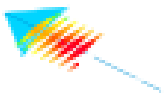

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Suppression techniques for background cascades produced by atmospheric muon bundles

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Detection of high energy astrophysical neutrinos is the main aim of Baikal-GVD (Gigaton Volume Detector) neutrino experiment located in the southern part of Lake Baikal. It is a three dimensional grid of optical modules (OMs), which are attached to the vertical cables, called strings. The whole detector is sub-arranged into functionally independent units, referred to as clusters.

Highly energetic muons created by muon neutrino charged current interactions in the water induce “track-like” events. Charged-current interactions of electron neutrino and neutral-current interactions of all three neutrino flavours create a unique light signature of a single “cascade” in the detector. Nevertheless, muons can also produce cascade-like signatures via discrete stochastic energy losses. For that reason, atmospheric muon bundles represent the most abundant background in the search of astrophysical neutrinos via cascades. Therefore, different kinds of data analysis techniques for the suppression of background events have been developed.

These methods predominantly rely on the timing and charge information of detected signals at the OMs (called hits). While one method tries to find the maximum number of track hits among cascade hits, the other uses the distribution of charges and positions of hit OMs associated with cascade events. All suppression tools were developed and tested on the Monte Carlo simulations of neutrino-induced cascades and atmospheric muon bundles.

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