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Energy Dependent Morphology in the PWN candidate HESS J1825-137

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Abstract content

Observations with H.E.S.S. in 2004-2005 revealed a new source of very high-energy (VHE) gamma-rays above 100 GeV – HESS J1825-137 – extending mainly to the south of the energetic pulsar PSR B1823-13. While the direction of the VHE gamma-ray emission with respect to the pulsar is similar to that of the asymmetric X-ray PWN G18.0-0.2 in this system, the RMS extension of HESS J1825-137 is >0.25 deg and thereby an order of magnitude larger than the X-ray emission. A detailed spectral and morphological analysis of HESS J1825-137 reveals for the first time in VHE gamma-ray astronomy a steepening of the energy spectrum with increasing distance from the pulsar. This behaviour can be understood by invoking radiative cooling of the IC-Compton gamma-ray emitting electrons during their propagation. In this scenario the different sizes in X-rays and VHE gamma-rays can be naturally explained by different cooling timescales for the radiating electron populations. If this scenario is correct, HESS J1825-137 can serve as a prototype for a whole class of asymmetric PWN in which the X-rays are extended over a much smaller angular scales than the VHE gamma-rays. This scenario might be invoked to understand recent detections of X-ray PWN in systems such as HESS J1640-465 or HESS J1813-178.

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

for the H.E.S.S. Collaboration

Summary

Reference

Proceedings of the 30th International Cosmic Ray Conference; Rogelio Caballero, Juan Carlos D'Oliveo, 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 605-608

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