Contribution ID: **100** Type: **Poster**

MAGIC observations of the nearby short GRB 160821B

Friday 16 July 2021 19:18 (12 minutes)

Gamma-ray bursts (GRBs), the most luminous explosions in the universe, have at least two types known. One of them, short GRBs, have been thought to originate from binary neutron star (BNS) mergers. The discovery of GW170817 together with a GRB was the first and only direct proof of the hypothesis, and thus the properties of the short GRBs are poorly known yet. Aiming to clarify the underlying physical mechanisms of the short GRBs, we analyzed GRB 160821B, one of the nearest short GRBs known at z=0.162, observed with the MAGIC telescopes. A hint of a gamma-ray signal is found above 0.5 TeV at a significance of >3 sigma during observations from 24 seconds until 4 hours after the burst, as presented in the past.
Recently, multi-wavelength data of its afterglow emission revealed a well-sampled kilonova component from a BNS merger, and the importance of GRB 160821B increased concerning GRB-GW studies. Accordingly, we investigated GRB afterglow models again, using the revised multi-wavelength data. We found that the straightforward interpretation with one-zone synchrotron self-Compton model from the external forward shock is in tension with the observed TeV flux, contradicting the suggestion reported previously.
In this contribution we discuss the implication from the TeV observation, including alternative scenarios where the TeV emission can be enhanced. We also give a brief outlook of future GeV-TeV observations of short GRBs with imaging atmospheric Cherenkov telescopes, which could shed more light on the GRB-BNS merger relation.

Keywords

GRB; short GRB; kilonova; very high energy gamma rays; IACT

Collaboration

MAGIC

other Collaboration

Fermi-LAT

Subcategory

Experimental Results

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Session Classification: Discussion

Track Classification: Scientific Field: GAI | Gamma Ray Indirect