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Cosmic Tau Neutrinos and the Astrophysical Neutrino Flavor Composition

The IceCube Neutrino Observatory at the South Pole, which detects Cherenkov light from charged particles produced in neutrino interactions, firmly established the existence of an astrophysical high-energy neutrino component. The study of astrophysical neutrinos provides important clues about cosmic particle accelerators. In particular, the tau neutrino fraction on Earth is directly translatable to the source flavor composition and can constrain source production mechanisms. Due to the very prompt decay of the heavy tau lepton most tau neutrino interactions cannot be distinguished from other flavor neutrino interactions, thus leading to the tau neutrino fraction being largely unconstrained. However, in IceCube, ν_τ -CC interactions above ˜ 100 TeV can produce resolvable double cascades, breaking the degeneracy between ν_e and ν_τ present at lower energies. Here I present the measurement of the flavor composition performed on IceCube's High-Energy Starting Event sample with a livetime of about 7.5 years. I will present IceCube's first two identified double cascades and discuss the properties of the two ν_τ candidates.

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Abstract Title

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