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The First Fermi-LAT SNR Catalog SNR and Cosmic Ray Implications

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While supernova remnants (SNRs) are widely thought to be powerful cosmic-ray accelerators, indirect evidence comes from a small number of well-studied cases. Here we systematically determine the gamma-ray emission detected by the Fermi Large Area Telescope (LAT) from all known Galactic SNRs, disentangling them from the sea of cosmic-ray generated photons in the Galactic plane. Using LAT data we have characterized the 1-100 GeV emission in 279 regions containing SNRs, accounting for systematic uncertainties caused by source confusion and instrumental response. We classified 30 sources as SNRs, using spatial overlap with the radio position. For all the remaining regions we evaluated upper limits on SNRs' emission. In the First Fermi-LAT SNR Catalog there is a study of the aggregate characteristics of these SNRs, such as comparisons between GeV, radio and TeV quantities. We show that previously sufficient models of SNRs' GeV emission no longer adequately describe the data. To address the question of CR origins, we also examine the SNRs' maximal CR contribution assuming the GeV emission arises solely from proton interactions. Improved breadth and quality of multiwavelength data, including distances and local densities, and more, higher resolution gamma-ray data with correspondingly improved Galactic diffuse models will strengthen this constraint.

This abstract is on behalf of the Fermi-LAT collaboration

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