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Machine learning-based particle identification of atmospheric neutrinos in JUNO

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The Jiangmen Underground Neutrino Observation (JUNO), located at Southern China, is a multi-purpose neutrino experiment that consist of a 20 kton liquid scintillator detector. The primary goal of the experiment is to measure the neutrino mass ordering (NMO) and measure the relevant oscillation parameters to a high precision. Atmospheric neutrinos are sensitive to NMO via matter effects and can improve JUNO's total sensitivity in a joint analysis with reactor neutrinos, in which a good capability of reconstructing atmospheric neutrinos are crucial for such measurements.
In this poster, we present a machine learning approach for the particle identification of atmospheric neutrinos in JUNO. The method of feature extraction from PMT waveforms that are used as inputs to the machine learning models are detailed. Two independent strategies of utilising neutron capture information are also discussed and compared. Preliminary results based on Monte-Carlo simulations will also be presented. We demonstrate that using the machine learning-based approach shows good potential in future physics measurements.

Poster prize

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