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Supernova Remnant Studies with Fermi LAT

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Supernova remnants (SNRs) have been studied at GeV energies using the Fermi Large Area Telescope (LAT) for nearly a decade. The detection of the pion bump in four SNRs demonstrates that these are sources of cosmic ray protons. However, the detailed physics of particle acceleration (or re-acceleration) and diffusion remain undetermined. To determine the Galactic cosmic ray contribution from SNRs requires both a larger gamma-ray sample of Galactic SNRs and detailed spectral and spatial studies at GeV and TeV energies. Recently released Pass 8 data significantly improves the sensitivity and angular resolution of GeV studies of SNRs. A complete search for extended sources located along the Galactic plane at energies above 10 GeV has detected 46 extended sources, 16 of which are newly identified and likely to be either SNRs or pulsar wind nebulae. Joint studies with observatories at TeV energies —HAWC, MAGIC and VERITAS - characterize spectra of 16 new unassociated HAWC sources at TeV energies and spatially resolve shock-cloud interaction regions of the well-studied SNR IC 443. Such multi-instrument studies promise to uncover the origins of SNRs as cosmic accelerators.

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