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Long-term observation of the blazars Mrk 501 by LHAASO

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Long-term and unbiased monitoring of rapidly variable gamma-ray sources, such as active galactic nuclei (AGNs), is essential for elucidating the emission mechanisms behind these extragalactic objects. The Large High Altitude Air Shower Observatory (LHAASO), one of the largest ground-based experiments, provides valuable insights into very high energy (VHE) phenomena, enabling comprehensive studies of AGN physics. In this work, we present a long-term monitoring campaign of Markarian 501 (Mrk 501), a well-known BL Lacertae object. Over the past few years, Mrk 501 exhibited relatively quiescent behavior, with no significant flares or outbursts observed. Its long-term spectral energy distribution (SED), corrected for extragalactic background light absorption, is well described by a power-law function with an exponential cutoff. Our analysis reveals five notable outbursts, with durations ranging from 14 to 180 days, which we categorize into three distinct types. Notably, we identified a “harder when brighter” trend in its emission. Multi-wavelength observations from Fermi-LAT, MAXI, and Swift indicate a strong correlation between VHE gamma-ray and X-ray emissions, while the correlation with high-energy (HE) gamma rays is weaker. Furthermore, no significant time lags were detected between HE, VHE, and X-ray emissions

Collaboration(s)

Author: XIAO, Dixuan

Co-authors: SHICONG, Hu (IHEP); ZHA, Min (IHEP); Ms WANG, Ran (Shandong University); CUI, Shuwang (Hebei Normal University)

Presenter: XIAO, Dixuan

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