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Real-time identification of short transient neutrino sources within the IceCube optical follow-up program

The identification of the sources of astrophysical neutrinos is one of the main motivations behind the IceCube real-time follow-up programs. Currently, there are two approaches to distinguish astrophysical neutrinos from atmospheric background. The first is to select single high-energy neutrinos assuming that the signal neutrino spectrum is harder compared to the background. The second is to search for neutrino events clustering in time and space.

The latter approach is used by IceCube's optical follow-up program, which aims to probe gamma-ray bursts and choked-jet supernovae as possible neutrino source candidates. I focus on improvements of this program that can be obtained using maximum likelihood techniques for the identification of signal-like clusters of neutrinos. Resulting sensitivities to transients flaring on a timescale of O(100) seconds and future prospects will also be presented.

Mini-abstract

Improvements on the IceCube real-time search for short transients

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