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Predicting Multi-TeV Emission in Pulsars: Insights from Fermi-LAT 3PC Phase-Resolved Spectral Analysis

Only three TeV-emitting pulsars are known to date, two of which —the Vela Pulsar and PSR J1509 —exhibit a multi-TeV emission component distinct from their GeV emission spectrum. While the origin of the GeV component, whether due to curvature radiation in gaps or synchrotron radiation in the current sheet, remains debated, the multi-TeV emission is most likely produced by inverse-Compton scattering of low-energy photons by relativistic electrons.

Using data from selected pulsars in the *Fermi*-LAT 3PC catalog, we first derive their phase-resolved spectra and fit radiative models to estimate the properties of the underlying particle population. Based on our understanding of the two known multi-TeV emitting pulsars, we then compute the expected inverse-Compton emission, assuming that the same population of particles is responsible for both components.

These results provide insights into the broader TeV pulsar landscape and offer a tentative outlook on what may be attainable with next-generation gamma-ray facilities.

Collaboration(s)

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