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Calibration method for the non-linearity in the response of 20-inch PMTs in the JUNO experiment

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The Jiangmen Underground Neutrino Observatory (JUNO) is a 20-kiloton liquid scintillator detector, currently under construction in Jiangmen, China. JUNO will be equipped with 17,612 20-inch photomultiplier tubes (PMTs) and 25,600 3-inch PMTs, and it will undertake a wide range of physics programs, including the observation of reactor, atmospheric, solar, geo, and supernova neutrinos, as well as searches for new physics. Among these, the primary physics goal is to precisely measure the neutrino oscillation parameters, including the neutrino mass ordering, from the energy spectrum of reactor neutrinos, with an energy scale uncertainty controlled within 1% and an energy resolution of 3% at 1 MeV. Achieving this objective requires a thorough understanding of the non-linearity and non-uniformity of the energy scale. Given that the number of observed photoelectrons per 20-inch PMT in reactor neutrino events in the JUNO detector varies from a single photoelectron to over 100 photoelectrons, calibrating the non-linear response of the 20-inch PMTs using the 3-inch PMTs, which are expected to observe significantly fewer photoelectrons due to their smaller size, is crucial to achieving these goals. This talk will introduce the calibration strategy, the key calibration system employed for this purpose, and the expected calibration quality based on the JUNO detector simulation.

Do you need a VISA letter for traveling to Canada ?

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Author: Dr TAKENAKA, Akira (Shanghai Jiao Tong University, Tsung-Dao Lee Institute)

Presenter: Dr TAKENAKA, Akira (Shanghai Jiao Tong University, Tsung-Dao Lee Institute)

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