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Determination of the neutrino mass hierarchy with JUNO experiment

The Nobel Price in Physics 2015 was awarded to Takaaki Kajita and Arthur McDonald for “the discovery of neutrino oscillation, which shows that neutrinos have mass”. However, the neutrino mass hierarchy of three mass eigenstates (ν_1, ν_2, ν_3) remains unknown. The information of this mass hierarchy is believed to be accessible by measuring precisely the flavour oscillation of reactor anti-neutrinos, which requires a neutrino detector with extremely high energy resolution.

JUNO (Jiangmen underground neutrino observatory) is one of the most promising experiments specialising in the determination of the neutrino mass hierarchy. JUNO is located 53 km away from both Yangjiang and Taishan nuclear power plants in Guangdong, China, itself is composed of a water pool for muon veto and a central detector which is an acrylic sphere of 35m in diameter containing 20 000 tons of liquid scintillator, the optical coverage of the central detector will achieve 75% of its surface by using ˜17k 20-inch Photomultiplier Tubes(PMT). A second set of ˜36k 3-inch PMTs will be installed as well, thus we are capable to combine information from two independent readout systems. This unprecedented design allows us to measure the neutrino energy with a resolution expected to be 3%.

In my poster, more details of the JUNO design and in particular, its multi-calorimeter system will be shown and explained more precisely.

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