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Establishing a connection between high-power pulsars and very-high-energy gamma-ray sources

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Abstract content

Recently, advances in VHE instrumentation have made the discovery of many new, predominantly Galactic, sources possible. Of these, a significant number can be identified as pulsar wind nebulae. It has long been known that pulsars can drive powerful winds of highly relativistic particles. These winds end in a termination shock from which high-energy particles with a wide spectrum of energies emerge. High-energy electrons and positrons among these particles give rise to two components of electromagnetic radiation: a low-energy component from synchrotron radiation and a high-energy component from inverse Compton upscattering of ambient photons. Details of the energy conversion mechanisms in the vicinity of pulsars are not well understood, nor is it known if all pulsars drive pulsar wind nebulae and emit high-energy radiation.

Here we show that for a sample of pulsars in the central Milky Way, pulsars with large spin-down energy flux are with high probability associated with VHE gamma-ray sources. This implies that these pulsars emit on the order of 1% of their spin-down energy in tera electron volt gamma-ray energies.

If this paper is presented for a collaboration, please specify the collaboration

H.E.S.S. collaboration

Summary

Reference

Proceedings of the 30th International Cosmic Ray Conference; Rogelio Caballero, Juan Carlos D'Olivo, Gustavo Medina-Tanco, Lukas Nellen, Federico A. Sánchez, José F. Valdés-Galicia (eds.); Universidad Nacional Autónoma de México, Mexico City, Mexico, 2008; Vol. 2 (OG part 1), pages 659-662

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