

Spectrum of the Isotropic Diffuse Gamma-ray Background

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The isotropic diffuse γ -ray background (IGRB) comprises of all extragalactic diffuse emission that is not resolved into sources and is found to be approximately isotropic on large angular scales. The initial measurement of the IGRB intensity with the Fermi Large Area Telescope (LAT) was performed in 2010 using the first 10 months of sky-survey data. After improvements were made in event selection and characterization of cosmic-ray backgrounds, a second measurement using 50 months of LAT data allowed for a refinement and a better understanding of the IGRB measurement, this time covering an energy range from 100 MeV to 820 GeV. The result was a spectrum defined by a power law with exponential cutoff with a spectral index of 2.32 ± 0.02 . A total intensity of $(7.2 \pm 0.6) \times 10^{-6} \text{ cm}^{-2} \text{ s}^{-1} \text{ sr}^{-1}$ above 100 MeV was seen with about $\pm 15\%$ systematic uncertainty attributed to Galactic diffuse foregrounds. This systematic uncertainty dominates the measurement uncertainties over most of the observed energy range. In the current analysis, therefore, the primary goal is to refine the measurement of the IGRB, employing 8 years of pass8 Fermi data and the 4FGL source catalog. A reduction of the systematic uncertainties arising from the DGE emission will be achieved through improved modeling of this emission, as well as a careful selection of analysis regions. A few other improvements including, wider energy range (between 50 MeV - >1 TeV), larger dataset, more powerful fitting techniques etc., will also be achieved in the current analysis.

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Collaboration

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