

The Main Structure of the Central Detector of JUNO

Abstract

Jiangmen Underground Neutrino Observatory (JUNO) is under construction in Southern China which aims to measure the neutrino mass hierarchy and neutrino oscillation parameters using primarily the reactor neutrinos from two nearby nuclear power plants 53km away. JUNO's central detector is designed to measure reactor antineutrinos via inverse beta decay with 20k tons of liquid scintillator as the target. The detector is designed to reach $(3\%)/\sqrt{E/\text{MeV}}$ of energy resolution. The central detector system consists of an inner transparent sphere of 35.4 m in diameter and an outer support structure of 40.1 m in diameter. The inner sphere is made of acrylic and contains the 20 ktons of liquid scintillator. About 17000 photomultiplier tubes (PMTs) are mounted on the outer structure, covering $\sim 75\%$ of surface to detect the scintillating photons. Such a big detector with such a high energy resolution places a big challenge to massive liquid scintillator technology. Here the design and R&D progress of the main structure of the central detector are introduced.

Primary author: Prof. HENG, Yuekun (IHEP, Beijing)

Presenter: Prof. HENG, Yuekun (IHEP, Beijing)

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