

# Searches for neutrinos from precursors and afterglows of Gamma-ray Bursts using the IceCube Neutrino Observatory

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Gamma-ray bursts (GRBs) are among the most powerful events observed in our universe and have long been considered as possible sources of ultra-high-energy cosmic rays, which makes them promising neutrino source candidates. Previous IceCube searches for neutrino correlations with GRBs focused on the prompt (main emission) phase of the GRB and found no significant correlation between neutrino events and the observed GRBs. This motivates us to extend our search beyond the prompt phase. We perform analyses looking for evidence of neutrino emission up to 14 days before and after the prompt phase of GRBs. These analyses rely on a sample of candidate muon-neutrino events observed by IceCube from May 2011 to October 2018. The analyses are model-independent. Two of them scan different time-windows for possible neutrino emission, while a third analysis targets precursor emission based on GRB precursor observations by Fermi-GBM. We discuss the results and implications of these searches including limits on the contribution of GRBs to the diffuse neutrino flux.

## Keywords

IceCube Neutrino Observatory; GRB; astrophysical neutrinos; astrophysical neutrino sources; muons; precursors; afterglows; prompt phase

## Collaboration

IceCube

## other Collaboration

## Subcategory

Experimental Results

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