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# Diffuse gamma-ray emission around the massive star forming region of Carina Nebula Complex

We report the Fermi Large Area Telescope (Fermi-LAT) detection of gamma-ray emission toward the massive star forming region of Carina Nebula Complex (CNC). The GeV gamma-ray emission can be resolved into three different components. The GeV gamma-ray emission from the central point source is considered to originate from η Car. We further found the diffuse GeV gamma-ray emission around the CNC which can be modelled by two Gaussian discs with radii of 0.4 degree (region A) and 0.75 degree (region B), respectively. The GeV gamma–ray emission from both regions A and B have good spatial consistency with the derived molecular gas in projection on the sky. The GeV gamma-ray emission of region A reveals a characteristic spectral shape of the pion-decay process, which indicates that the gamma-rays are produced by the interactions of hadronic cosmic rays with ambient gas. The gamma-rays spectrum of region B has a hard photon index of 2.12 ± 0.02, which is similar to other young massive star clusters (YMCs). We argue that the diffuse GeV gamma-ray emission in regions A and B likely originate from the interaction of accelerated protons in clusters with the ambient gas.

## Summary

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