

Discovery of a giant peanut-shaped PeVatron below the Galactic plane

Here we report the discovery of a giant enigmatic extended source peanut-shaped source (PEANUT) emitting UHE γ rays with LHAASO. Observed spatial morphology and energy spectrum suggest a common origin of PEANUT substructures. The spectrum is described with a power-law with index of -1.92 ± 0.13 and an exponential cutoff at 229 ± 59 TeV, implying a total luminosity of $7.04 \times 10^{32} (D/3 \text{ kpc}) \text{ erg s}^{-1}$. The absence of a spatial correlation between this LHAASO PEANUT and interstellar gas makes it unlikely that the observed signal is caused by hadronic γ radiation. The inverse Compton(IC) scattering from a luminous millisecond pulsar (MSP) J0218+4232 is more compelling. These findings suggest that MSPs have the potential to act as PeV accelerators (PeVatrons) of the Milky Way.

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