

Searches for Neutrino Sources with IceCube Cascade Events

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IceCube has discovered a flux of astrophysical neutrinos, and more recently has used muon-neutrino datasets to present evidence for one source; a flaring blazar known as TXS 0506+056. However, the sources responsible for the majority of the astrophysical neutrino flux remain elusive. Opening up new channels for detection can improve sensitivity and increase the chance of a discovery. In this work we present a new neutrino dataset relying heavily on Deep-Neural-Networks (DNN) to select cascade events produced from neutral-current interactions of all flavors and charged-current interactions with flavors other than muon-neutrino. The speed of DNN based selections allows the event selection to be performed in near-realtime with a single GPU. Cascade events have reduced angular resolution when compared to muon-neutrino events, however the resulting dataset has a lower energy threshold in the southern sky and a lower background rate. These benefits lead to an improved sensitivity to sources in the southern sky when compared to muon-neutrino datasets. This improvement is particularly promising for identifying transient neutrino sources in the southern sky and neutrino production from the galactic plane.

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