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Pursuing gamma-ray emitting pulsar wind nebulae with the Fermi-LAT

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Pulsars are rapidly rotating neutron stars that descend from a core collapse supernova and can generate pulsar wind nebulae (PWNe) through the expenditure of their rotational energy. PWNe are highly magnetized particle winds and are brightly detected across the electromagnetic spectrum. Synchrotron emission from the relativistic particles is observed from the majority of these objects from radio to X-ray while the same particle population is believed to scatter off of ambient photon fields generating Inverse Compton Scattering (ICS) emission at gamma-ray energies. Gamma-rays are becoming key to finding and characterizing PWNe. In fact, the majority of Galactic TeV sources detected by Imaging Air Cherenkov Telescopes are classified as PWNe. However, the Fermi—LAT has only identified a small fraction of MeV—GeV PWN counterparts, due to most PWN locations being along the Galactic plane, embedded within bright diffuse gamma-ray emission. A systematic search in the 11.5yr Fermi—LAT dataset is presented. The locations of PWNe identified in other wavelengths are targeted, omitting systems that have pulsars detected by the Fermi—LAT for the first half of the search. We present the preliminary results for the Fermi—LAT analysis of 58 regions accompanied by the broadband analyses of two newly detected Fermi PWNe and the physical implications of the results.

Track

SNR/PWNe

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