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Diffuse emission measurement with INTEGRAL/SPI as indirect probe of cosmic-ray electrons and positrons

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(Submitted on 1 Jul 2011)

Significant advances have been made in the understanding of the diffuse Galactic hard X-ray continuum emission using data from the INTEGRAL observatory. The diffuse hard power-law component seen with the INTEGRAL/SPI spectrometer has been identified with inverse-Compton emission from relativistic (GeV) electrons on the cosmic microwave background and Galactic interstellar radiation field. In the present analysis, SPI data from 2003 to 2009, with a total exposure time of ~ 10^8 s, are used to derive the Galactic ridge hard X-ray spatial distribution and spectrum between 20 keV and 2.4 MeV. Both are consistent with predictions from the GALPROP code. The good agreement between measured and predicted emission from keV to GeV energies suggests that the correct production mechanisms have been identified. We discuss the potential of the SPI data to provide an indirect probe of the interstellar cosmic-ray electron distribution, in particular for energies below a few GeV.

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