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Gamma-ray emission and the physics of microquasars

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Microquasars are jetted binary systems composed of an accreting compact object—typically a black hole—and a donor optical star. They exhibit bright emission across the entire electromagnetic spectrum, with prominent non-thermal leptonic components, particularly in the radio and soft gamma-ray bands. However, their contribution to the Galactic cosmic-ray spectrum remains unclear. Recent detections of several microquasars by HAWC, HESS, and LHAASO in the very-high-energy (VHE; >100 GeV) and even ultra-high-energy (UHE; >100 TeV) regimes have demonstrated that particle acceleration in these systems is remarkably efficient. This makes microquasars excellent natural laboratories for studying the acceleration, transport, and radiation of ultrarelativistic particles. Preliminary analyses suggest that microquasars may contribute significantly—if not dominantly—to the cosmic-ray spectrum around the knee region.
In this talk, we present an overview of both historical and recent observational results and discuss their implications for our understanding of the physical processes taking place in these enigmatic sources.

Collaboration(s)

Author: KHANGULYAN, Dmitriy

Presenter: KHANGULYAN, Dmitriy

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