MAGIC observation of a short nearby GRB 160821B

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on behalf of the MAGIC and Fermi Collaboration
One of the nearest observed GRBs: \( z = 0.16 \) ! (Levan et al. 2016)

Multiwavelength Observations

**Fermi-GBM:**
- \( T_{90} < 1 \) s, \( E_p \sim 84 \) keV
- \( S = 1.7 \times 10^{-6} \) erg cm\(^{-2}\), \( E_{iso} = 1.2 \times 10^{50} \) erg

**Swift-XRT:**
- Extended Emission (<300 s)
  - Steep Decay \( t < 500 \) s
  - Plateau \( t < 30 \) 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
- $t \sim 24$ s - 1.5 h, $Z_d^{\sim 34-40}$°, poor weather, NSB $\sim 3-5 \times$ dark
- $t \sim 1.5$ h – 4 h, $Z_d^{\sim 40-55}$°, good weather, NSB $\sim 5-9 \times$ 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 $\sim 70$ deg
- $TS < 1$

Bayesian Approach to calculate the ULs!

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

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