Contribution ID: **129** Type: **Contributed Talk**

Discovery of high-energy gamma-ray emission from a reverse shock of GRB 180720B

Wednesday 12 October 2022 16:30 (15 minutes)

Gamma-ray bursts (GRBs) emit cosmic high-energy gamma rays over a short period of time and the origin of gamma rays is still under debate. Recent gamma-ray observations in the GeV and TeV bands by Fermi and MAGIC revealed that some of the high-energy gamma rays are thought to originate from the forward shock of GRB jets. However, early-stage bright gamma-ray emissions are still poorly understood and cannot be explained by only the forward shock of relativistic ejecta. One of the possible origins is a reverse-shock emission, but there has been no distinct evidence so far. Here, we present the discovery of gamma-ray emission originating from the reverse shock coincident with the optical emission from GRB 180720B. The Large Area Telescope (LAT) on board the Fermi Gamma-ray Space Telescope detected bright gamma-rays lasting for >100 s in the GeV band while the Kanata telescope simultaneously detected bright optical emission. The observed temporal and spectral behaviors in the optical and GeV bands at the early phase can be interpreted as a reverse-shock component: relativistic electrons scatter optical synchrotron photons serving as seed photons and inverse-Compton GeV emission is created in the reverse shock. This result suggests that not only the forward shock but also the reverse shock is crucial for explaining the origin of the high-energy gamma-ray emission.

Track

GRBs

Primary author: ARIMOTO, Makoto

Co-authors: Dr ASANO, Katsuaki (ICRR, University of Tokyo); KAWABATA, Koji (Hiroshima Univ.); Dr TOMA, Kenji (Tohoku University); GILL, Ramandeep (CITA); Prof. GRANOT, Jonathan (Open University of Israel)

Presenter: ARIMOTO, Makoto

Session Classification: Parallel 10