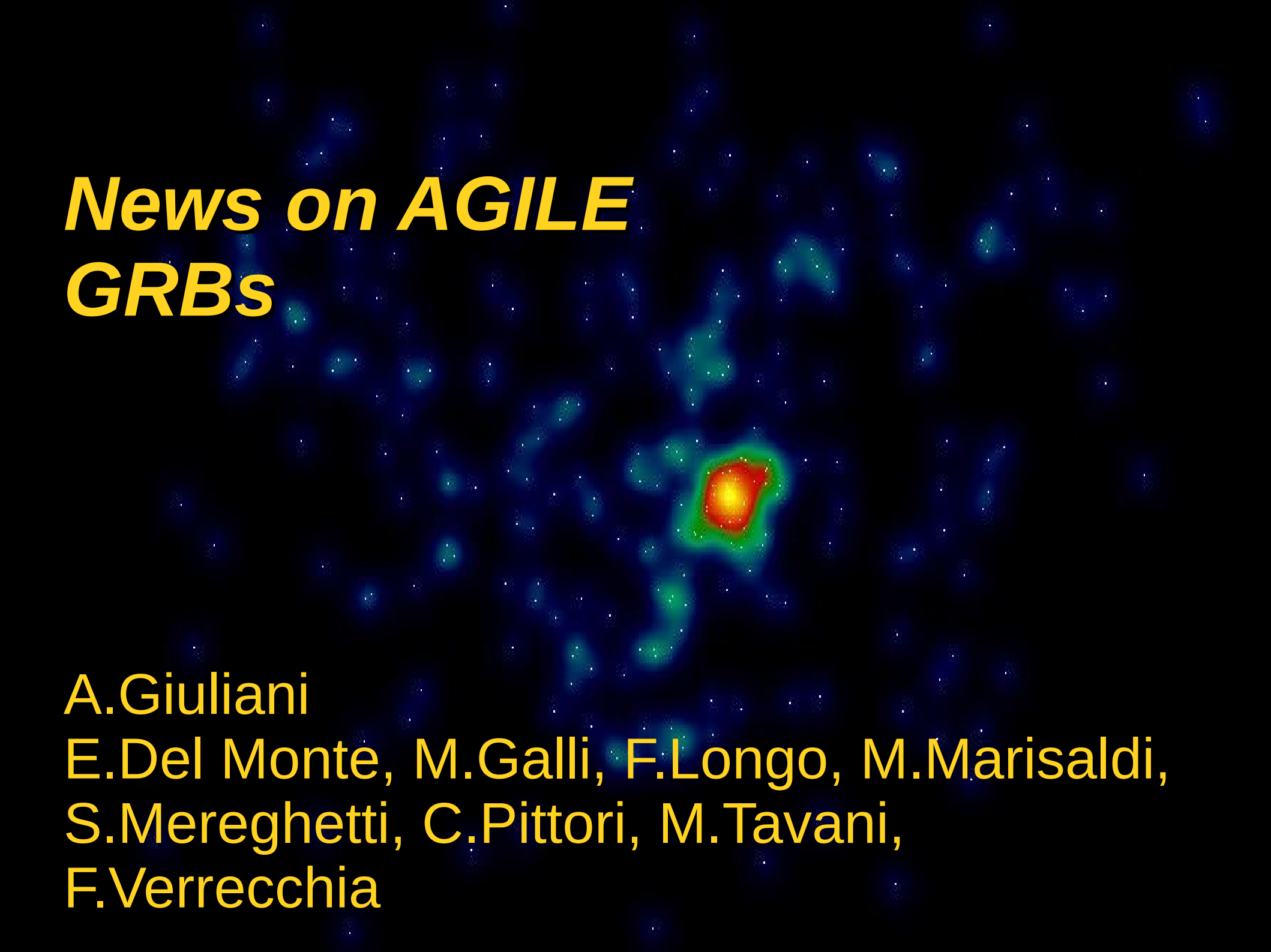
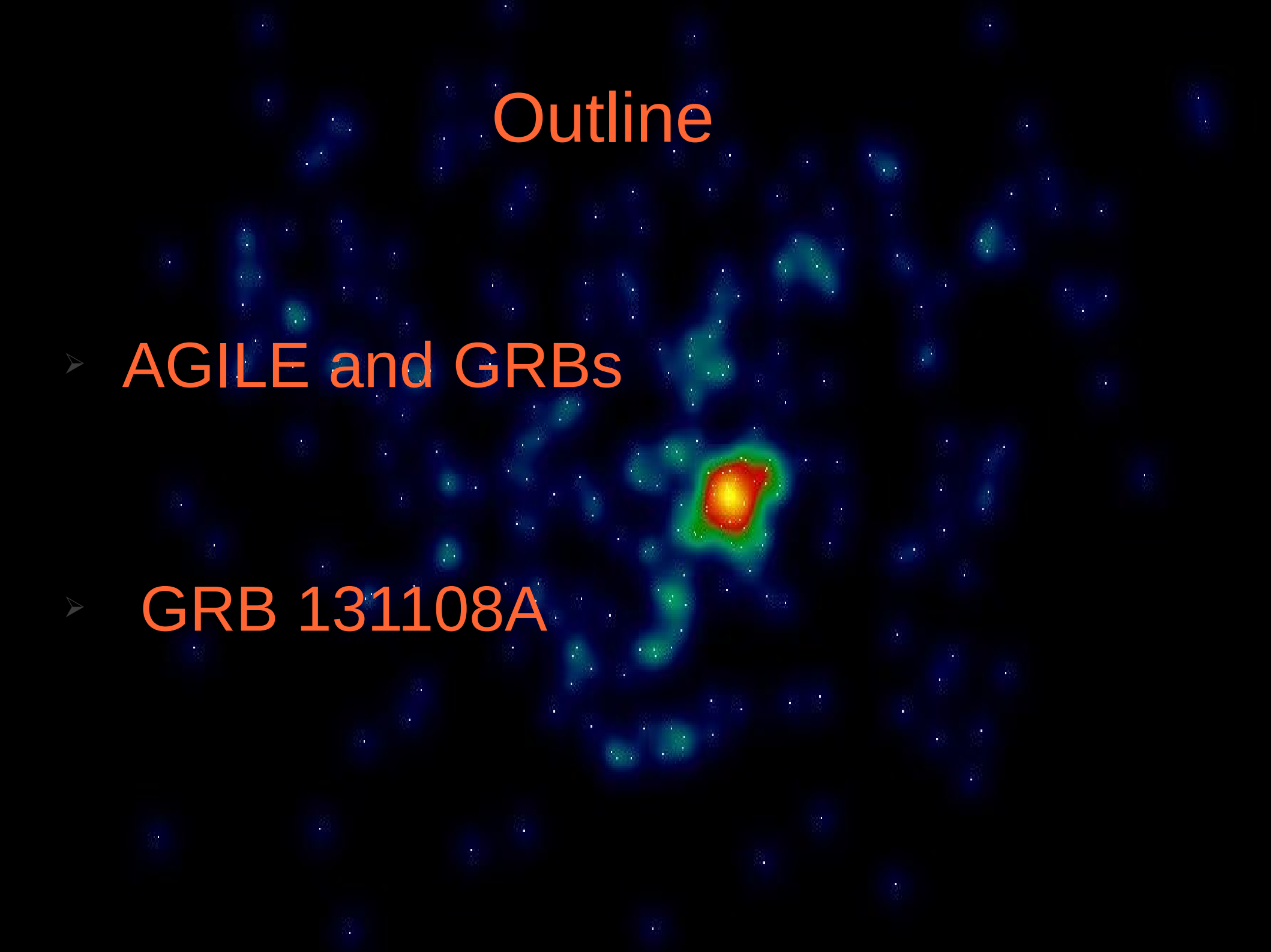
News on AGILE GRBs



A.Giuliani
E.Del Monte, M.Galli, F.Longo, M.Marisaldi, S.Mereghetti, C.Pittori, M.Tavani, F.Verrecchia

Outline

- AGILE and GRBs
- GRB 131108A



GRBs observed by AGILE and Fermi

From an observational point of view, there is not a “standard” behavior

In the Light Curve :

- Extended emission

- Delayed onset

- L ~ t^-a

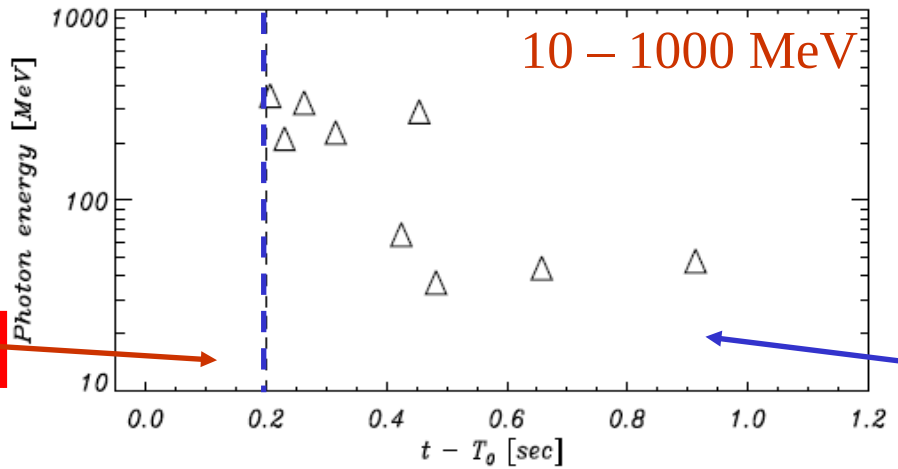
- Prompt emission

- Superlong Bursts

In the spectrum :

- Extra component

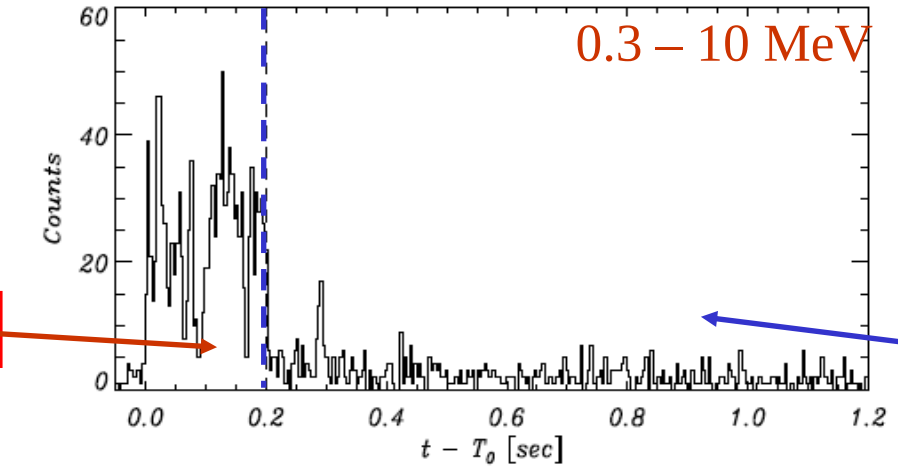
Delayed onset : GRB 090510



Giuliani et al. 2010, ApJ, 708, L84 – L88

prompt emission interval

delayed emission interval

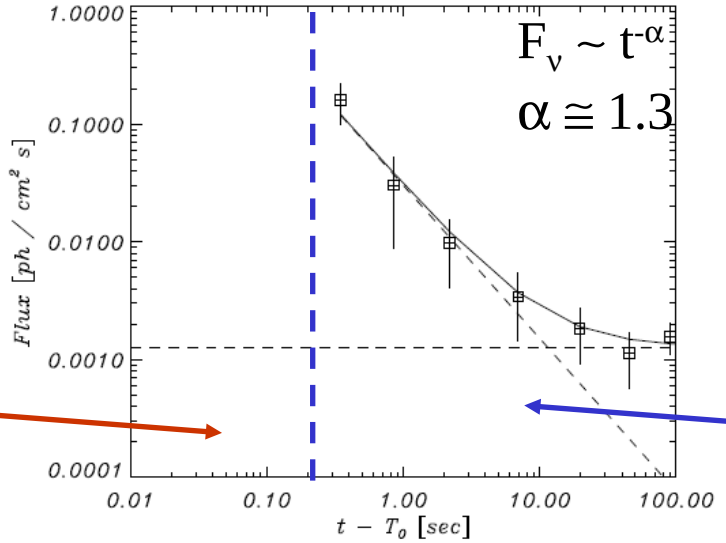


prompt emission interval

delayed emission interval

GRB 090510 has been localized by Swift and detected also by Fermi/LAT (Ackermann et al. 2010) and AGILE (Giuliani et al. 2010). The redshift is 0.903 (De Pasquale et al. 2010).

Afterglow-like Light curve



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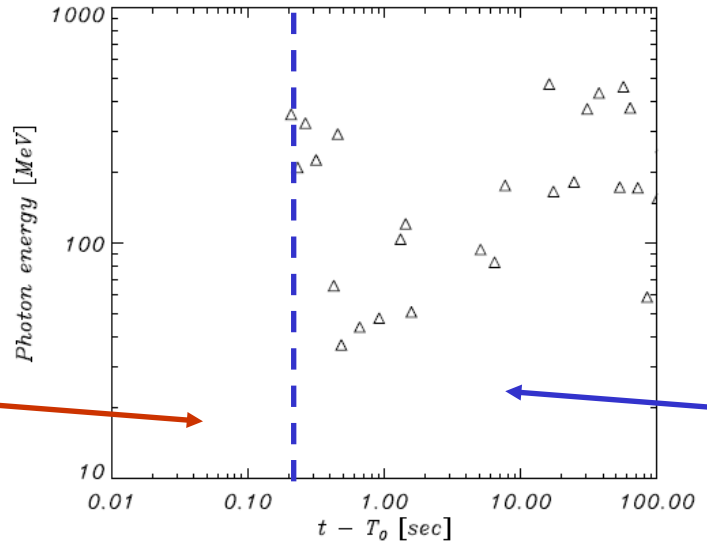
prompt emission interval

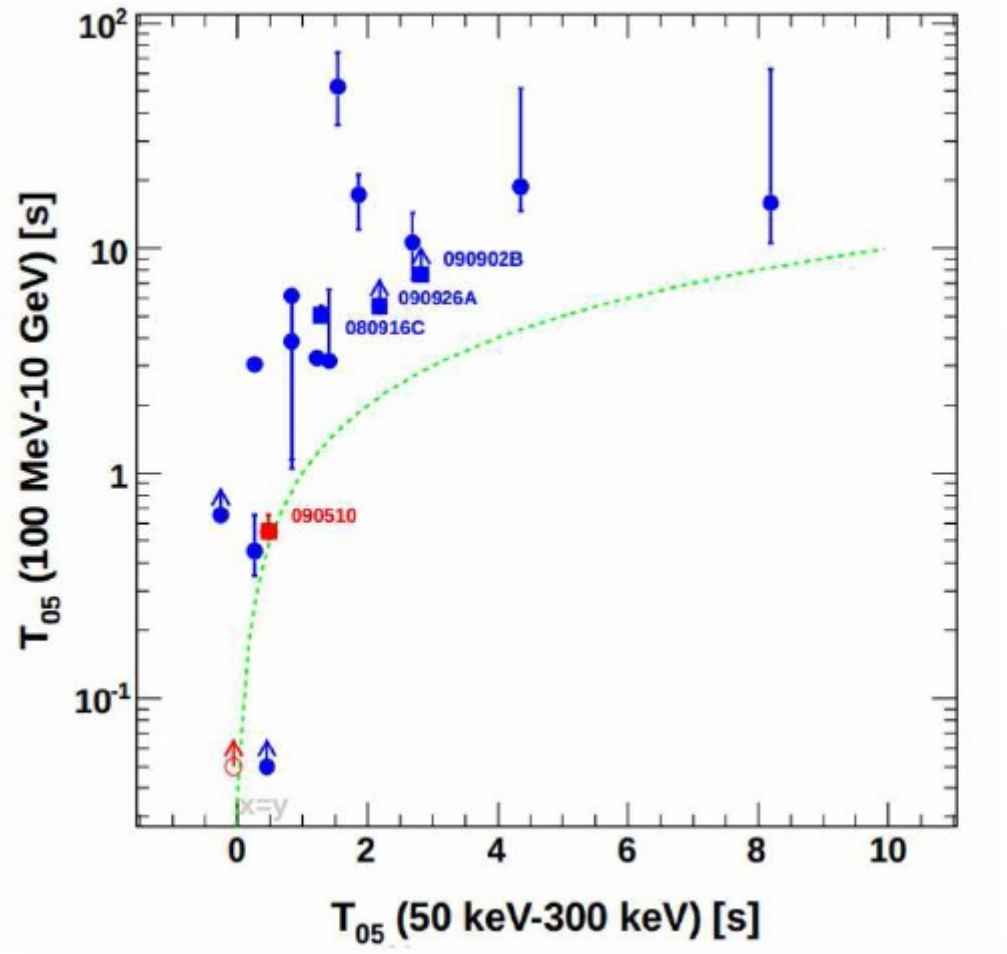
delayed emission interval

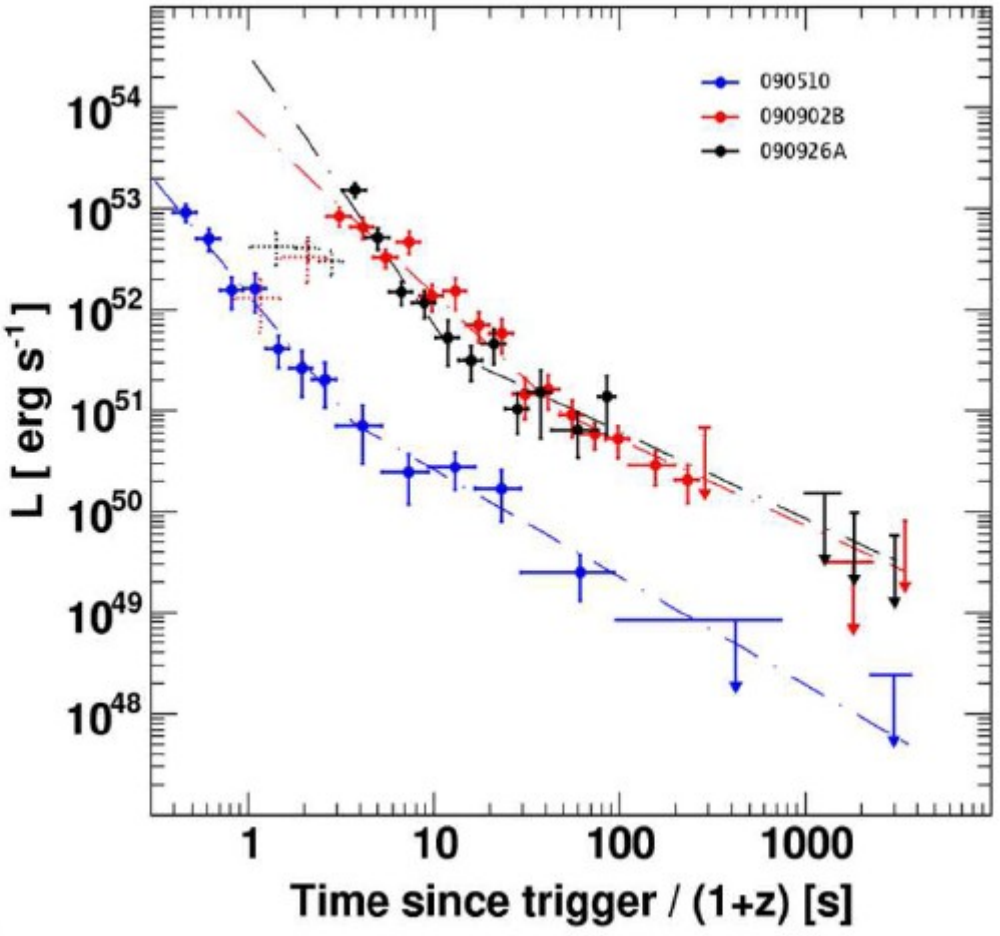


prompt emission interval

delayed emission interval

Delayed emission



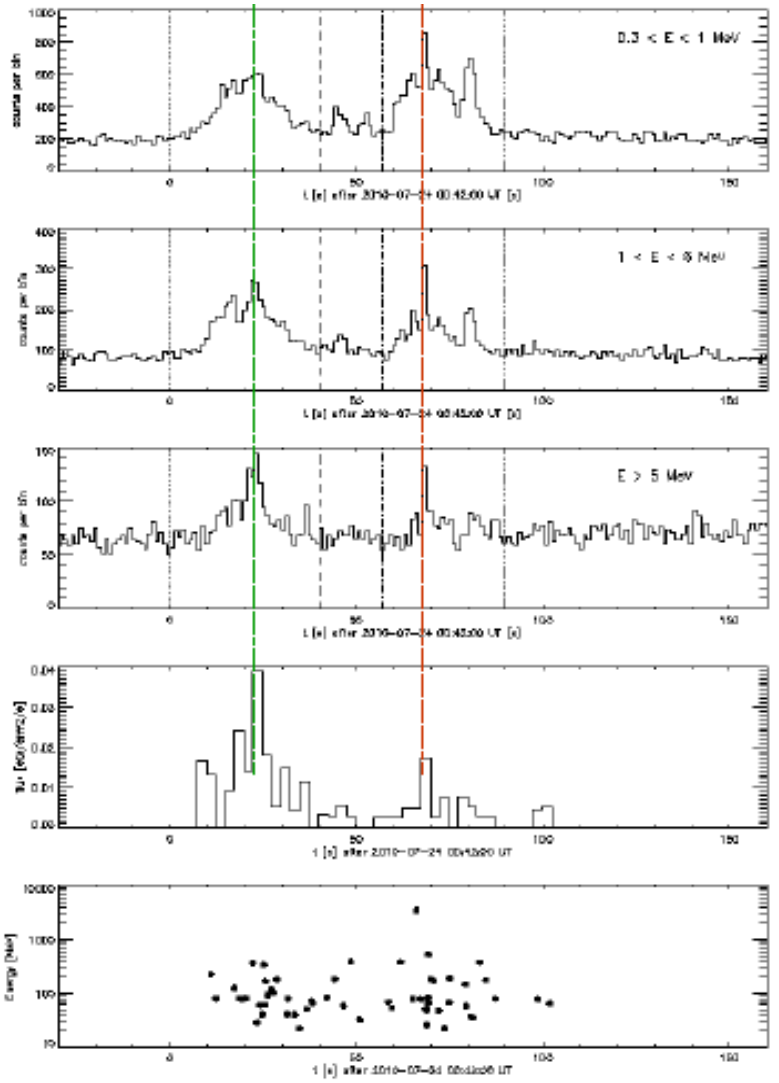


LAT GRB Catalog

Prompt GeV emission : GRB 100724B

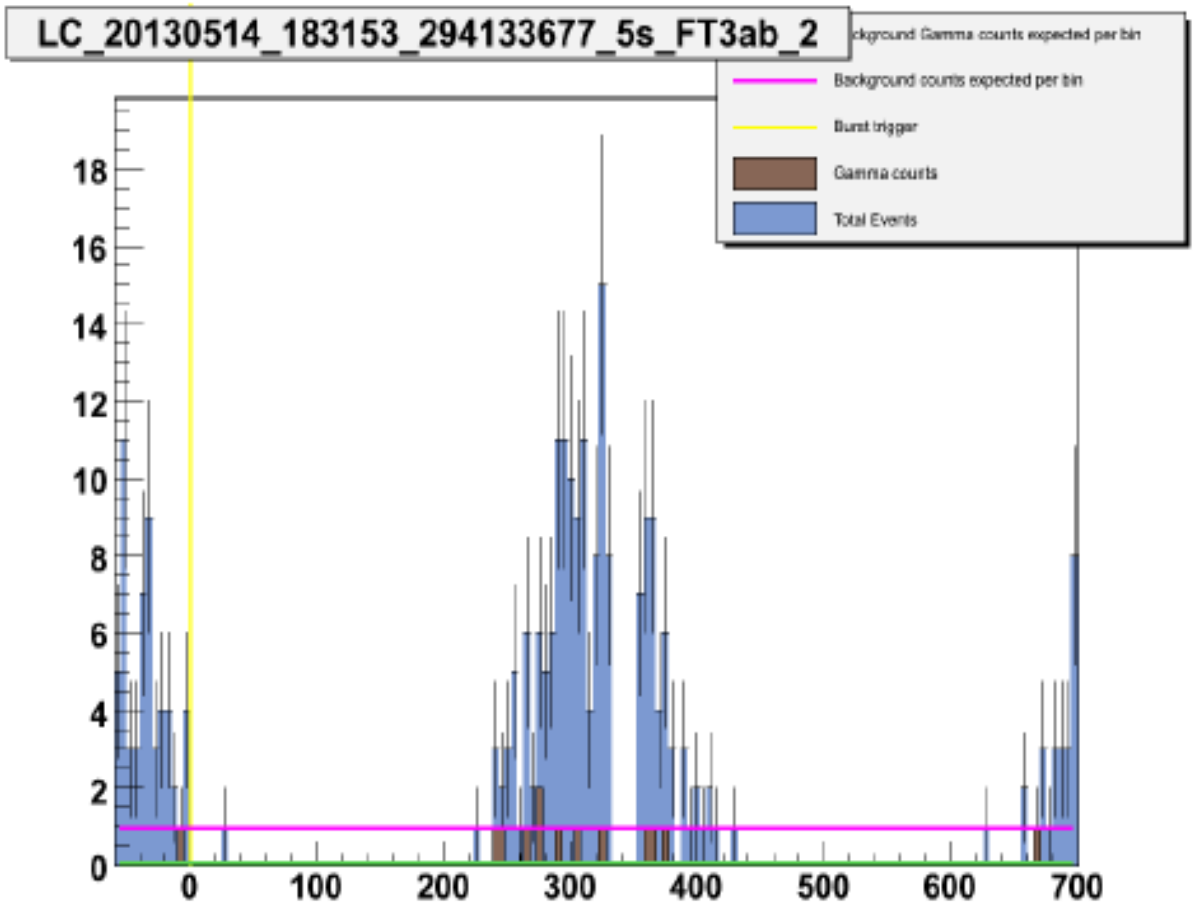
- No time lag is found between the MeV and GeV emission. The two main bumps in the lightcurve show a remarkably similar shape at MeV and GeV.
- Due to the spinning operative mode, GRB 100724B remained within the AGILE/GRID FoV between t_0+6s and t_0+125 s.
- The GRB is not detected during the next "transit" in the FoV (t_0 + 410 s , t_0 + 529 s).
- SuperAGILE was not collecting data for telemetry sharing reasons.

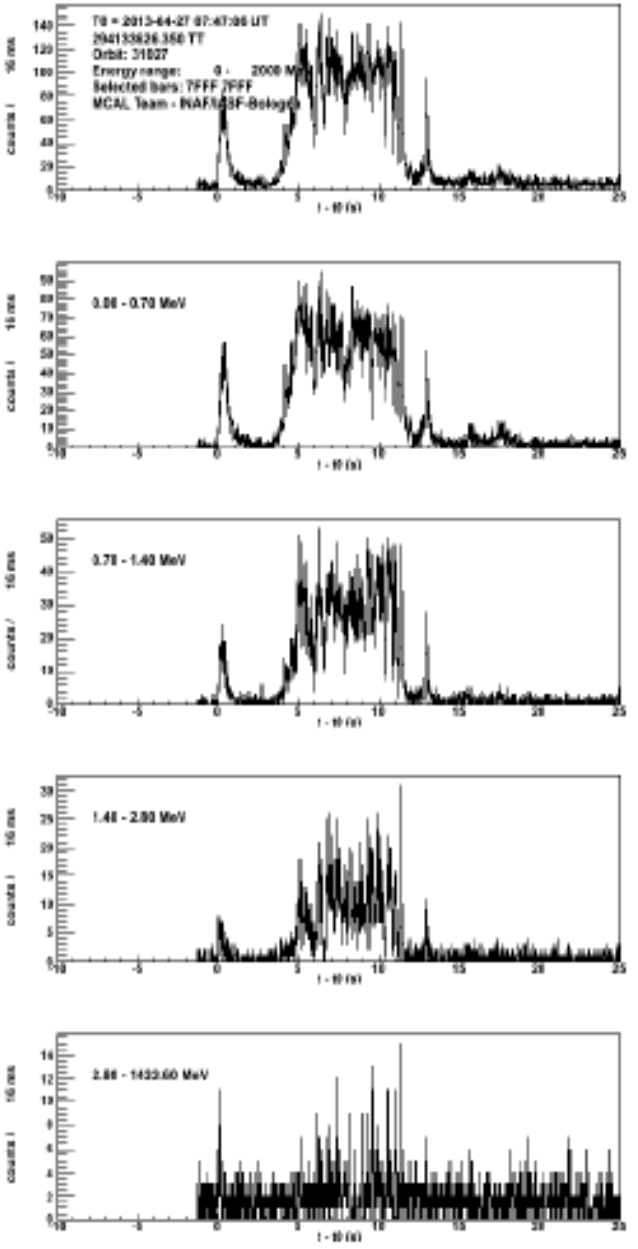
Del Monte et al., A&A, 535, 120, (2011)



Superlong GRBs : GRB 130427

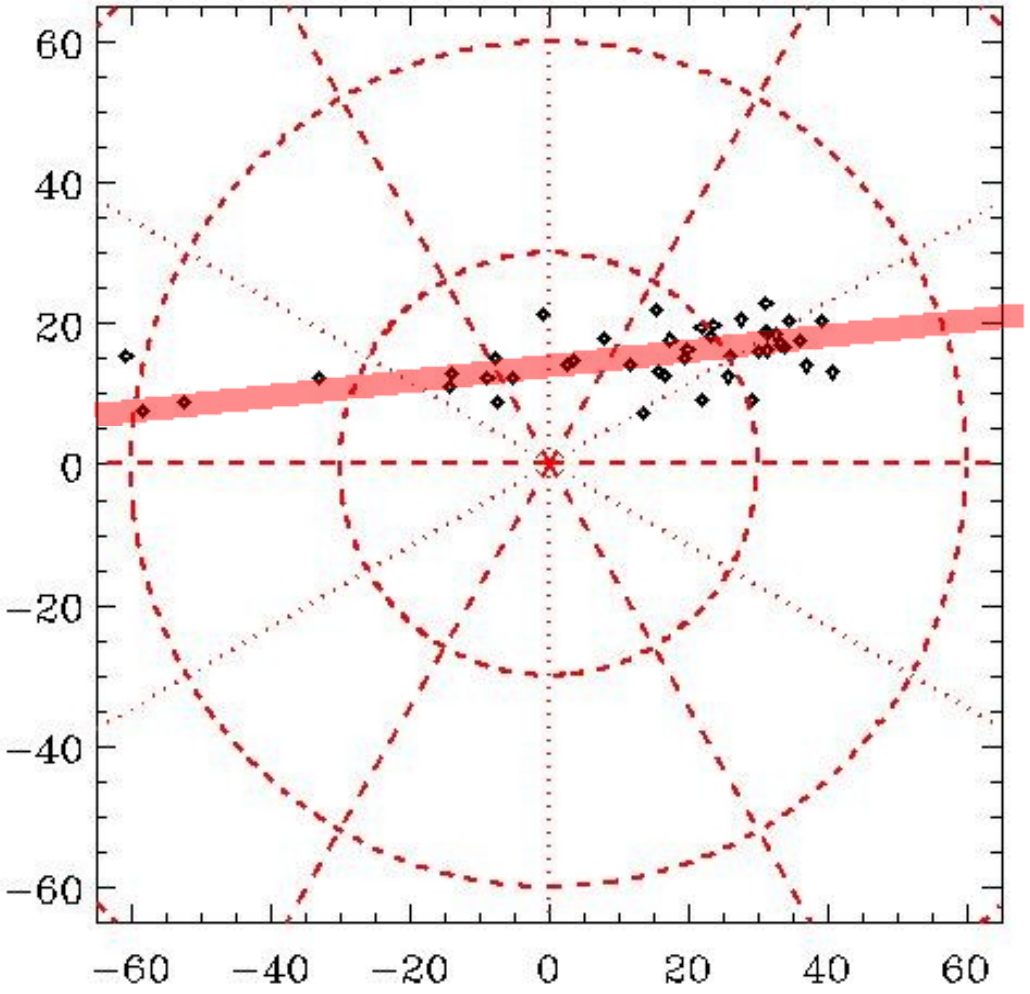
- Outside of the GRID FoV for the first ~ 200 s
- Strong prompt detection by MCAL





	080514B	090401B	090510	100724B	130327B	130427A	131108A
In the Light Curve :							
- Extended emission ,.....	X	X	X			X	X
- Delayed onset			X				
- L ~ t^-a			X				X
- Prompt emission				X	X		
- Superlong Bursts						X	
In the spectrum :							
- Extra component			X				X

GRB 131108A



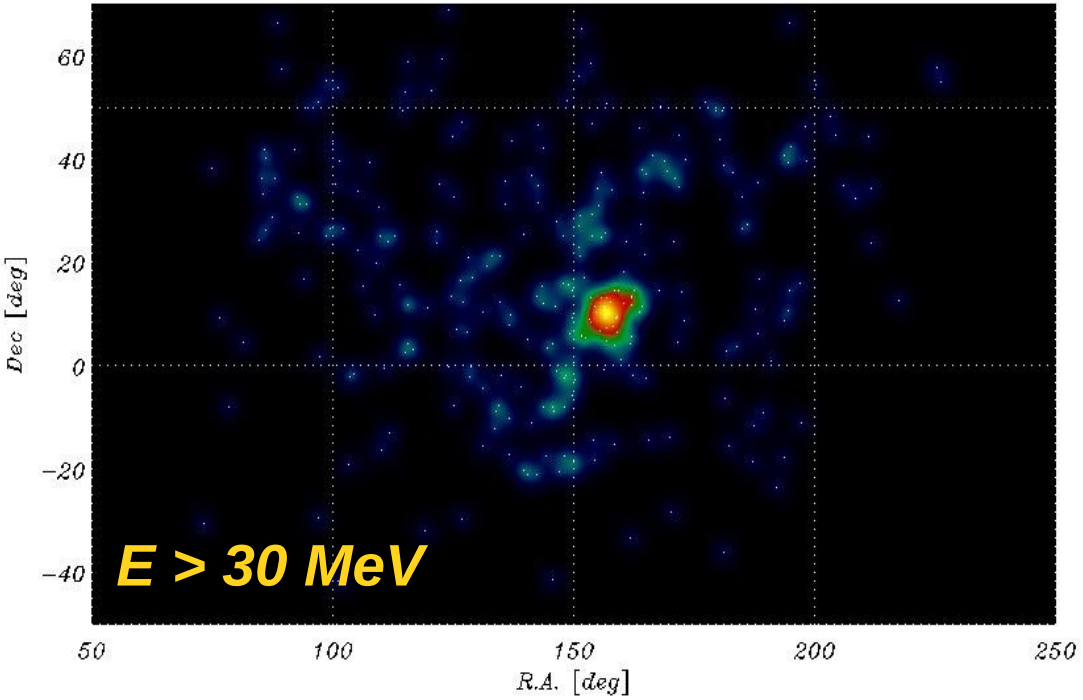
At T_0 = 20:41:55 UTC the GRB was in the GRID FOV, at an off-axis angle of 40

It crossed the FOV during the following 110 s.

In the following rotations of the satellite, the GRB region was observed with the GRID several time

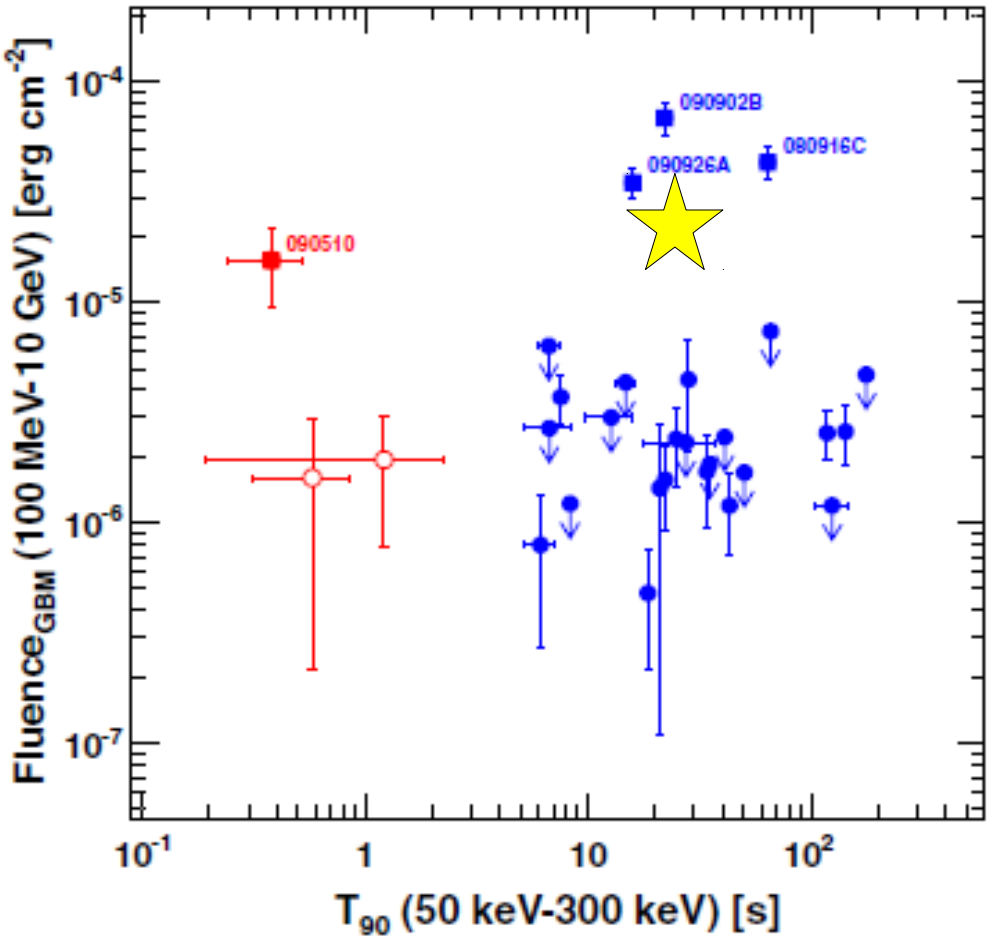
Detected by both GRID and MCAL

GRB 131108A



- Bright and distant
- During the first 80 seconds after T0 the GRID instrument detected 66 photons compatible with the GRB, most of which below 100 MeV
- Fluence of 2.56 +- 0.32 10^-5 erg / cm^2 in the energy band 30 MeV - 1 GeV.
- Redshift 2.4 (GCN 15470)

GRB 131108A



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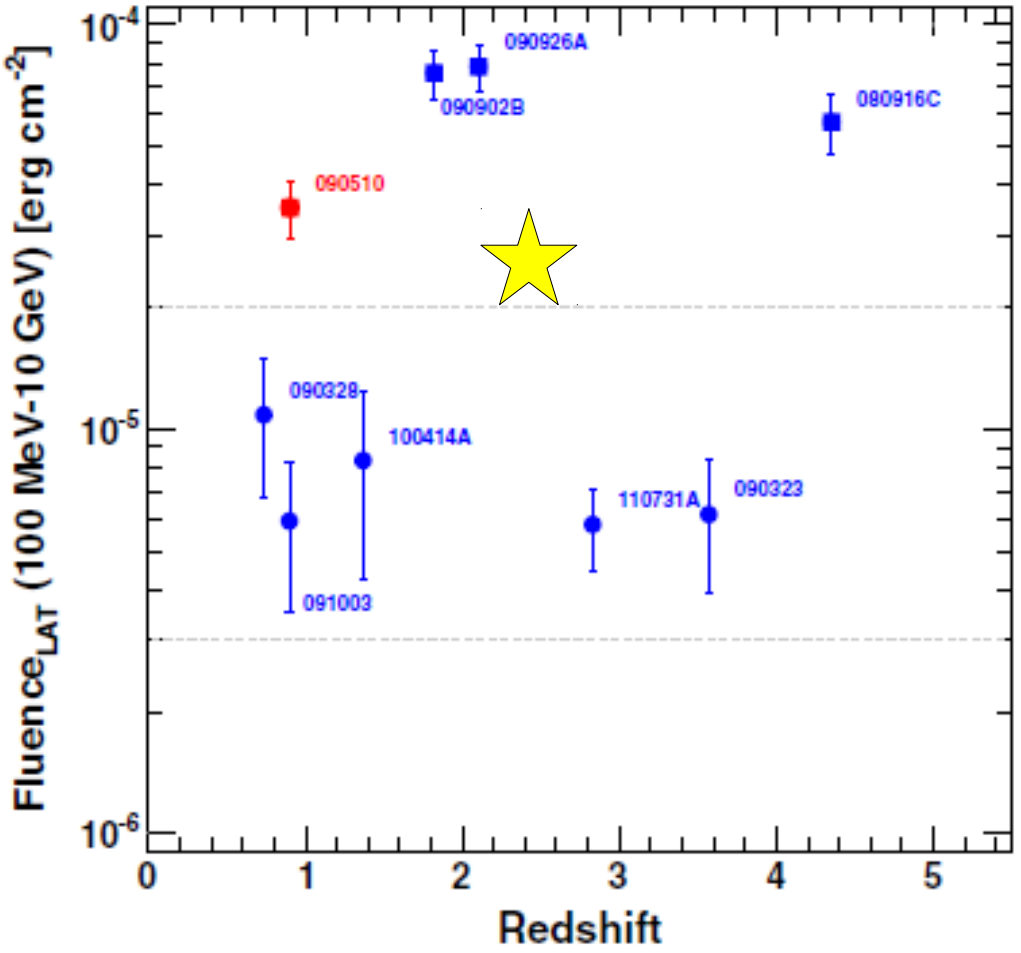

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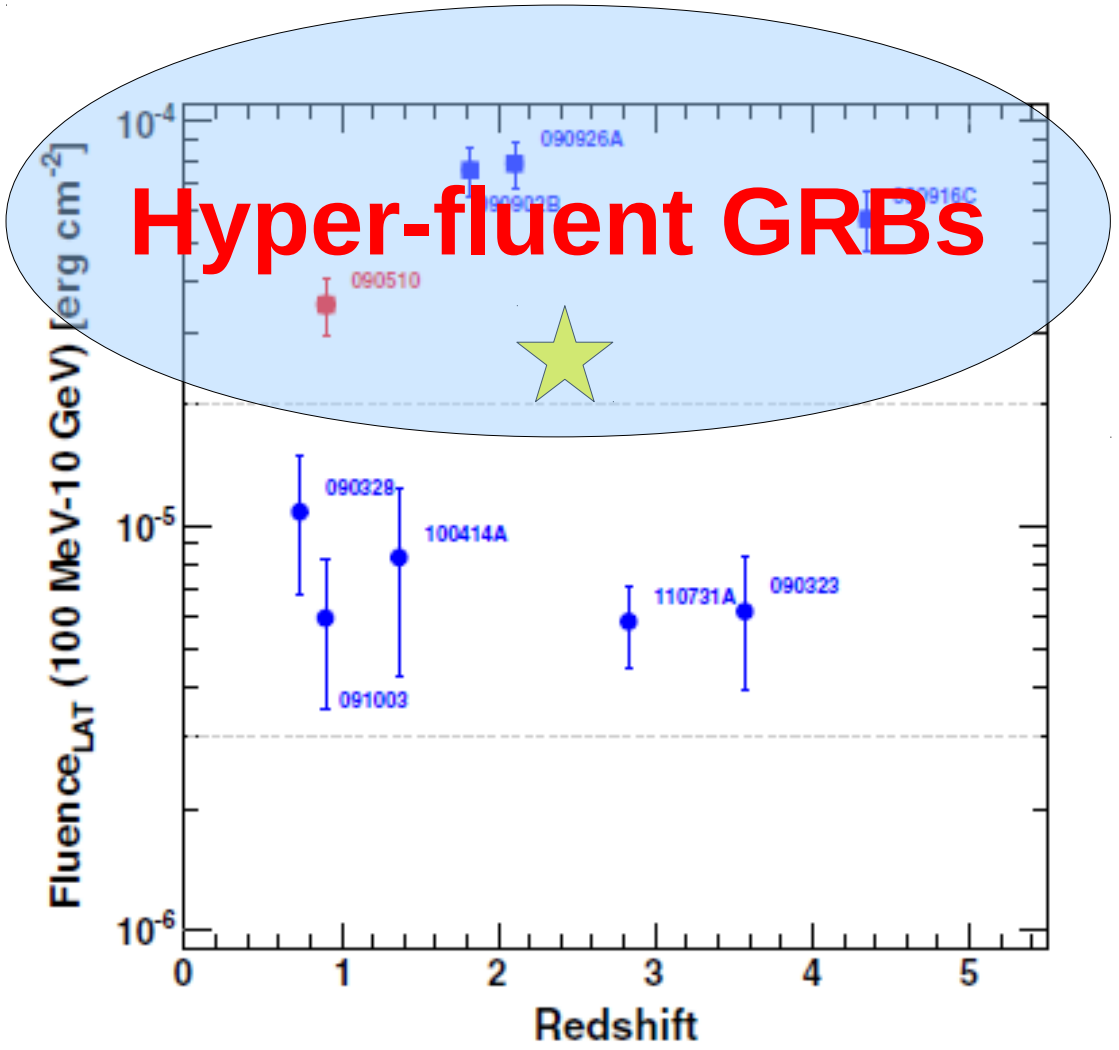

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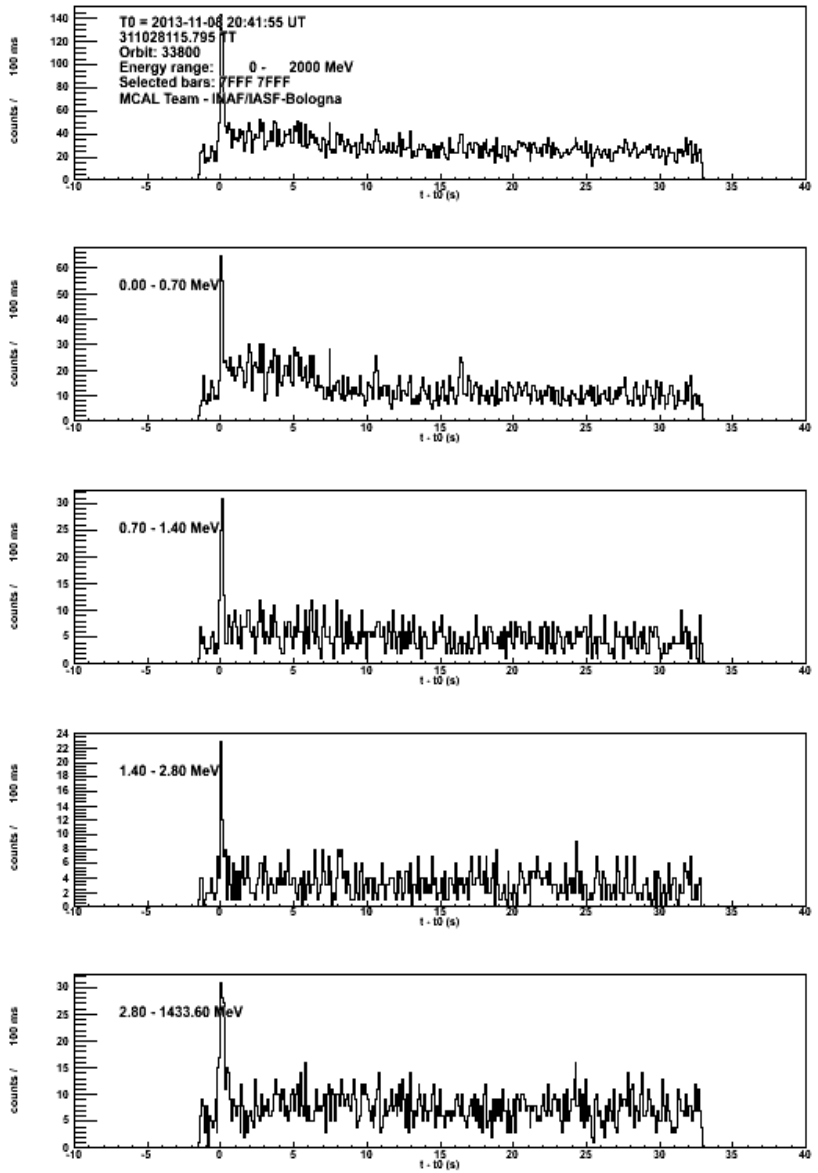
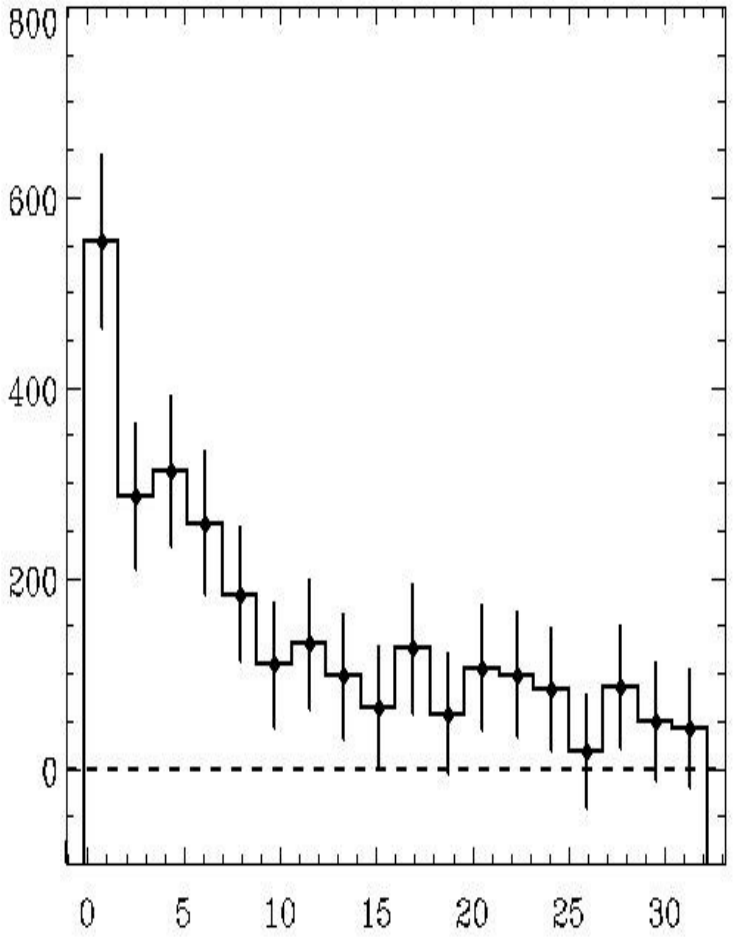


MCAL Light Curve :

Bright initial peak detected from 300 keV to few MeV (width 0.1 s)

Above the background up to 20-25 seconds

GRB 131108A



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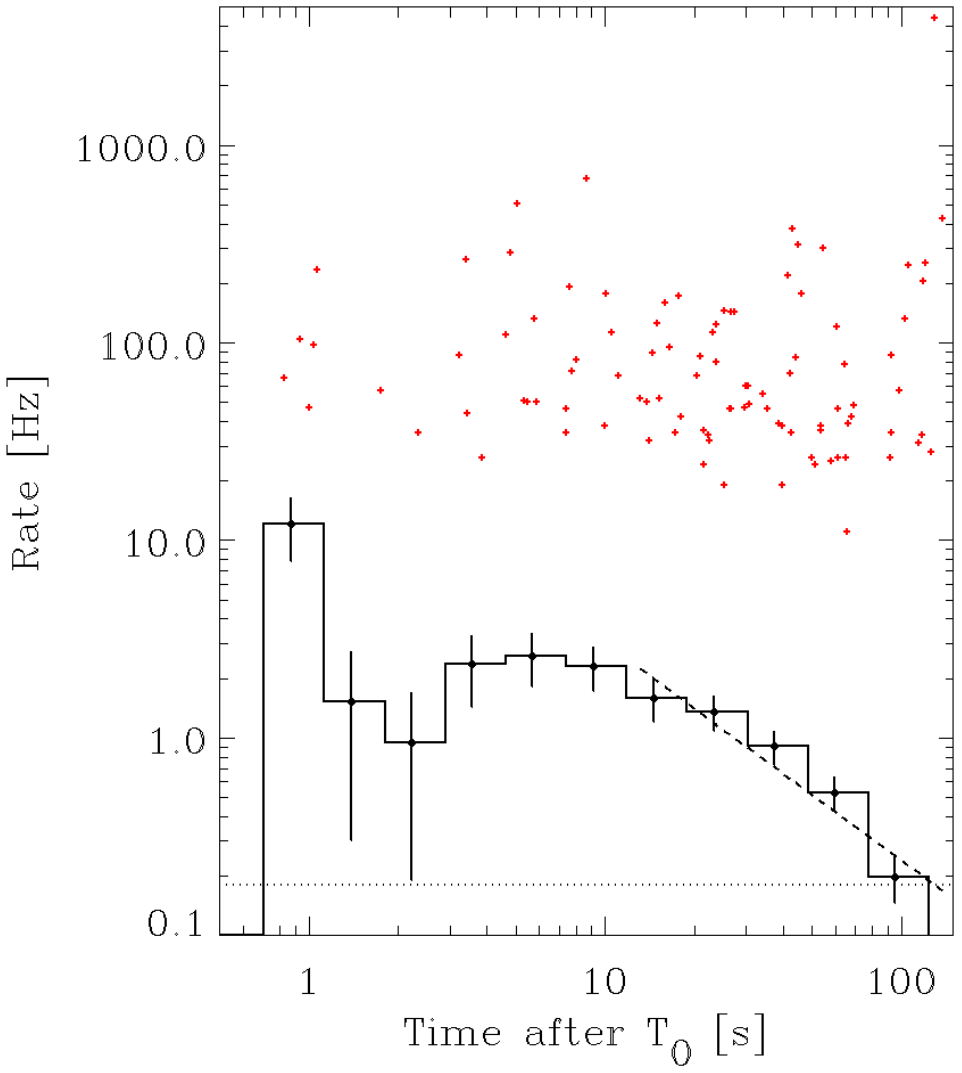
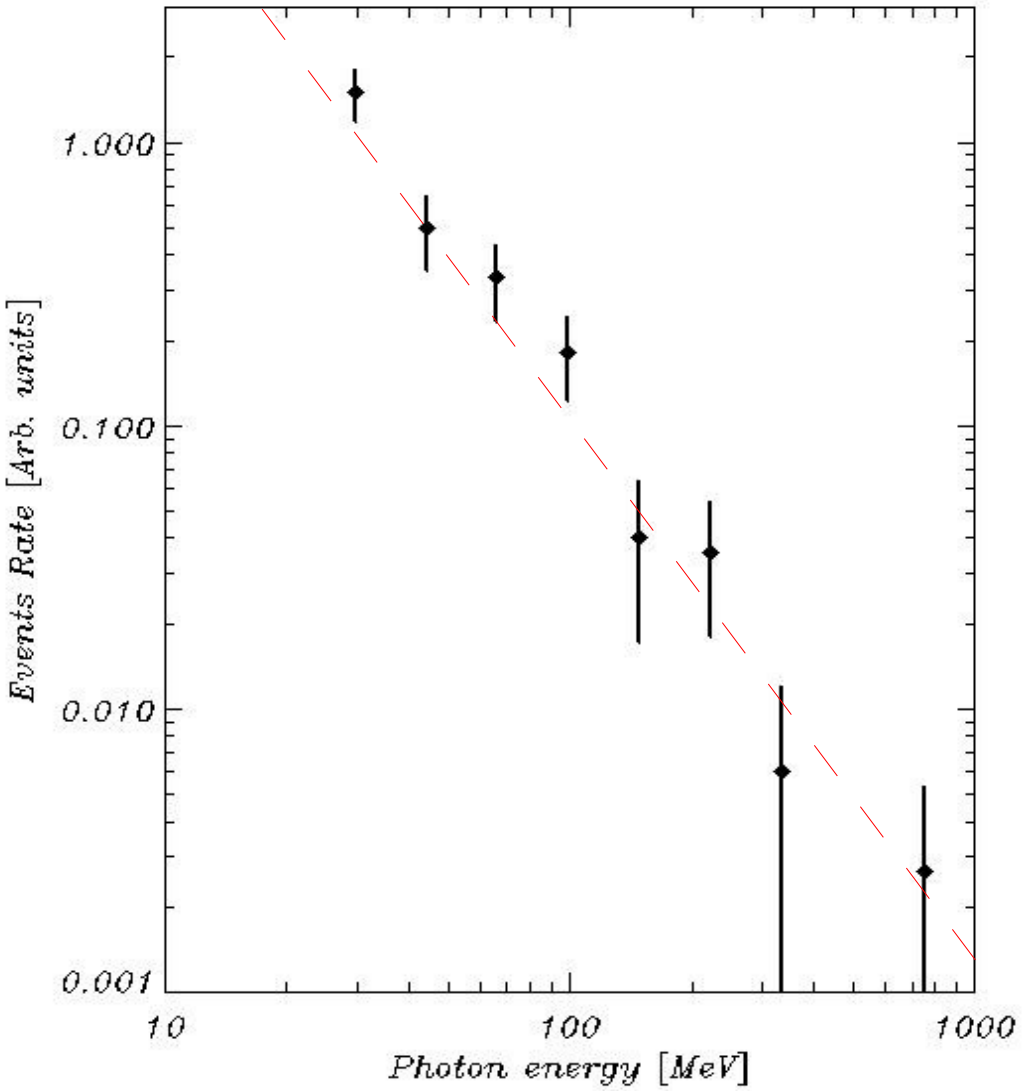


GRID Light Curve :

- The selected events have arrival directions within 20 from the position of GRB131108A .
- After an initial bright peak, the signal remains compatible with a constant rate for about 20-30 s
- The time bins after T0+20 s can be roughly fitted by a function of t^-a with a = 1.1.

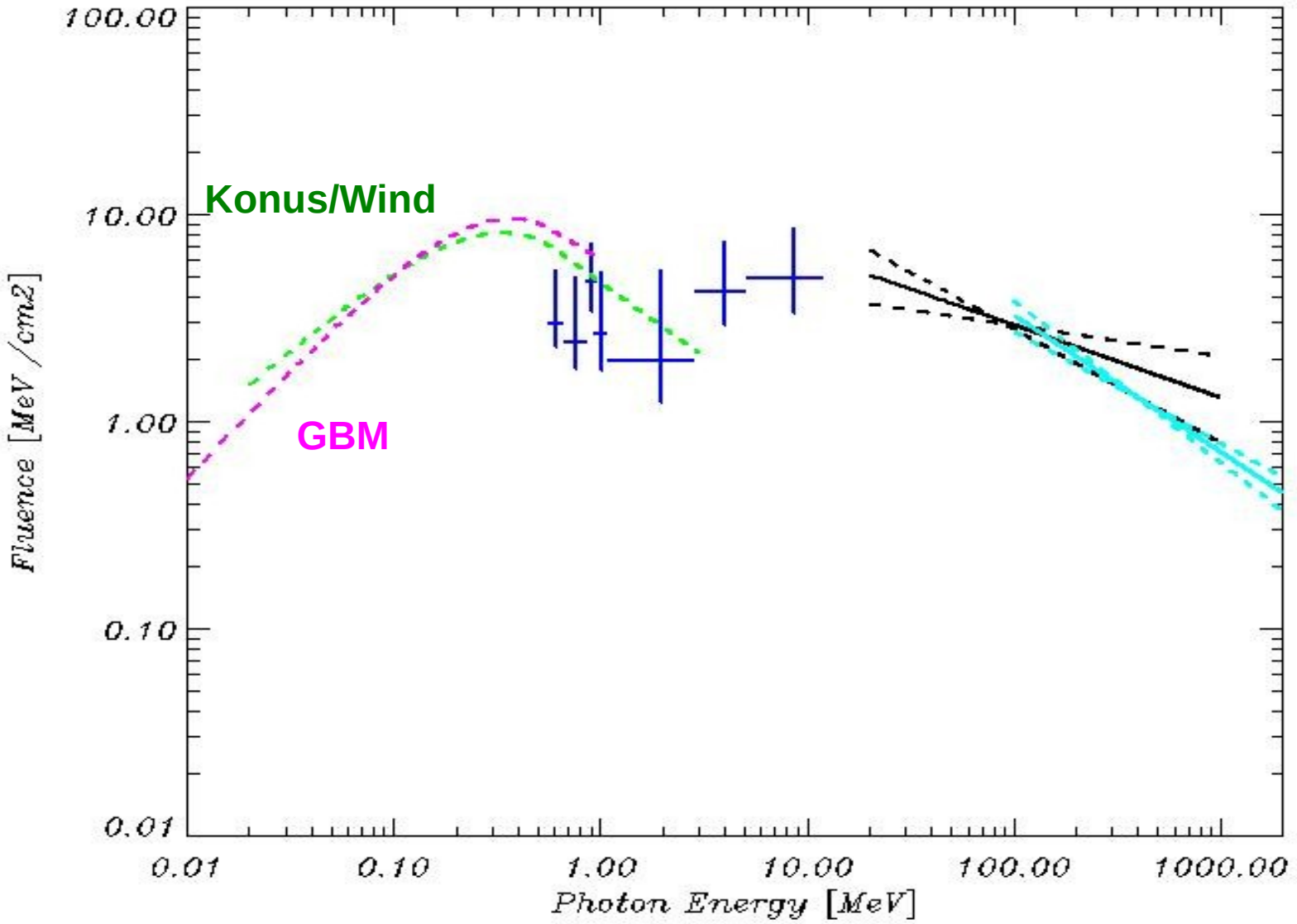
GRID Spectrum



Assuming a power-law spectrum, and taking into account of the effects of the cross-correlation between energy channels and energy dependence of the e ffective area, the above ratio for GRB131108A corresponds to a spectral index of 2.6 +- 0.1.

There is no evidence of change in the spectrum during the GRB.

Spectral Energy Distribution



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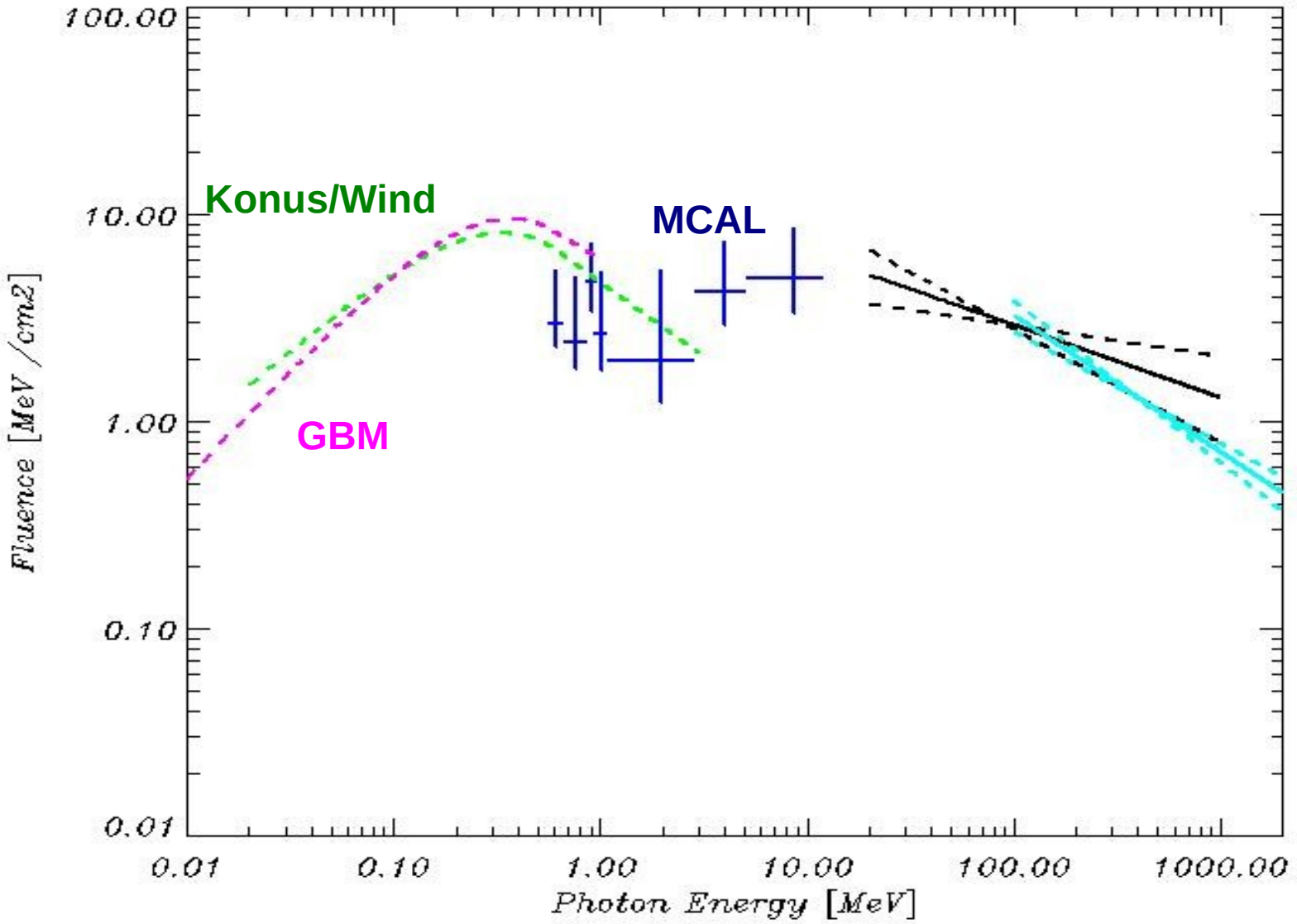

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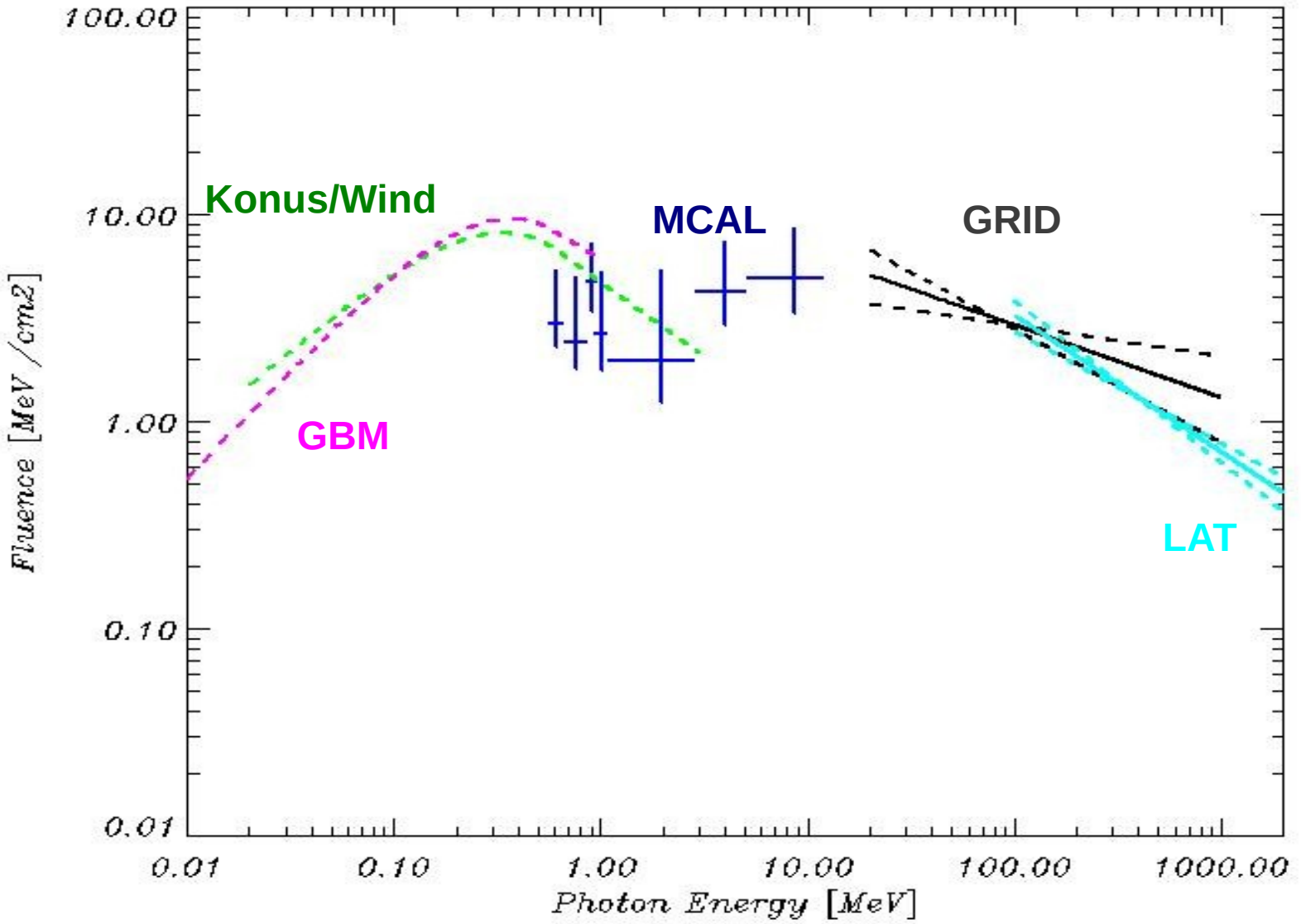

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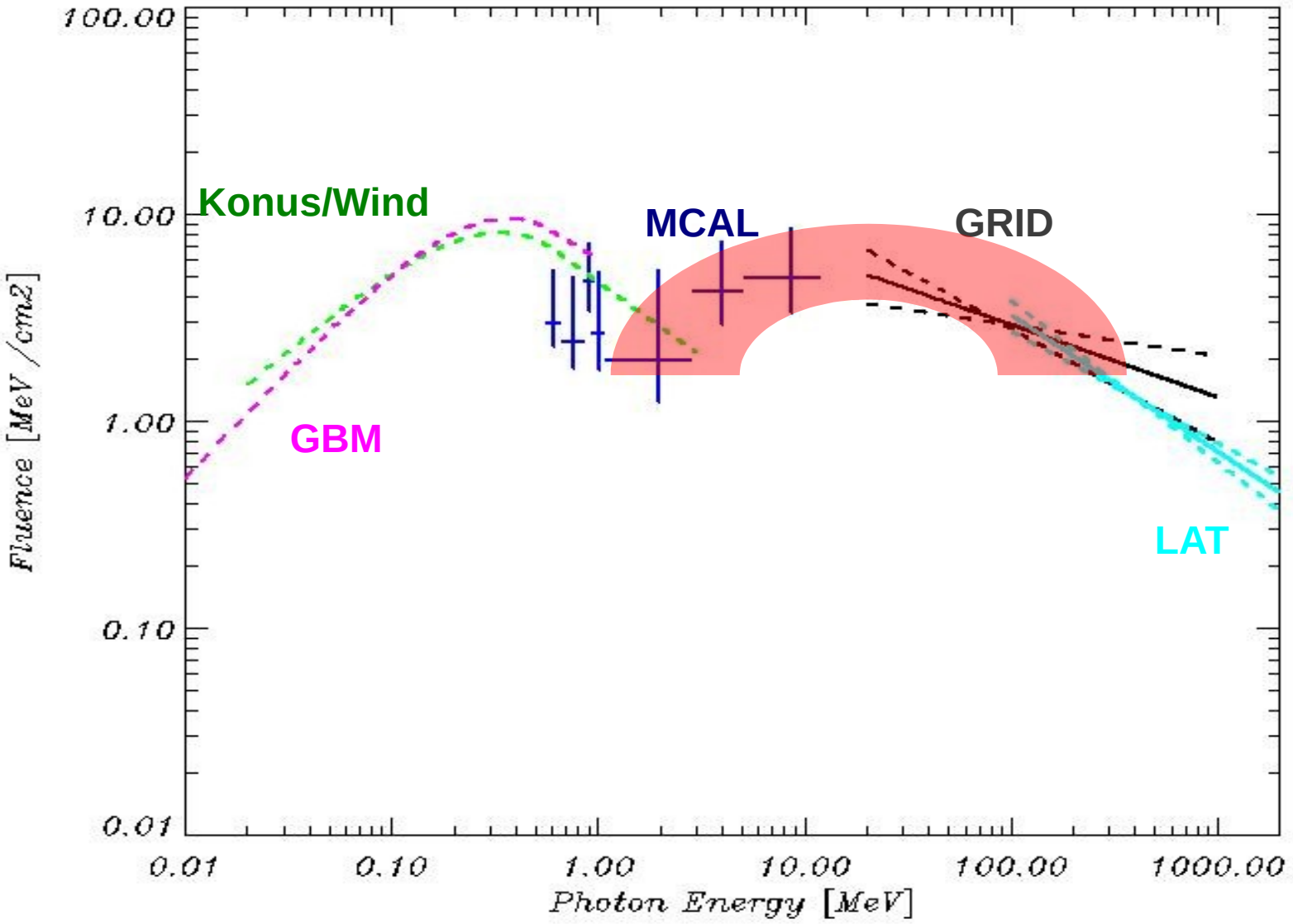

Conclusion

High-energy gamma-ray emission from GRBs shows a large variety of behavior

AGILE can help to investigate any of this temporal and spectral

GRB 131108A : Similar l.c. @500 keV and 50 MeV. Extra spectral component with a broad peak between 10 and 20 MeV

AGILE detected 7 GRBs in 7 years : be ready for the 2014 GRB !