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Exploring Cosmic Ray acceleration and escape in the W44 region with Fermi-LAT and MAGIC

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W44 is a middle-aged Supernova Remnant (SNR) largely investigated to probe acceleration of Cosmic Rays (CRs). Previous studies already showed the presence of gamma-ray emission not only from the remnant, but also from its surroundings, thought to be due to high-energy CRs escaping from the forward shock of the remnant.

We present a detailed morphological and spectral analysis of Fermi-LAT data above 100 MeV related to the W 44 region. The morphological analysis was performed for energies above 1 GeV, to exploit the improved angular resolution of the instrument, deriving an accurate description of the region's morphology.

The W 44 region was also observed in the very high-energy gamma-ray band by the MAGIC telescopes. We carried out a likelihood analysis exploiting the spatial information derived from the Fermi-LAT analysis above 1 GeV, focusing on the northwestern side of the remnant. The combined Fermi-LAT and MAGIC spectra provide useful constraints on the diffusion of the escaped CRs.

In this talk we describe the analysis results and a model that includes the temporal evolution of the acceleration and escape process of high-energy particles from the remnant's shock.

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