

Searches for High-Energy Astrophysical Neutrino Sources in Super-Kamiokande

In this study we present the results of the searches for high-energy astrophysical neutrino point sources in the energy region above GeV using Super-Kamiokande data taken from 1996 to 2019 with total live time exceeding 6,000 days. The searches include time-integrated and time-dependent full sky searches for both muon and electron neutrino sources and coincidence check with candidates including TXS 0506+056 and NGC 1068. The searches use unbinned maximum likelihood method, and test statistics is calculated to find signal excess over atmospheric neutrino background. The time-integrated search method is updated from a previous search by adding the neutrino energy distribution in the likelihood to consider different power-law emission spectra with varying spectral indices. This is the first time to perform the time-dependent search, which has a better performance in searching for neutrino emission in a short time, in Super-Kamiokande. Upper limits on neutrino flux or fluence are set for all searches.

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