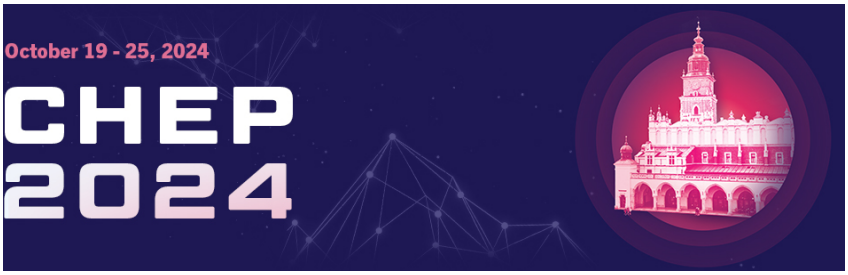

Contribution ID: **405** Type: **Talk**

Novel Fitting Approach Based on a Neural Network for JUNO

Wednesday 23 October 2024 17:45 (18 minutes)

JUNO (Jiangmen Underground Neutrino Observatory) is a neutrino experiment being built in South China. Its primary goals are to resolve the order of the neutrino mass eigenstates and to precisely measure the oscillation parameters $\sin^2\theta_{12}$, Δm^2_{21}, and $\Delta m^2_{31(32)}$ by observing the oscillation pattern of electron antineutrinos produced in eight reactor cores of two commercial nuclear power plants at a distance of 52.5 km. A crucual stage in the data analysis is to fit the observed spectrum to the expected one under different oscillation scenarios taking into account realistic detector response, backgrounds, and all relevant uncertainties. This task becomes computationally challenging when a full Monte Carlo simulation of the detector is directly used to predict the detector response instead of otherwise used empirical models. It is proposed using a neural network to precisely predict the detector spectrum as a function of oscillation parameters and a set of detector response parameters. This approach drastically reduces computation time and makes it possible to fit a spectrum within one second. The contribution presents the details, performance, and limitations of the method.

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