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Gamma-ray emission from Puppis A with Fermi-LAT telescope evidence for proton acceleration

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Supernova Remnants (SNRs) are the primary suspect among Galactic sources to accelerate particles via diffusive shock acceleration up to the necessary PeV energies. The gamma-ray emission of SNRs can provide direct evidence of leptonic (inverse Compton and bremsstrahlung) and hadronic (pion-decay from proton-proton interactions) processes.

Puppis A is a middle-aged SNR interacting with interstellar clouds which has been observed in a broad energy band, from radio to gamma-rays. We analyzed its gamma-ray emission with 14 years of Fermi-LAT observations. The remnant shows a clear asymmetry in high-energy flux between East and West sides corresponding to the asymmetry found in its X-ray emission. The same asymmetry has not been found in the spectral analysis, which suggests the same origin for the gamma-ray emission in the global remnant. Moreover, we analyzed two gamma-ray sources located close to the remnant. The hardness of their spectra suggests that the gamma-ray emission can be due to particles escaping from the shock of Puppis A.

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