

# MAGIC observation of a short nearby GRB 160821B

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on behalf of the MAGIC and Fermi Collaboration

# Short GRB 160821B

One of the **nearest** observed GRBs:  $z = 0.16$  ! (Levan et al. 2016)

## Multiwavelength Observations

### Fermi-GBM:

$T_{90} < 1\text{s}$ ,  $E_p \sim 84\text{ keV}$

$S = 1.7 \times 10^{-6} \text{ erg cm}^{-2}$ ,  $E_{\text{iso}} = 1.2 \times 10^{50} \text{ erg}$

### Swift-XRT:

Extended Emission ( $< 300\text{ s}$ )

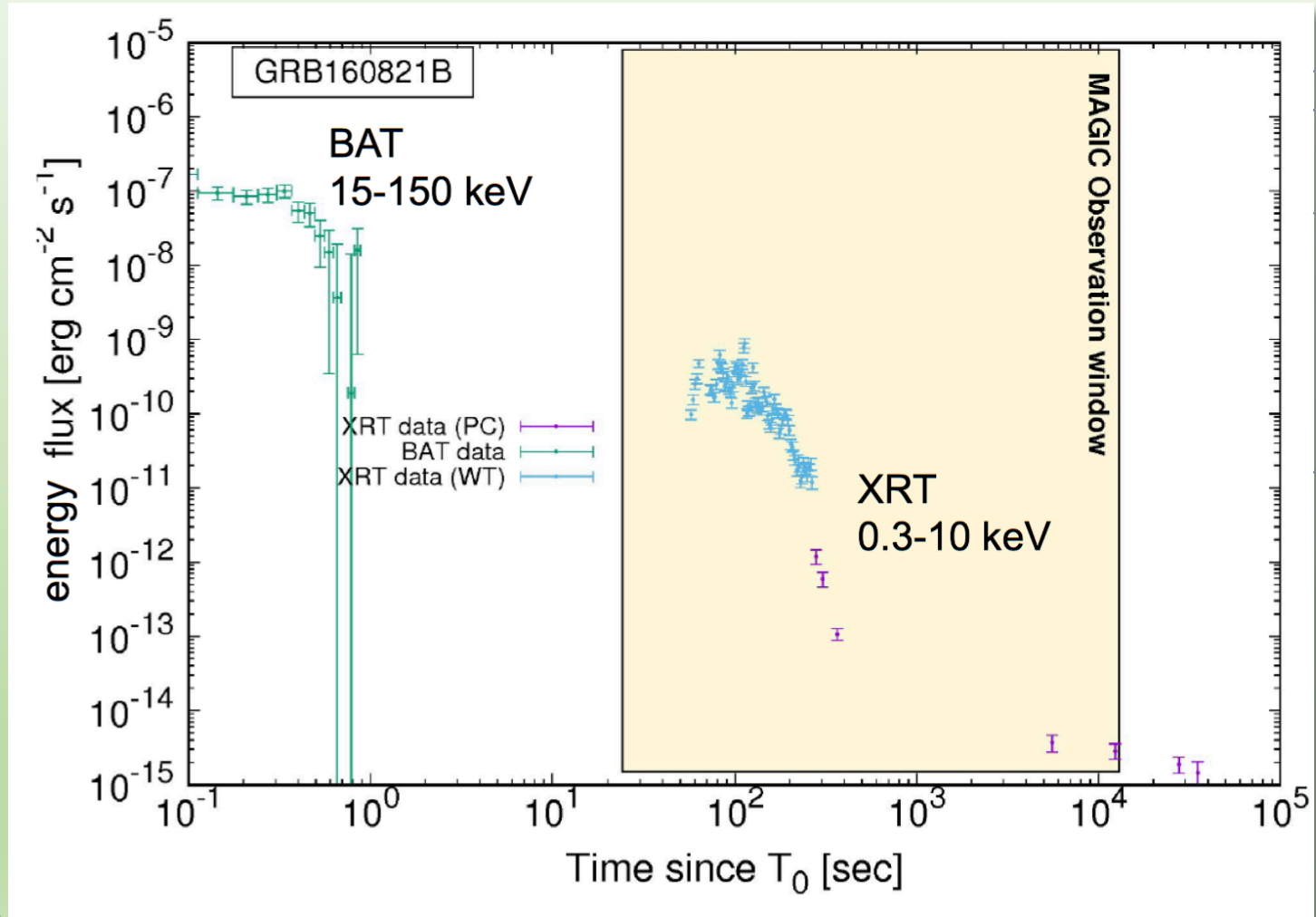
- + Steep Decay  $t < 500\text{s}$
- + Plateau  $t < 30\text{ks}$

## Afterglow constrains on kilonova

**Optical** (Xu et al. 2016)

**IR** (Fong et al. 2016)

**hint in H-band?** (Tanvir et al. in prep)



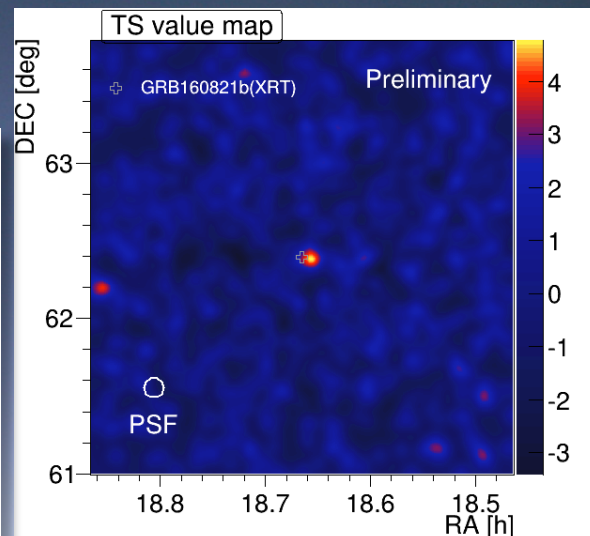
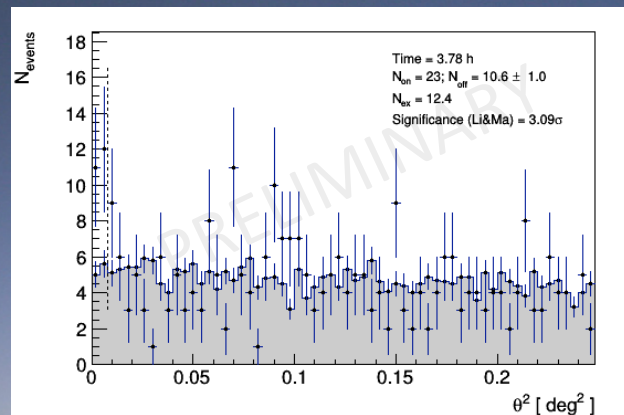


# Short GRB 160821B: MAGIC/Fermi-LAT Analysis

## Automatic follow-up by MAGIC

- $t \sim 24 \text{ s} - 1.5 \text{ h}$ ,  $Z_d \sim 34\text{--}40^\circ$ , poor weather, NSB  $\sim 3\text{--}5 \times \text{dark}$
- $t \sim 1.5 \text{ h} - 4 \text{ h}$ ,  $Z_d \sim 40\text{--}55^\circ$ , good weather, NSB  $\sim 5\text{--}9 \times \text{dark}$

highest significant hint at VHE  
for a GRB with an IACT

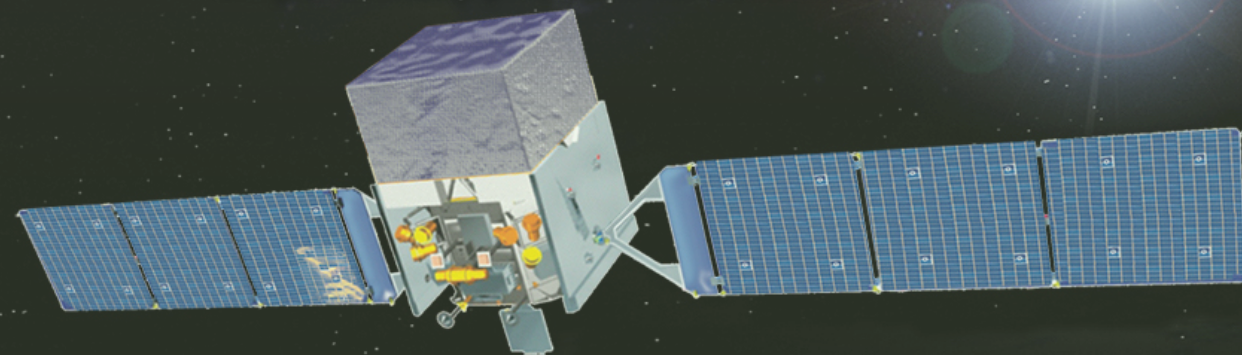


## Fermi-LAT Observation

Due to a previous repointing alert (GRB160821A) the *Fermi*-LAT GRB160821B data are taken in a not Favourable pointing conditions:

- Maximum Fov  $\sim 70^\circ$
- $TS < 1$

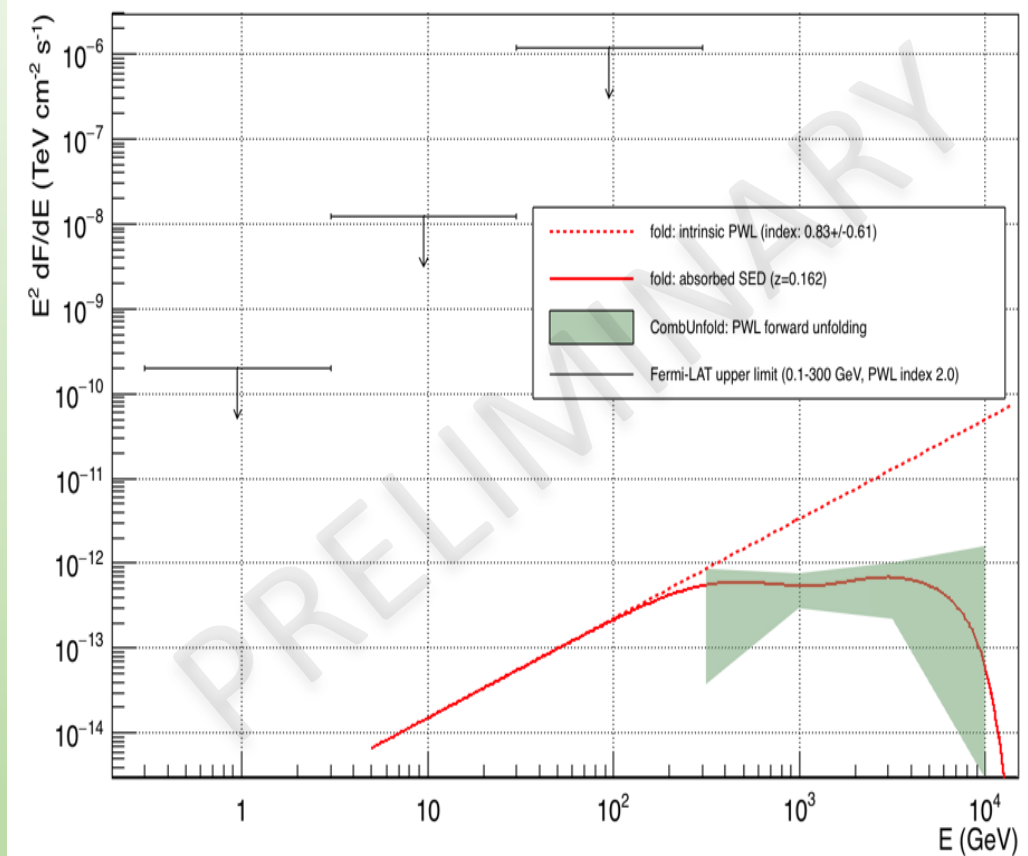
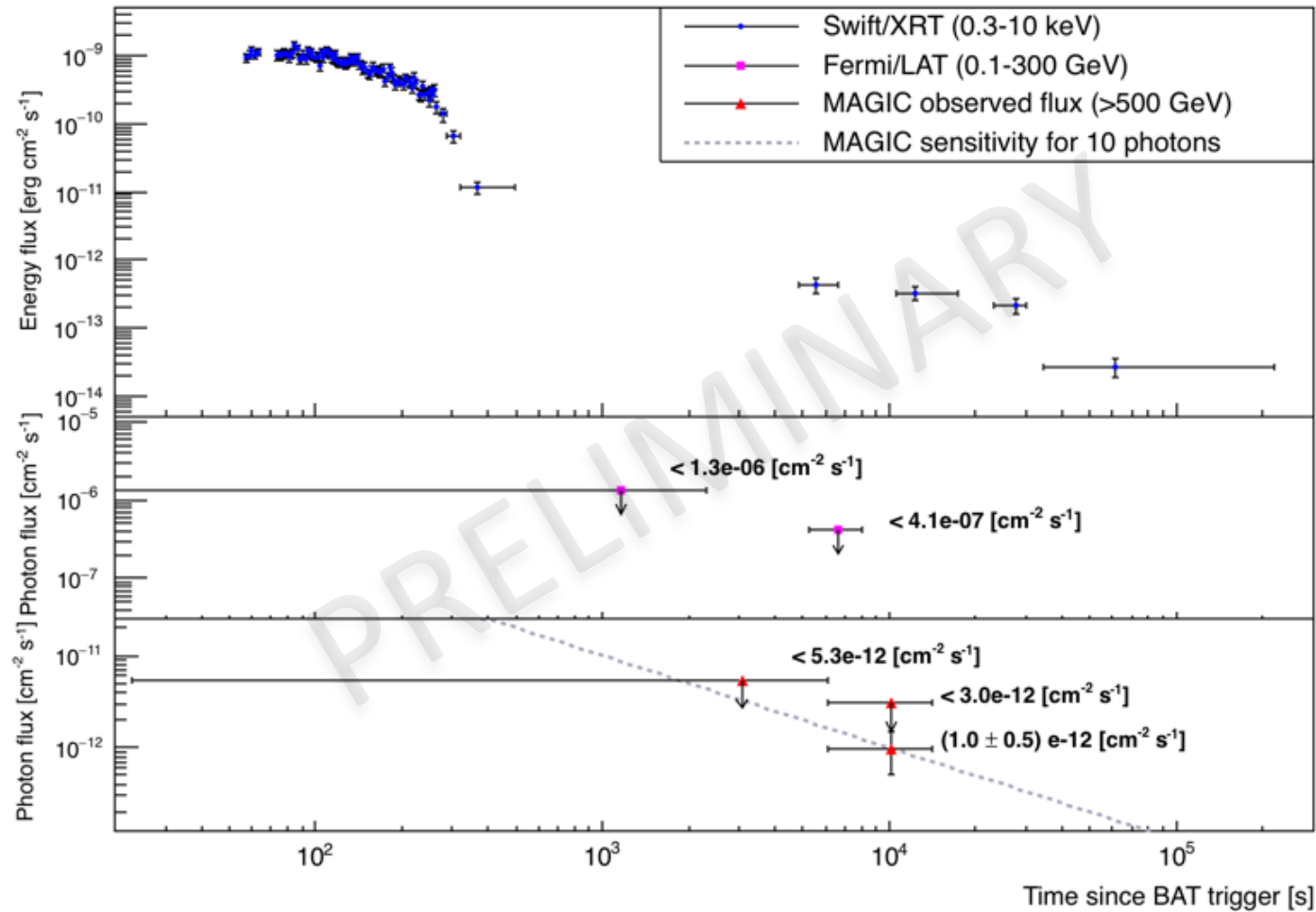
**Bayesian Approach to calculate the ULs !**



$$T_0 - T_0 + 23115 \rightarrow 1.34 \times 10^{-6} \text{ ph/cm}^2/\text{s} \quad (2.15 \times 10^{-10} \text{ erg/cm}^2/\text{s})$$

$$T_0 + 5270 \text{ s} - T_0 + 8050 \text{ s} \rightarrow 4.10 \times 10^{-7} \text{ ph/cm}^2/\text{s} \quad (6.57 \times 10^{-11} \text{ erg/cm}^2/\text{s})$$

# GRB 160821B Multiwavelength Results



Suggesting a relatively flat light curve in HE-VHE?

Flat VHE SED seems well explained by EBL-attenuated PL. Modeling ongoing.