

Searching for astrophysical neutrino counterparts

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Pinpointing the neutrino sources is crucial to unveil the mystery of high-energy cosmic rays. The possible association of the neutrino alert IceCube-170922A with the flaring blazar TXS0506+056 marks the new era of neutrino astronomy. Tracking the sources close to the IceCube high-energy alerts is an efficient way to search for neutrino-source candidates. We have been following up on the neutrino alerts with the insight-HXMT twice. The upper limits from potential neutrino sources are obtained. Additionally, we have performed several analyses to search for potential neutrino emissions from multi-frequency catalogs and various blazar samples, investigating possible correlations with IceCube alerts and 10-year track-like events. No significant neutrino emissions were found in our analyses. Our results indicate an interesting trend showing the infrared flaring stages of WISE blazars might be correlated with the arrival times of the neutrino alerts. Possible overflow of neutrinos associated with two of our blazar sub-samples are also illustrated. One is characterized by a significant flaring lag in infrared with respect to gamma-rays, as seen for TXS0506+056, and highly simultaneous infrared and gamma-ray flares characterize the other. These phenomena suggest the need to improve current multi-frequency light-curve catalogs to pair with the advent of more sensitive neutrino observatories.

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