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Observation of sub-TeV gamma-ray emission from GRB 201216C at redshift 1.1

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Gamma-ray bursts (GRBs) are the most luminous explosions in the Universe. Thanks to the recent observations by ground-based gamma-ray telescopes, we now know that at least a class of GRBs are able to emit very-high-energy (VHE) gamma-ray emission. Starting from GRB 190114C detected by the MAGIC telescopes, in total there are five reports of VHE detection so far from MAGIC, H.E.S.S. and LHAASO. Currently, the most accredited radiation process able to explain this component is the Synchrotron-Self Compton (SSC) emission. The MAGIC second GRB detected is a long GRB 201216C at redshift of 1.1, which is the furthest source ever detected by ground-based gamma-ray telescopes. The MAGIC telescopes started follow-up of the GRB at 56 seconds after the Swift-BAT trigger and continued the observation for 2.2 hours. We analyzed the MAGIC data, optical data from Liverpool Telescope and the Swift-XRT data, and performed modeling of the multi-wavelength emission. We find that a single-zone SSC model can explain the data from the optical to the VHE band. In this contribution, we present the final results of our analysis of GRB 201216C and discuss the impact that these results have on the GRB afterglow theory.

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