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Supernova Remnant W28 observed by Fermi-LAT

We present a long term analysis of temporal evolution of the gamma-ray source W28, which is a supernova remnant (SNR) observed by the Large Area Telescope (LAT) on board of the Fermi Gamma-Ray Space Telescope since 2008. W28 is an old ($3.5 - 4.5 \times 10^4$ yr) galactic diffuse gamma-ray source, located ~ 2 kpc away from us, at (l:6.71, b:0.05). Observed for more than 10 years, W28 is an interesting target of study because of its good spectral and spatial data resolution. We studied the 10 years data (04/August/2008 - 04/August/2018) between the energy range 100 MeV to 300 GeV, this study takes a longer observation time allowing us to have good statistics and confidence in our results. SNR W28, a verified hadronic gamma-ray source, is an example of interaction of the supernovae ejecta with the ISM. For this work we performed an extended source binned likelihood analysis, through FermiTools software. We obtained light curves, flux and spectral parameters. Our results are in agreement with parameters obtained from a simulation of the source region (10 degrees radii) considering the contribution of gamma-ray nearby sources, due to large point spread function (PSF) at low energies, and background, through Galactic diffuse and isotropic emission models. We found an excess of gamma-ray emission in the time period between 2014 and 2015, with a significance of more than 8σ . We reproduce previous results, the increase in gamma emission was produced by the interaction of the shock front with a dense region within a molecular cloud (MC). After this emission episode we found another emission episode in 2016, and we studied its characteristics. Finally, we discuss the potential physical processes responsible for the gamma emission of the SNR.

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