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Probing cosmic-ray origin with the cosmogenic neutrino searches with IceCube

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IceCube is a cubic kilo-meter scale, deep-ice Cherenkov neutrino detector at the South Pole. IceCube's high energy neutrino searches cover an energy region of the TeV and lower energies, and also the much higher energy region up to EeV and higher. In the EeV energy region, cosmogenic neutrinos channelled from ultra-high energy cosmic-ray emissions which play leading roles in the flow of astrophysical energies are expected. While cosmic-rays and gamma-ray photons rapidly loose their energies in the ultra-high energy region via the interaction with the cosmic microwave background, cosmogenic neutrinos remember the history of the ultra-high energy emission activity since the era when the Universe was young because neutrinos can travel long distance regardless of their energy. The analysis of 2 years of IceCube data taken in the period between May 2010 and May 2012 in search for ultra-high energy neutrinos was conducted. Two events with approximately 1 PeV were observed from the analysis. No observation of events in higher energies allows to place the tightest upper limit to date on the neutrino flux in the energy region from PeV to 10EeV. In this talk the results from the cosmogenic neutrino search with IceCube are presented and their implication is discussed.

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