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A search for extremely high energy neutrinos in 6 years of IceCube data

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Observations of extremely high energy neutrinos are expected to probe the origin of the highest energy cosmic rays with energies up to and above 10^{20}eV. Cosmogenic neutrinos are associated with the interaction of those most energetic cosmic rays with cosmic microwave background photons (GZK effect) and considered a guaranteed astrophysical neutrino signal. The cosmogenic neutrinos have been searched with the partially completed and completed IceCube detector. The previous cosmogenic neutrino search with approximately 2 years of the complete IceCube data has placed the stringent limit on cosmogenic neutrino models and shown that astrophysical objects with populations following a strong cosmological evolution such as Fanaroff-Riley type II radio galaxies are unlikely the highest energy cosmic-ray sources. We present the updated results of the extremly high energy neutrinos search above ~10^{6}GeV in the total of 6 years of IceCube sample with 3 years of partially completed IceCube data taken in 2008-2011 and 3 years of completed IceCube data in 2011-2014. With expected improvements of more than a factor of two from the previous study, we are able to further constrain or prove the highest energy cosmic-ray origin with the IceCube neutrino observatory.

Collaboration

IceCube

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Primary author: ISHIHARA, Aya (Chiba University)

Presenter: ISHIHARA, Aya (Chiba University)

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