

The origin of MeV gamma-ray diffuse emission from the inner Galactic region

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The origin of the inner Galactic emission, measured by COMPTEL with a flux of $0.01 \text{ MeV/cm}^2/\text{s}/\text{sr}$ in the 1-30 MeV range from a region of $|\ell| < 60$ degree and $|b| < 10$ degree, has remained unsettled since its discovery in 1994. We investigate the origin of this emission by taking into account the Galactic diffuse emission and individual sources which are not resolved by COMPTEL. The Galactic diffuse emission is calculated by GALPROP to reconcile the cosmic-ray and gamma-ray spectra with observations by AMS-02, Voyager, and Fermi-LAT, resulting in a flux of 20-80% of the COMPTEL emission. The source contribution is estimated for sources cross-matched between the Swift-BAT and Fermi-LAT catalogs by extrapolating the energy spectra in the hard X-ray and GeV gamma-ray ranges, resulting in a flux of at least 10% of the COMPTEL excess. We will give the details of the analysis and show that the COMPTEL emission could be reproduced by a combination of the Galactic diffuse emission, resolved sources, and likely the gamma-ray cosmic background. We will also report on the importance of future missions for MeV gamma-ray observations, which would be critical for bridging the “MeV gap” in the spectra of gamma-ray sources.

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