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Reconstruction of Atmospheric Neutrino's Directionality and Energy in JUNO

The Jiangmen Underground Neutrino Observatory (JUNO) is a next-generation neutrino experiment currently under construction in southern China. Its primary objective is to determine the neutrino mass ordering (NMO). While reactor neutrinos are the main source of sensitivity to NMO at JUNO, atmospheric neutrino oscillations can provide independent sensitivity, and enhance its overall sensitivity in the combined analysis. However, accurately reconstructing atmospheric neutrinos in such a large liquid scintillator detector presents a significant challenge with conventional methods. In this flash talk, I present a novel method of reconstructing atmospheric neutrinos in JUNO and it is applicable to other liquid scintillator detectors. This method uses machine learning techniques to reconstruct multiple quantities like atmospheric neutrinos' directionality and energy, based on features extracted from waveforms reflecting the relationship between PMT hit charge and time. Performances using this method with JUNO simulation are reported.

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Track Classification: Machine Learning