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# Event reconstruction of atmospheric neutrinos using Machine Learning-based method in JUNO

The Jiangmen Underground Neutrino Observatory (JUNO), located in Southern China, is a multi-purpose neutrino experiment that consists of a 20-kton liquid scintillator detector. The primary goal of the experiment is to determine the neutrino mass ordering (NMO) and measure other neutrino oscillation parameters to sub-percent precision. Atmospheric neutrinos are sensitive to NMO via matter effects and can improve JUNO's total sensitivity in a joint analysis with reactor neutrinos; Good capability of reconstructing atmospheric neutrinos in JUNO is crucial for its physics goal.

In this talk, we present a novel multi-purpose reconstruction method for atmospheric neutrinos, by combining PMT waveform analysis and machine learning techniques. Multiple machine learning strategies, including usage of planer, spherical, and 3-dimensional models, as well as usage of neutron capture information are discussed. We show the performance of reconstructing atmospheric neutrino's directionality, energy and flavor-identification using Monte-Carlo simulations, and demonstrate that this method can achieve unprecedented reconstruction precision and fulfils the needs of JUNO.

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