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Observation of the MGRO J1908+06 Region with LHAASO

The gamma-ray source MGRO J1908+06 is esteemed as one of the primary Galactic sites for cosmic-ray acceleration, although its nature remains unrevealed. We report the detection of gammarays from this region spanning energies from 1.6 TeV to 1.3 PeV, with a spectrum exhibiting gradual steepening and yielding an index $\Gamma = (2.51\pm0.01) + (0.28\pm0.02)\times\log10(E/20\text{TeV})$ through log-parabola model fitting. Considering a two-dimensional Gaussian template, the intrinsic extension is about $\sigma\text{ext} = 0.36 \circ \pm 0.01 \circ$ which is consistent with previous experimental measurements. Additionally, in its vicinity, we discovered a more extended gamma-ray source with a standard deviation of $\sigma\text{ext} = 1.24 \circ \pm 0.01 \circ$. The morphology of these two sources dose not exhibit significant changes with energy, suggesting a common origin that shares notable similarities with the star-forming region Cygnus X. This morphological feature is challenging to explain through a purely leptonic origin. In contrast, the hadronic model could reproduce the observed spectrum and morphology by assuming a proton spectrum with a cutoff energy of approximately 1 PeV.

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