

# Calibration of 20-inch Photomultiplier Tubes in JUNO

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The Jiangmen Underground Neutrino Observatory (JUNO) is the world's largest liquid scintillator detector, utilizing 20 kton liquid scintillator as target mass, and equipped with 17,612 20-inch and 25,600 3-inch photomultiplier tubes (PMTs) in its central detector for photon detection. There are two types of 20-inch PMTs in JUNO, including the MCP-PMT manufactured by Northern Night Vision Technology Co. (NNVT), and the dynode PMT manufactured by Hamamatsu Photonics K.K. (HPK). JUNO's primary objective is to determine the neutrino mass ordering by precisely measuring the reactor anti-neutrino energy spectrum. To achieve this goal, it requires an energy resolution better than 3% at 1 MeV, and an energy scale uncertainty less than 1%. A precise calibration of the gain and single photoelectron charge spectrum is a prerequisite for both waveform and energy reconstruction, and is therefore of fundamental importance. This poster presents the calibration strategy, data analysis method and calibration results for the 20-inch PMTs in JUNO.

## Collaboration you are representing

JUNO

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