

New cosmic-ray acceleration sites detected by the Fermi-LAT in our Galaxy

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Cosmic rays are mostly composed by protons accelerated to relativistic speeds. When those protons encounter interstellar material, they produce neutral pions which in turn decay into gamma rays. This offers a compelling way to identify the acceleration sites of protons. A characteristic hadronic spectrum was detected in the gamma-ray spectra of four Supernovae Remnants (SNRs), IC 443, W44, W49B and W51C, with the Fermi Large Area Telescope. This detection provided direct evidence that cosmic-ray protons are (re-)accelerated in SNRs.

In this review, we present the results from a comprehensive search for low energy spectral breaks. We use 8 years of data from the Fermi Large Area Telescope between 50 MeV and 1 GeV. This search is based on the 4FGL catalog from which we extracted the unidentified sources or those associated to SNRs with a significance above 3 sigma at low energy in both cases. Several SNRs, binaries and one star forming region as well as a handful of unidentified sources are detected with our search.

These best candidates will be presented, focusing on the most intriguing cases such as Eta Carinae and the Cygnus star forming region, thus enlarging our view to potential new cosmic-ray acceleration sites.

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