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The JUNO detector: design concept and status

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JUNO (Jiangmen Underground Neutrino Observatory) is a large liquid scintillator detector currently under construction in the underground laboratory of Kaiping (Guangdong, China) and expected to be completed in 2023.

The JUNO central detector will contain a 35.4 m diameter acrylic vessel filled with 20-kt of LAB-based scintillator, and submerged in a water pool equipped with PMTs to act as Cherenkov detector. The scintillation light will be read-out by 17612 20" PMTs and 25600 3" PMTs, reaching a geometric coverage higher than 75%. On top of the main detector, a plastic scintillator tracker will complete the JUNO veto system for cosmic muons. JUNO's ambitious design primarily aims to the determination of the neutrino mass ordering at high statistical significance ($3 - 4\sigma$ in about 6 years of data taking), by measuring the oscillation pattern of electron antineutrinos generated by two nuclear power plants, on a ~ 53 km baseline from the experimental site. JUNO will target an unprecedented 3% energy resolution at 1 MeV scale, thus it will be a unique facility for particle and astroparticle physics. Besides its main goal, JUNO indeed aspires to the sub-percent determination of the neutrino oscillation parameters ($\sin^2 \theta_{12}$, Δm_{21}^2 , and Δm_{31}^2) as well as to the measurement of atmospheric neutrinos, to solar neutrino precision spectroscopy, and to the detection of low-energy neutrinos coming from supernovae and geo-neutrinos.

In this talk, the JUNO detector design and the status of the experiment construction will be presented.

In-person participation

Yes

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