

Research Result Report
ICRR Inter-University Research Program 2025

Research Subject: Galactic gamma-ray sources analysis

Principal Investigator: Yating Chai

Participating Researchers: Takayuki Saito, Marcel Strzys, Ievgen Vovk

Summary of Research Result :

Current research activities focus on the analysis of Galactic gamma-ray sources using observational data from LST-1 and the MAGIC telescopes. One of the primary targets is the Boomerang source (G106.3+2.7), which is considered a promising candidate for cosmic-ray acceleration up to very high energies. The ongoing study combines approximately 50 hours of LST-1 observations and 100 hours of MAGIC data. Preliminary analyses show significant gamma-ray emission above 3 TeV, with detection significances exceeding 5 sigma independently for both LST-1 and MAGIC. Detailed spectral and morphological analyses are currently in progress, including investigations of possible spectral breaks and the origin of the gamma-ray emission.

Another important target is the supernova remnant G17.8+16.7. Initial analyses based on only 10 hours of observational data already indicate a possible hint of gamma-ray emission at energies of a few hundred GeV. The obtained upper limits are able to constrain the power-law spectrum proposed from Fermi observations. Although the current significance is not yet sufficient for a firm detection claim, the observed excess is scientifically interesting and motivates further investigation. Additional studies are being

carried out to optimize the analysis and improve background estimation. A new observation proposal is also being prepared to request additional observation time in order to improve the statistical significance and enable more detailed studies of the source.

These research activities contribute to the understanding of particle acceleration and the origin of cosmic rays in Galactic environments. The combined use of LST and MAGIC observations provides excellent sensitivity over a broad energy range and demonstrates the scientific potential of next-generation gamma-ray observations.

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