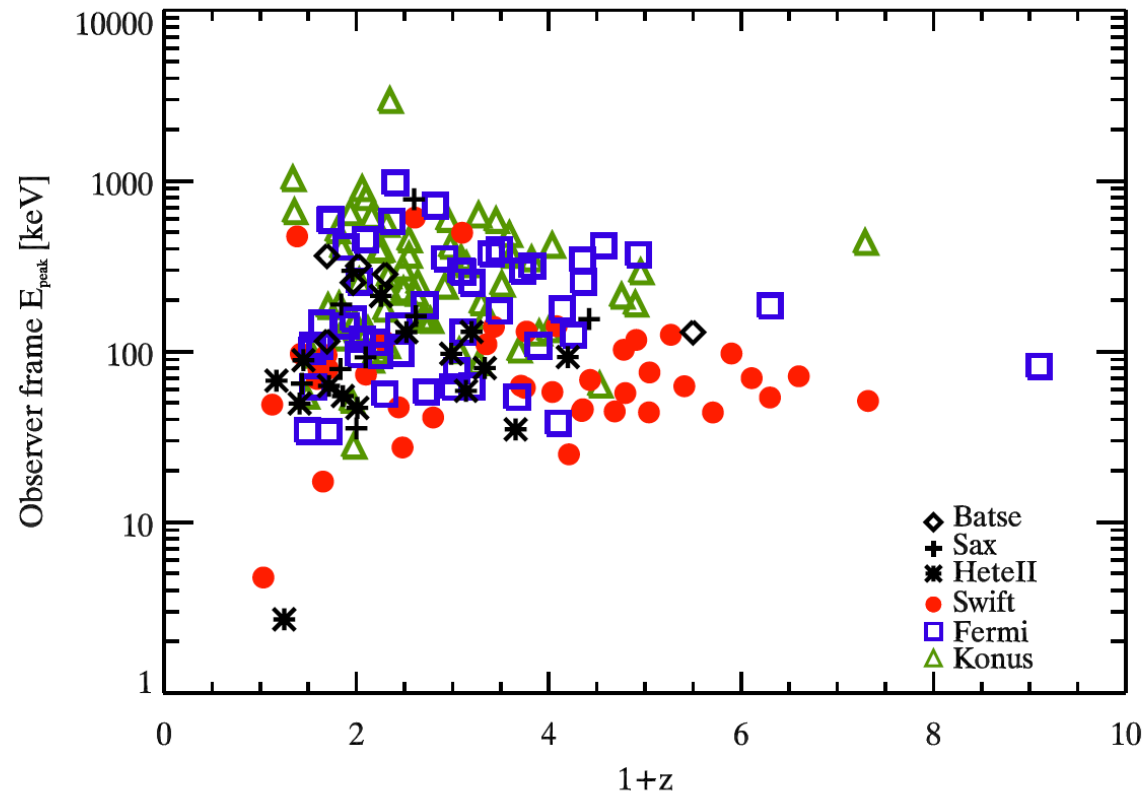


The POpulation SYNthesis Theory Integrated project for Very high-energy Emission.

# The GRB population



The POpulation SYNthesis Theory Integrated project for Very high-energy Emission.

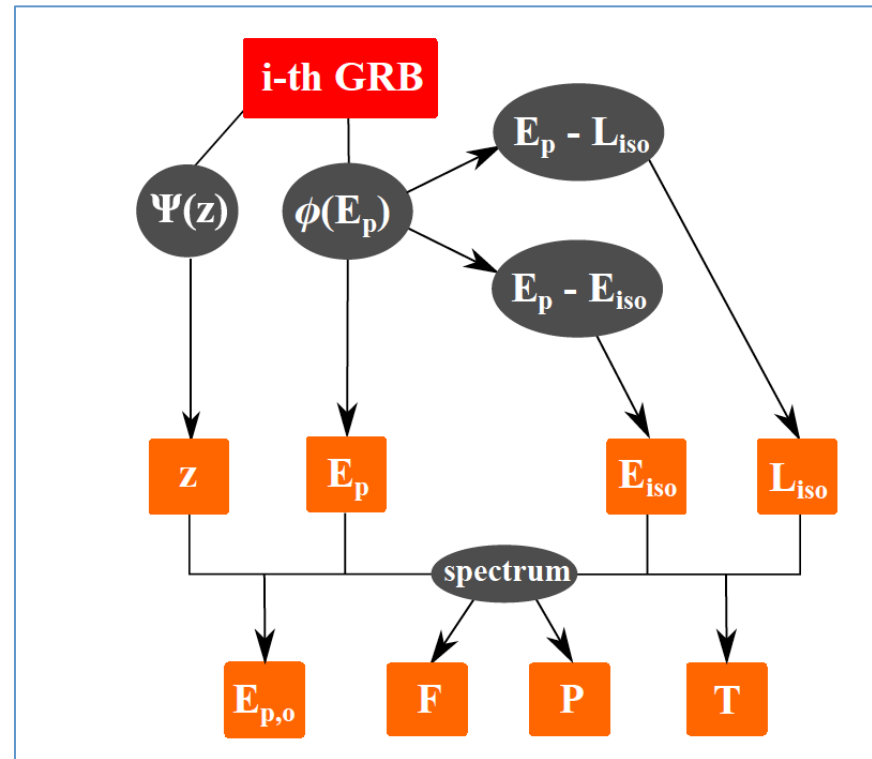


G. Ghirlanda et al. Monthly Notices of the Royal Astronomical Society 448 (2015), p. 2514.

# The GRB population



The POpulation SYNthesis Theory Integrated project for Very high-energy Emission.



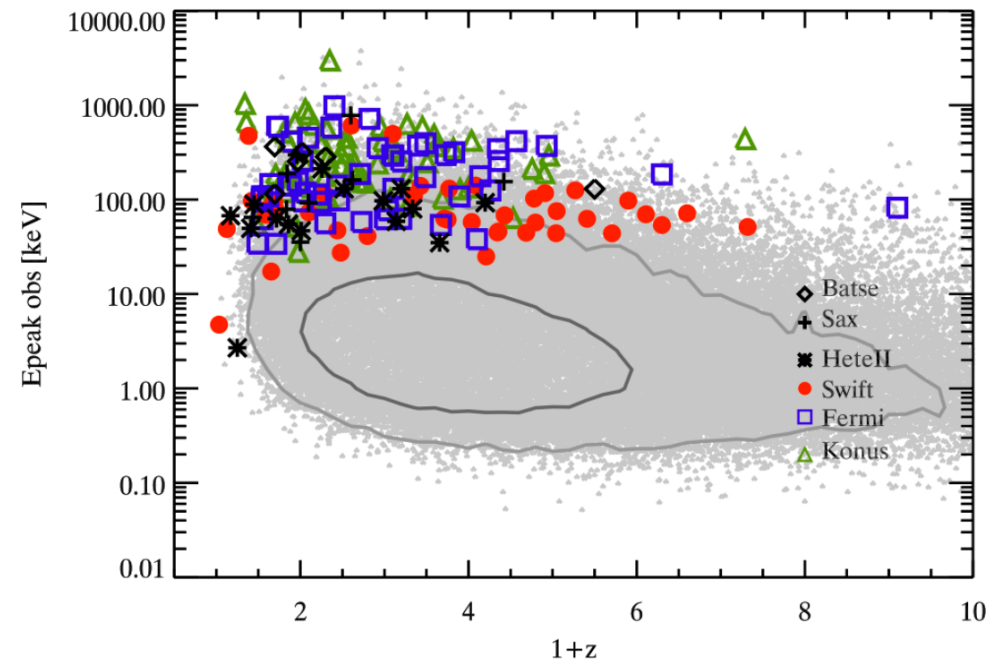
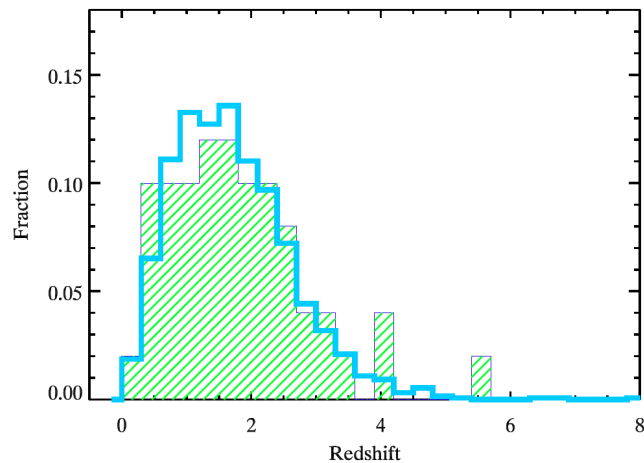
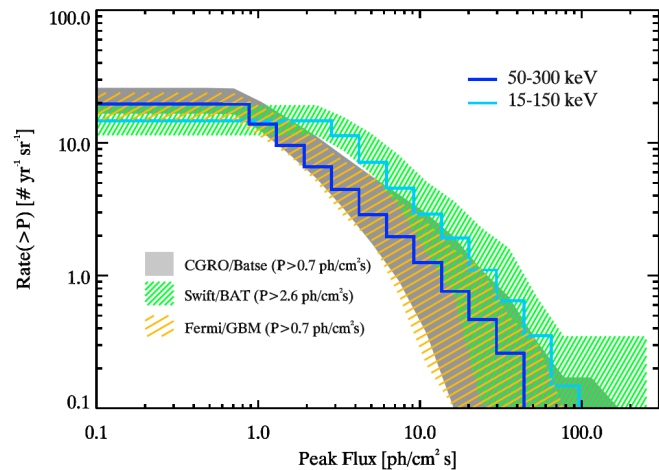
G. Ghirlanda et al. Astronomy & Astrophysics 594 (2016), A84.

G. Ghirlanda et al. Monthly Notices of the Royal Astronomical Society 448 (2015), p. 2514.

# The GRB population



The POulation SYNthesis Theory Integrated project for Very high-energy Emission.

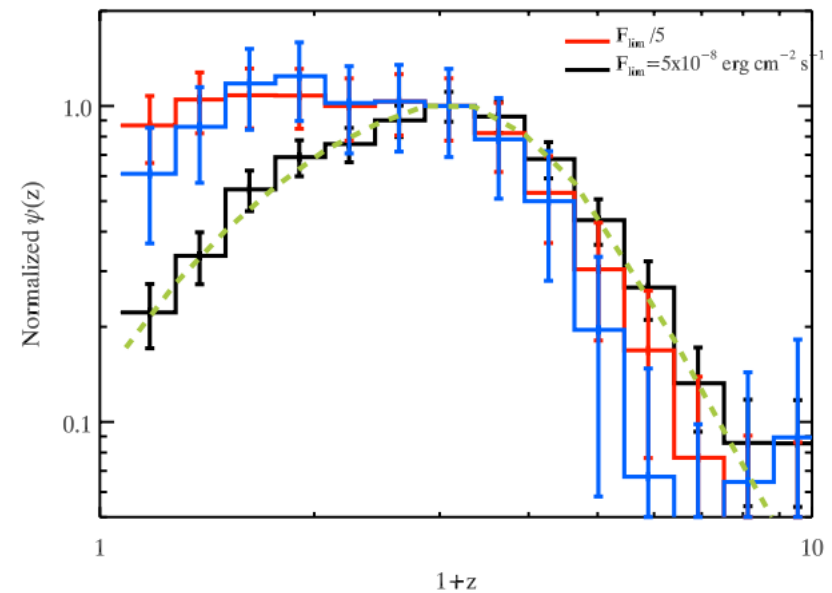
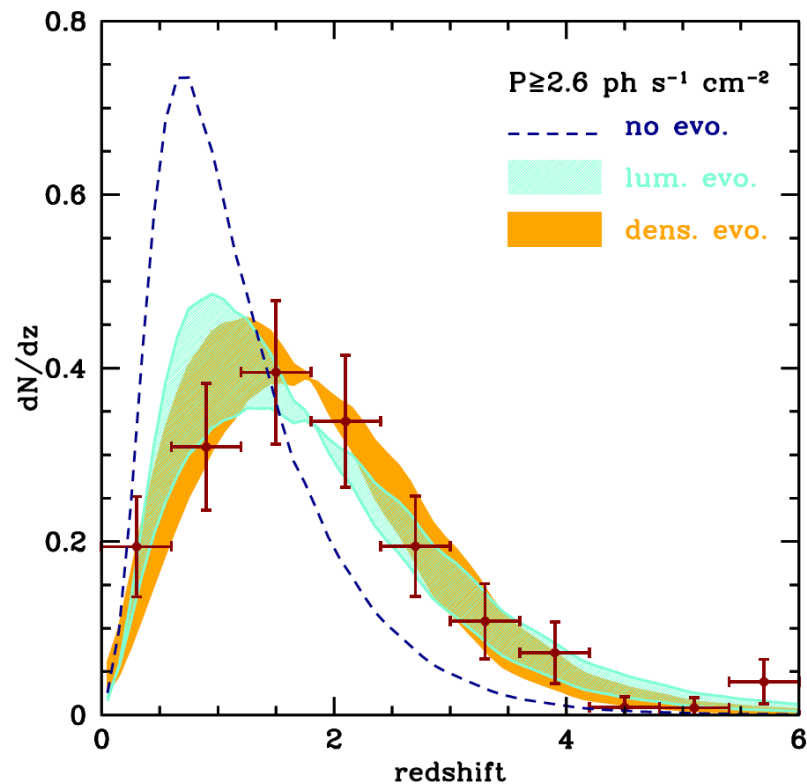


G. Ghirlanda et al. Monthly Notices of the Royal Astronomical Society 448 (2015), p. 2514.

# The GRB control sample



The POpulation SYNthesis Theory Integrated project for Very high-energy Emission.



A Pescalli et al.  
Astronomy & Astrophysics 587 (2016), A 40

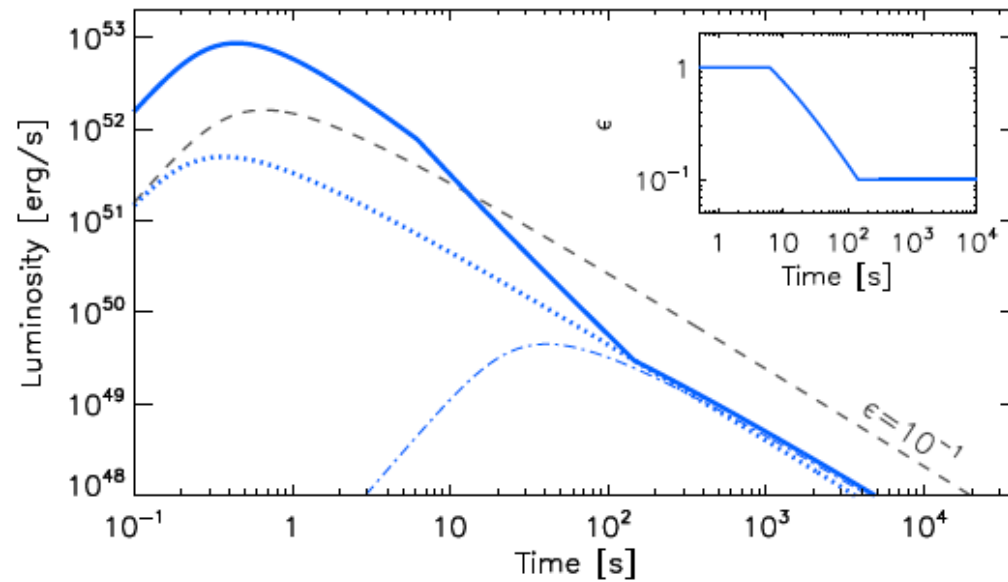
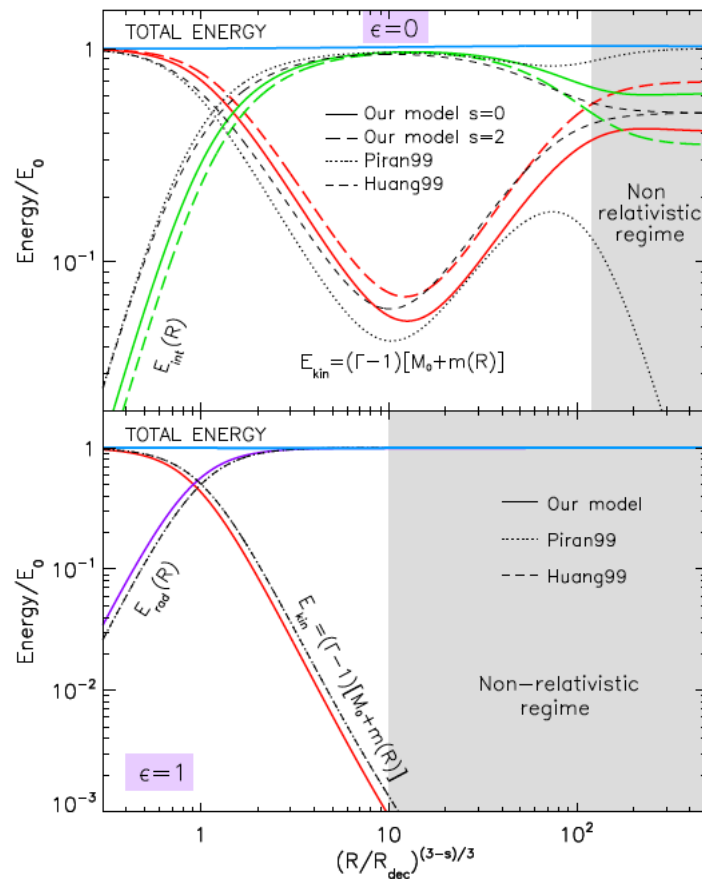
R Salvaterra et al.  
The Astrophysical Journal 749.1 (2012), p. 68



# The afterglow simulation



The POulation SYNthesis Theory Integrated project for Very high-energy Emission.

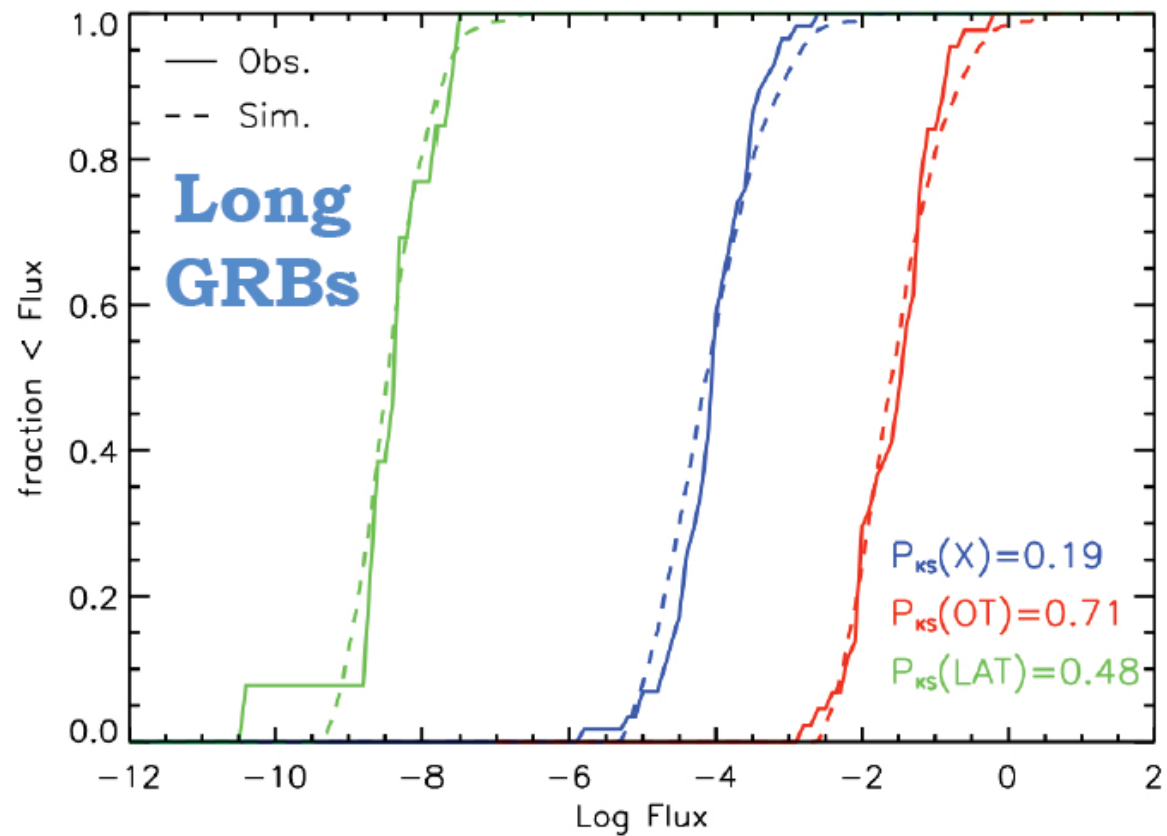


L. Nava et al. MNRAS 433.3 (2013), pp. 2107–2121.

# The afterglow simulation



The POpulation SYNthesis Theory Integrated project for Very high-energy Emission.

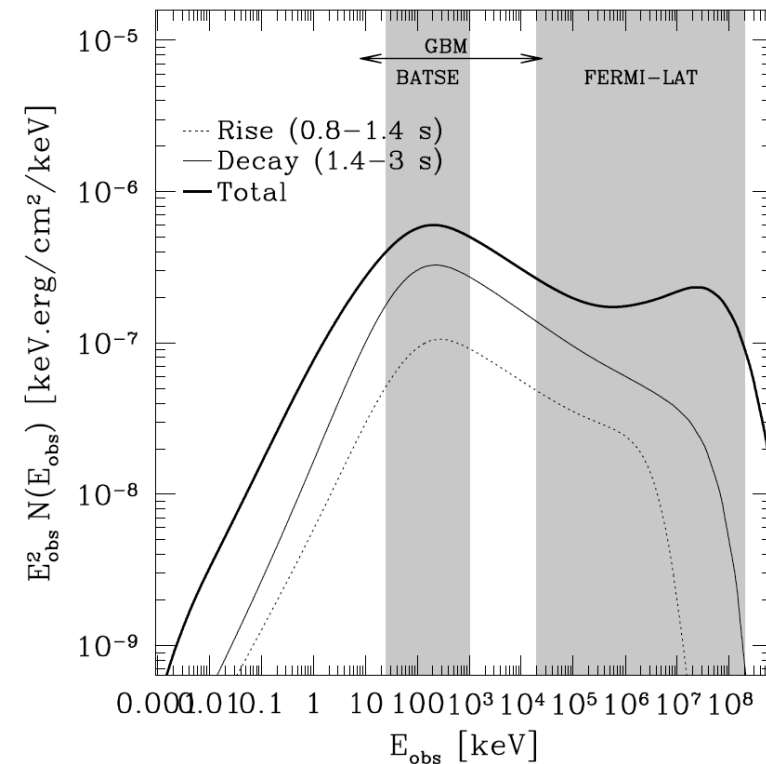
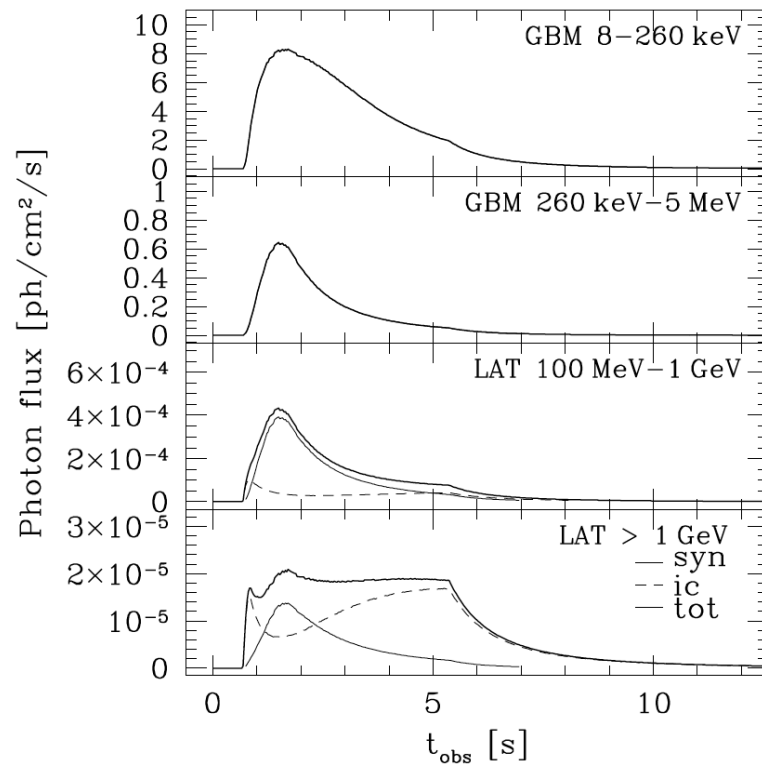


M.G. Bernardini et al. PoS(ICRC2019) 598

# The prompt simulation



The POulation SYNthesis Theory Integrated project for Very high-energy Emission.

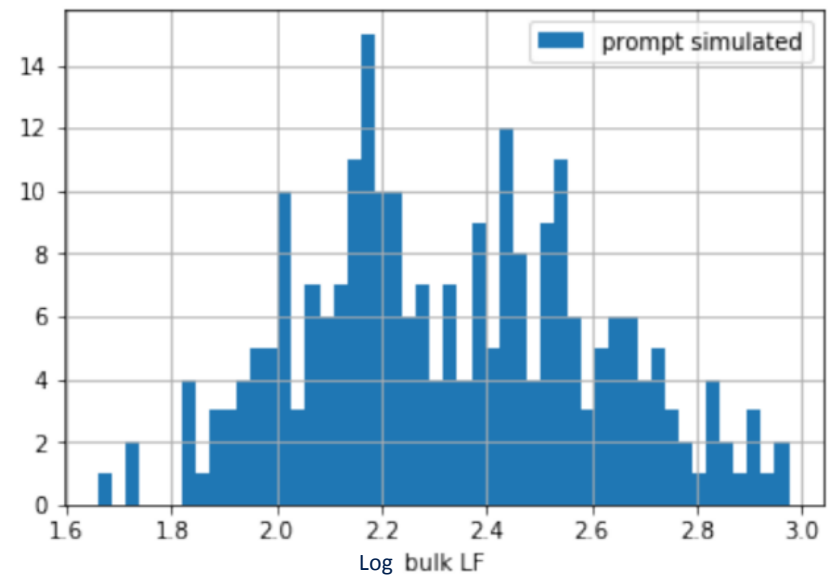
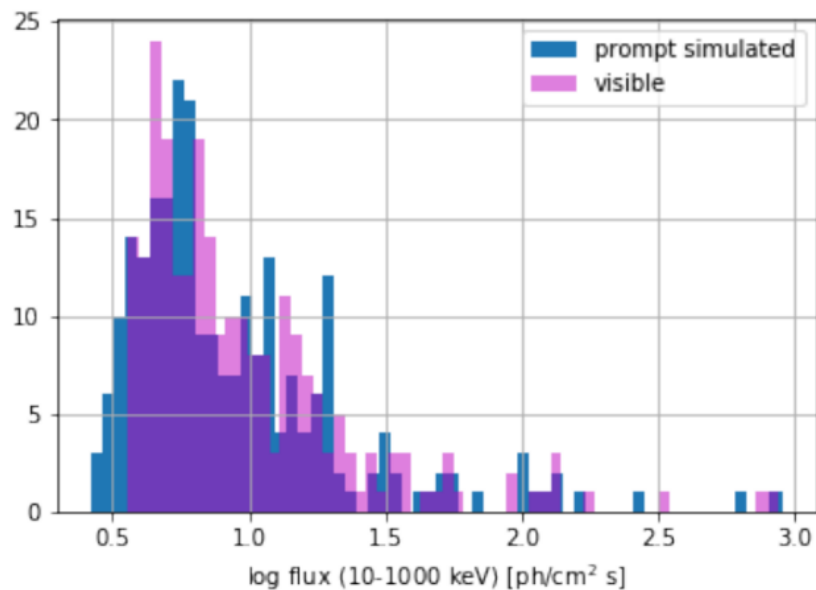


Ž. Bošnjak, F. Daigne, and G. Dubus. In: A&A 498 (May 2009), pp. 677–703.  
 Ž. Bošnjak and F. Daigne. In: A&A 568, A45 (Aug. 2014), A45.  
 F. Daigne, Z. Bosnjak & G. Dubus, A&A 526 (2011) id.A110.

# The prompt simulation



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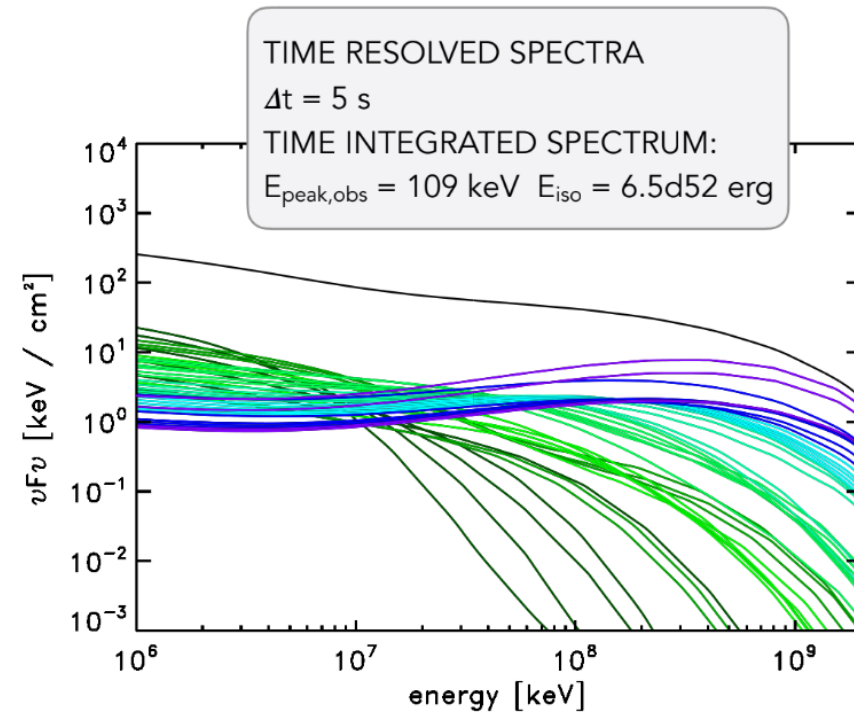
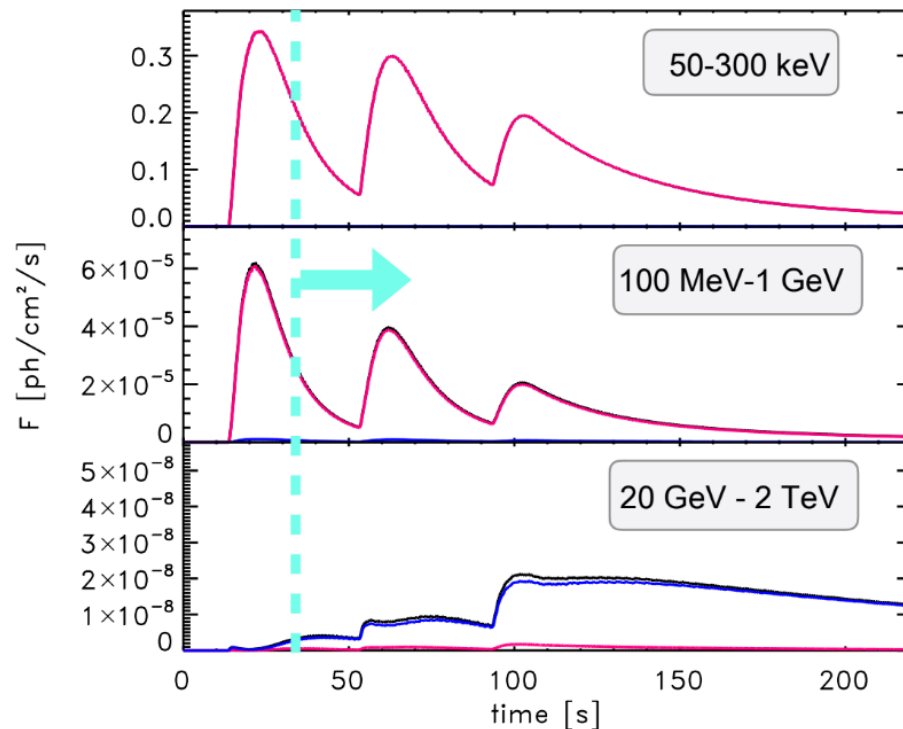


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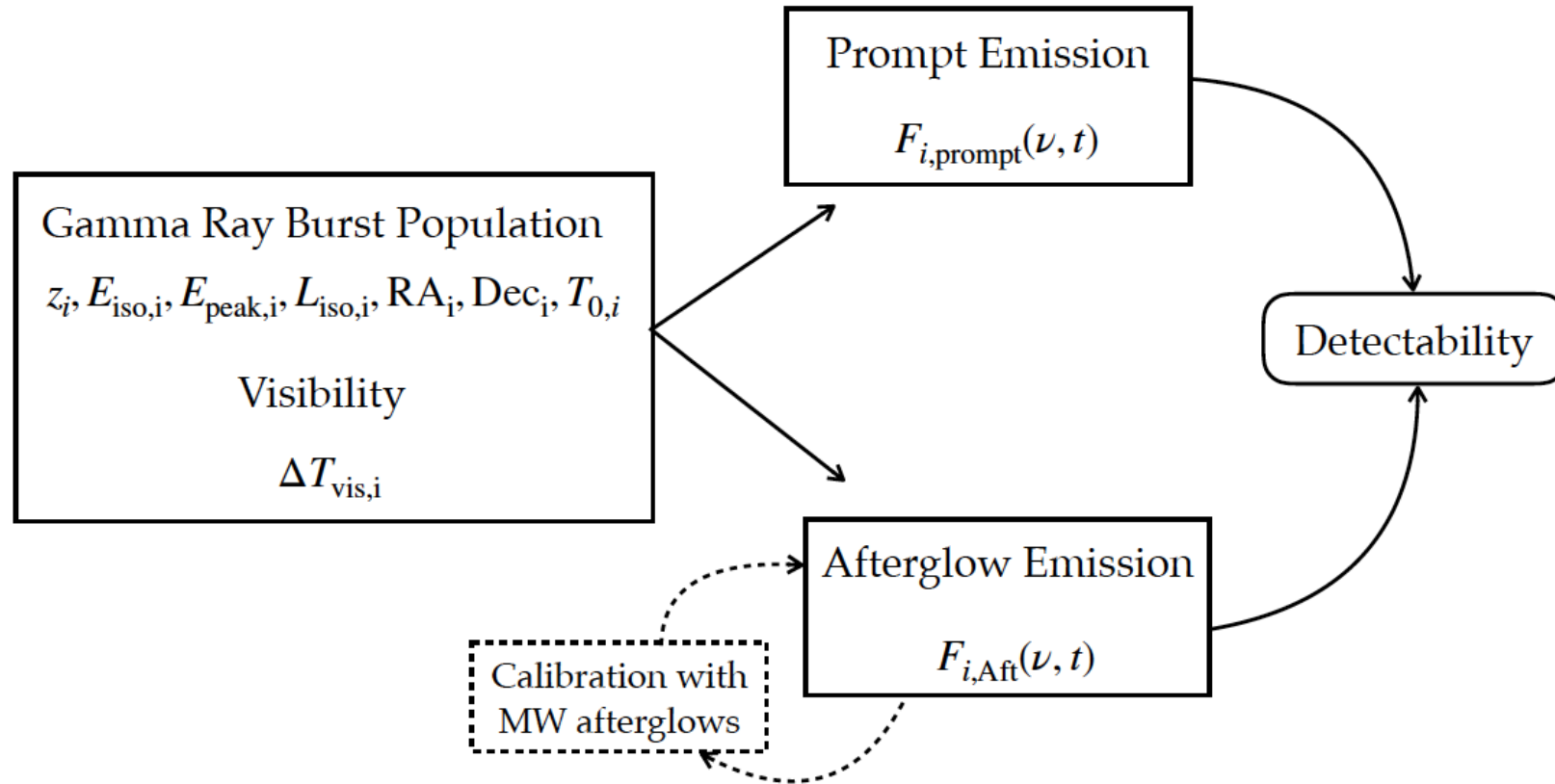


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F. Daigne, Z. Bosnjak & G. Dubus, A&A 526 (2011) id.A110.

# GRB Science with CTA - POSYTIVE



The POpulation SYNthesis Theory Integrated project for Very high-energy Emission.