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Observations of a UHE-Only Source: LHAASO J2027+3657 and its Potential Counterpart

LHAASO J2027+3657 is an ultra-high-energy (UHE) gamma-ray extended source discovered by LHAASO in the Cygnus region. No significant very-high-energy (VHE) emission has been detected from this source, and ground-based facilities like H.E.S.S. and HAWC have not observed it either, making the origin of its emission especially interesting. In this study, we use the latest LHAASO data to perform a detailed analysis of the morphology and spectrum of LHAASO J2027+3657, and investigate potential candidate counterparts in the extended region. Additionally, we correlate molecular clouds in the source direction using data from the Milky Way Imaging Scroll Painting (MWISP) project, examine observations from Fermi-LAT and X-ray instruments, and discuss possible emission mechanisms based on these results.

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