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Cosmic-Ray Origin and History Probed by GLAST: Gamma-Rays from Star-Forming Galaxies

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Abstract content

Gamma rays have long been recognized as a uniquely powerful probe of the existence, origin, and nature of cosmic rays beyond the solar system. The unprecedented sensitivity and resolution of GLAST should for the first time confirm the presence of cosmic rays in Local Group galaxies today, and in all galaxies throughout the history of cosmic star formation. We show that GLAST should detect, with high confidence, three Local Group galaxies: the Large and Small Magellanic Clouds, and M31. Observations of their gamma-ray intensities will measure the cosmic-ray flux within these galaxies, and tests whether supernovae are their dominant accelerators. Essentially all other galaxies in the universe will be too dim for GLAST to detect individually, but their collective emission will significantly contribute to the diffuse extragalactic gamma-ray background (EGRB) seen by GLAST. This cosmic-ray component of the EGRB will have a unique characteristic spectrum peaked around 0.5 GeV. GLAST measurements of the intensity and spectral shape of this emission will probe cosmic ray history and should reflect the cosmic star-formation history in a well-defined and testable way.

If this paper is presented for a collaboration, please specify the 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 153-156

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