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Investigating gamma-ray emission of the Cygnus cocoon with 12 years of Fermi-LAT data

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Massive star-forming regions are genuine reservoirs of energy and potential sources of non-thermal particles, but their role in Galactic cosmic-ray acceleration and propagation is still poorly understood. Gamma-ray observations of the Cygnus X star-forming region revealed the presence of a cocoon of freshly-accelerated cosmic rays, making it one of the best examples to investigate these issues. However, the exact acceleration sites and mechanisms, the nature of the particles, and how they propagate through the cocoon have not been firmly established yet, and the contribution from other gamma-ray sources in this crowded region remains uncertain. We will present a new in-depth analysis of more than 12 years of observations from the Fermi Large Area Telescope combined with high-resolution interstellar medium tracer data to improve the understanding of gamma-ray emission from the Cygnus region. The evolution of the cocoon morphology as a function of energy and its spectrum up to 1 TeV will be used to shed new light on the open questions about the physical processes shaping the young cosmic-ray population in Cygnus X.

Keywords

Gamma-ray analysis; interstellar emission model; Cygnus; OB association; acceleration of cosmic rays; propagation of cosmic rays

Collaboration

Ferrmi-LAT

other Collaboration

Subcategory

Experimental Results

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