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The first results on the search for extremely high energy neutrinos by the IceCube detector

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Abstract content

Extremely high energy (EHE) cosmic neutrinos (E>10ˆ8GeV) are considered to carry important information about particle acceleration mechanisms in the universe and the origin of EHE cosmic-ray. The IceCube experiment is uniquely designed to detect highly energetic astrophysical neutrino events using Antarctic ice as a natural Cherenkov radiator to overcome difficulties associated in the search for EHE neutrino. We study event samples recorded during 2006 by IceCube's deep in-ice 540 optical sensors tied to 9 electric cables and 68 sensors at the South Pole ice surface. In the EHE region, because of the increase of the neutrino cross-section with energy, mean free path of neutrino becomes shorter than the Earth radius, and secondary charged particles created during the neutrino propagation are not the minimum ionizing particle but they loose energy by stochastic radiative process, which implies that EHE neutrino events reach to the IceCube detector are from horizon or above leaving luminous bulk of Cherenkov photons. We show that these EHE signatures are distinguished from background atmospheric (bundled) muons using a detailed Monte Carlo simulation compared to real data samples. Finally the most updated results of EHE neutrino search on 2006 IceCube data are presented in energy regime greater than 10ˆ8 GeV.

If this papers is presented for a collaboration, please specify the collaboration

the IceCube collaboration

Summary

Reference

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