Monitoring Gamma-Ray Burst VHE emission with SWGO

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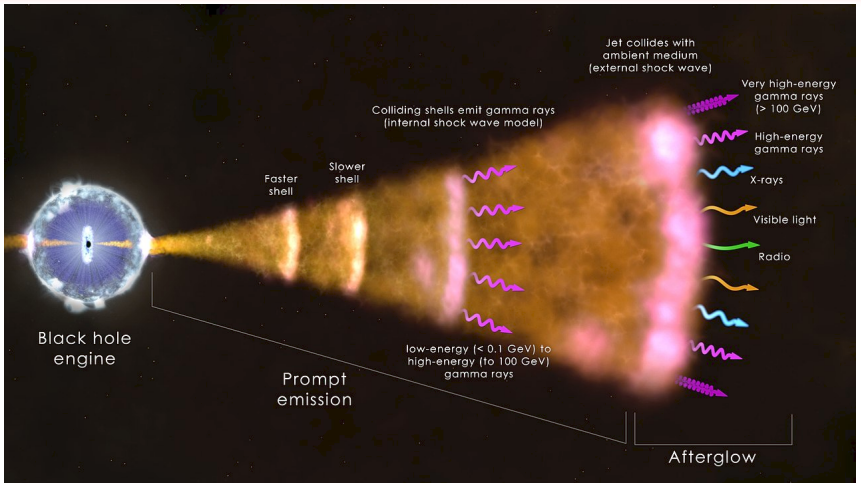
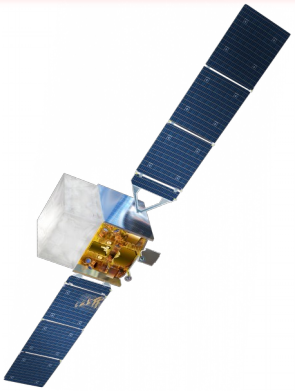
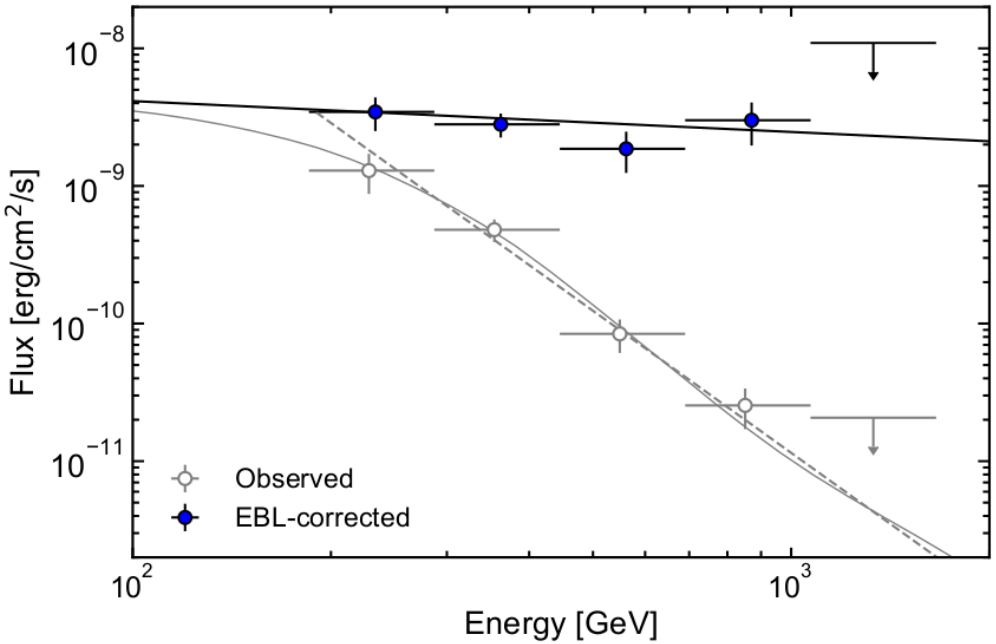
on behalf of the SWGO Collaboration

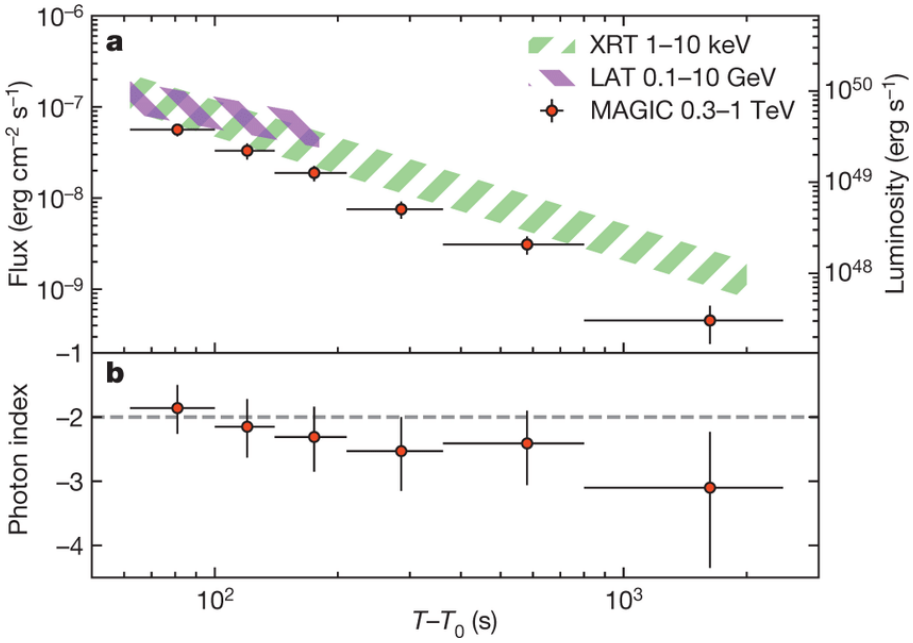
* Presenter

VHE detection of GRBs





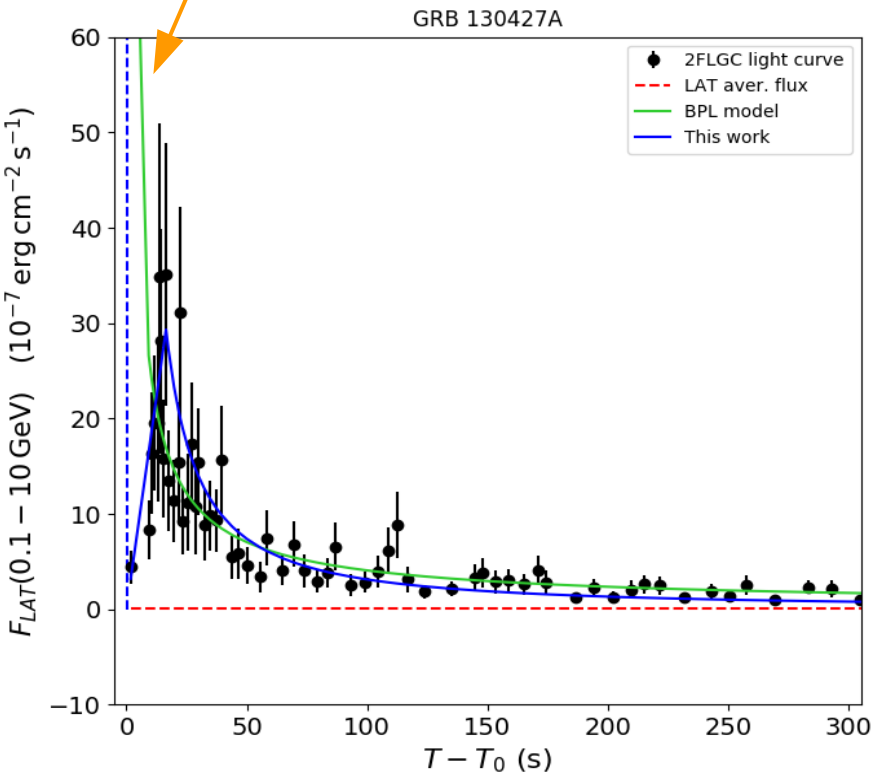




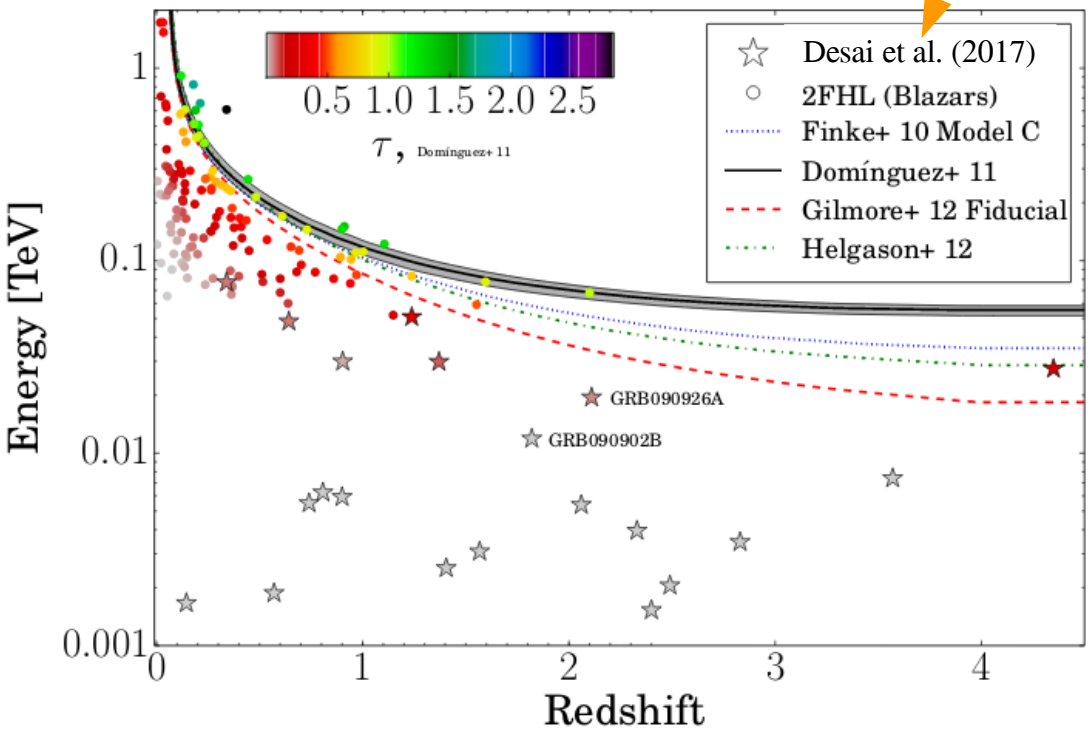
VHE spectrum (left) and multi-frequency light-curve (right) of GRB 190114C as seen by *MAGIC*, *Fermi*-LAT and *Swift*-XRT (MAGIC Coll., 2019, Nat., 575, 455)

GRBs at Very High Energies

Very little information on the early evolution (virtually none on prompt emission)



Radiation above 100 GeV subject to Extragalactic Background Light (EBL) opacity

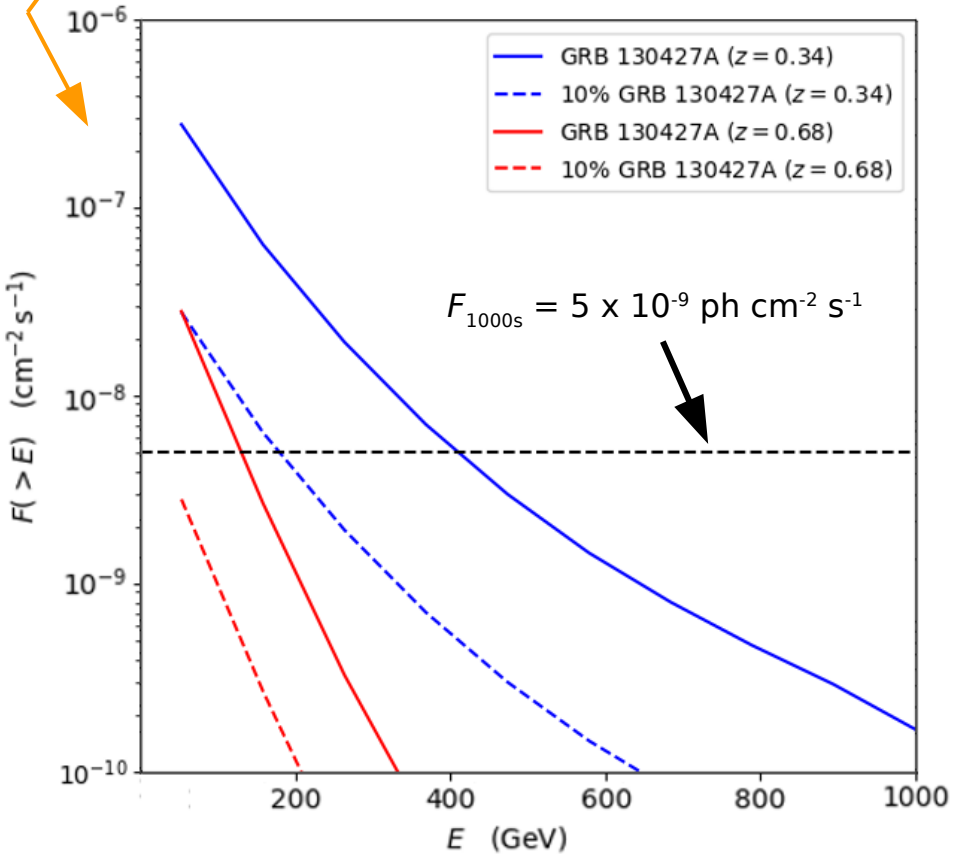


The visibility of GRBs in the VHE domain is controlled by multiple parameters: intrinsic source properties (GRB model); EBL opacity (redshift and Cosmology); spectral evolution (prompt and afterglow emission).

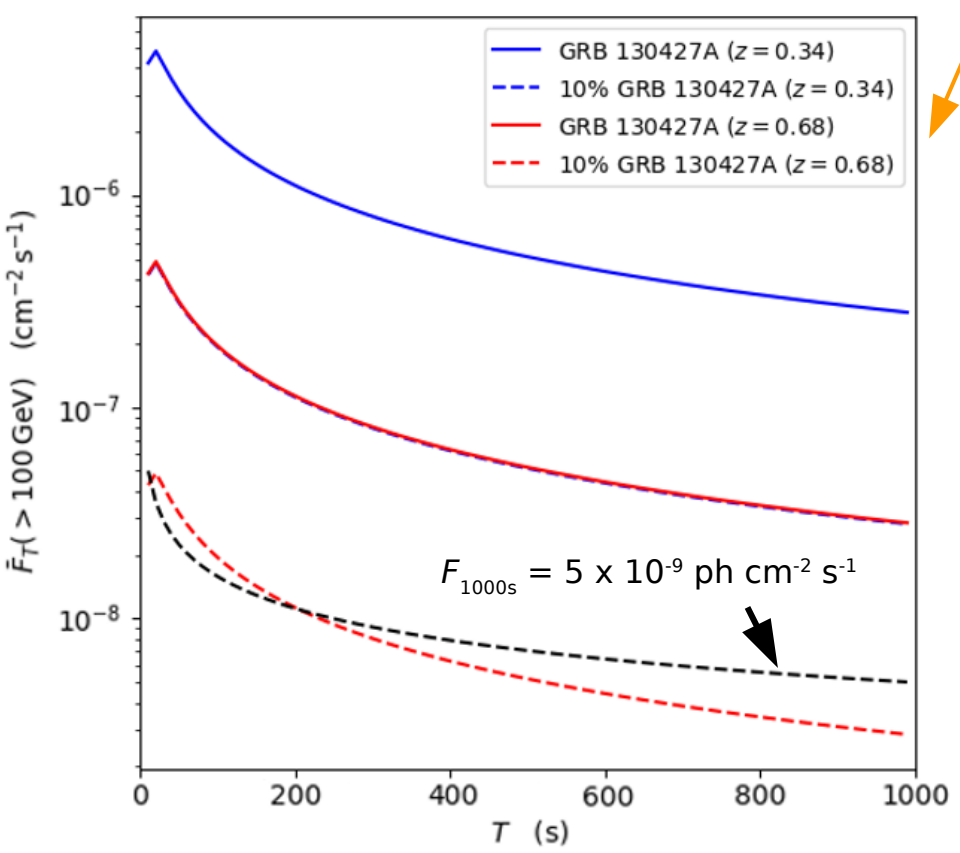
Only a large FoV instrument (~1 sr) can effectively probe the earliest properties.

Models and observations

Average integrated photon flux in 1000s for observed and modelled GRBs vs. Energy threshold



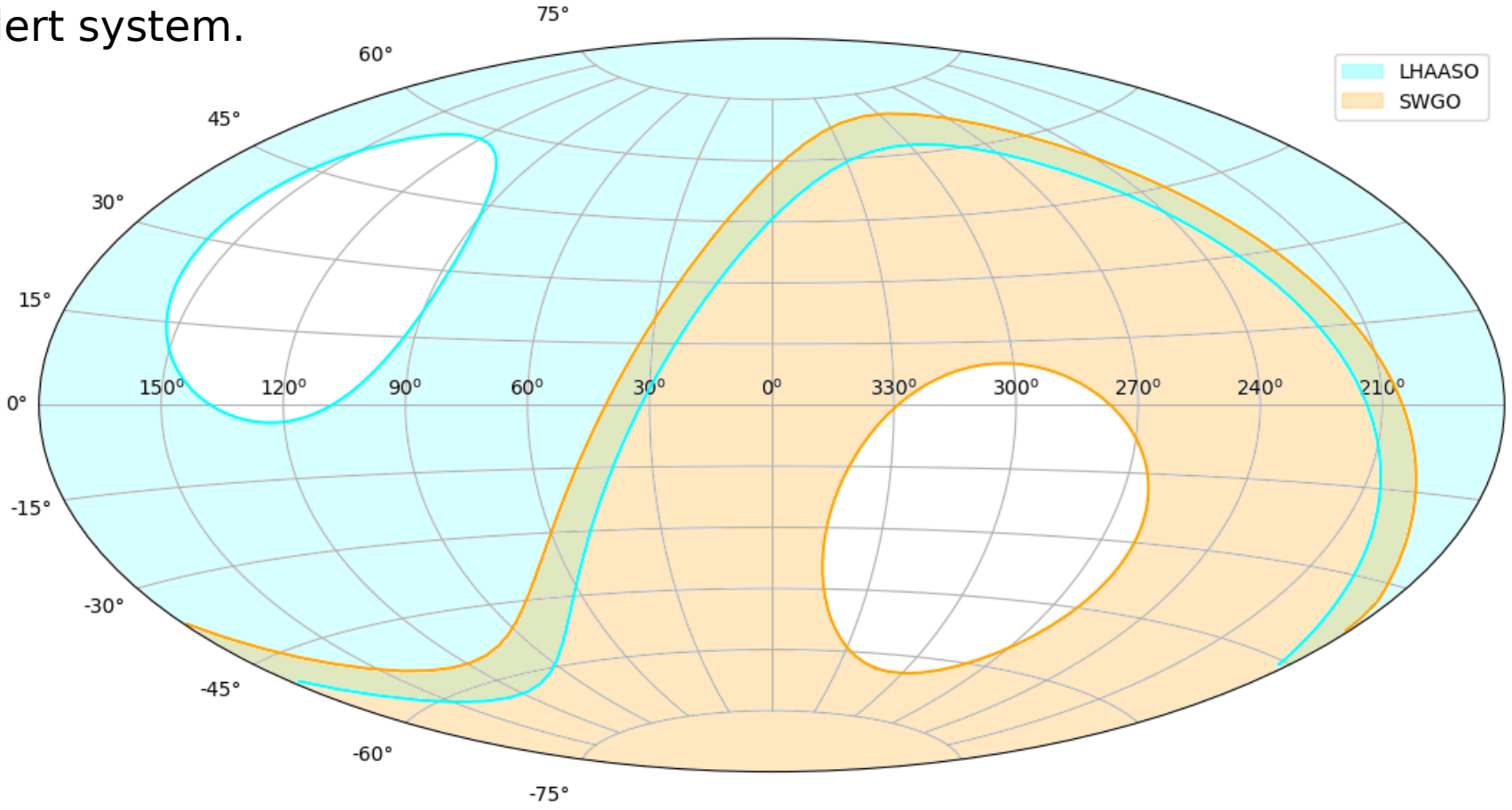
Instantaneous photon fluxes, as a function of time, compared with an integral sensitivity of 5x10^{-9} ph cm^{-2} s^{-1}



The available observations suggest that VHE emission from GRBs exceeds the extrapolation of the energetic component (E > 1 GeV) that Fermi-LAT detected in the brightest bursts that were observed during its first 10 years of monitoring. This offers the possibility that LAT detected GRBs may be used to estimate the frequency of VHE detectable events at different redshifts.

Fast transient monitoring

An integrated photon sensitivity in the order of 5×10^{-9} ph cm^{-2} s^{-1} above 100 GeV, in approximately 1000s, results in fast and effective detection opportunities for bright LAT detected bursts up to redshift $z \approx 1$. At lower redshift, even fainter bursts are visible, resulting in a likely VHE detection of 1 GRB per year. The wide FoV offers good prospects to probe the still unobserved prompt phase properties. The combination of LHAASO and SWGO survey coverage will result in a nearly all sky alert system.



Acknowledgements

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