

Studying High-Mass Microquasars with HAWC

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High-mass microquasars (HMMQs) are powerful particle accelerators, but their mechanism of the high-energy emission is poorly understood. To date, only a handful of these particle engines have ever been observed to emit gamma-ray photons and are thus potential TeV gamma-ray emitters. In this work, we study four HMMQs, namely, LS 5039, Cyg X-1, Cyg X-3, and SS 433 using the data from the High Altitude Water Cherenkov (HAWC) observatory. We report the most stringent limit to date on the gamma-ray emission above 10 TeV for each HMMQ. Also, by stacking the fitted likelihoods of the HMMQs, we constrain the fraction of the jet luminosity in emitting very-high-energy (VHE) gamma rays and high-energy neutrinos. We show that the non-detection of VHE gamma rays implies a significant magnetic field, which challenges synchrotron radiation as the dominant mechanism of the microquasar emission between 10 keV and 10 MeV. Furthermore, we perform time dependent analysis on each HMMQ to look for any periodic variations in their flux.

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Subcategory

Experimental Results

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