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

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Galactic cosmic ray (CRs) sources, classically proposed to be Supernova Remnants (SNRs), must meet the energetic particle content required by direct measurements of high energy CRs. Indirect gamma-ray measurements of SNRs with the Fermi Large Area Telescope (LAT) have now shown directly that at least three SNRs accelerate protons. With the first Fermi LAT SNR Catalog, we have systematically characterized the GeV gamma-rays emitted by 279 SNRs known primarily from radio surveys. We present these sources in a multiwavelength context, including studies of correlations between GeV and radio size, flux, and index, TeV index, and age and environment tracers, in order to better understand effects of evolution and environment on the GeV emission. 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.

### Collaboration

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