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The Jiangmen Underground Neutrino observatory (JUNO)

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The Jiangmen Underground Neutrino observatory (JUNO) experiment uses a large liquid scintillator detector to measure electron antineutrinos issued from nuclear reactors at a distance of 53 km. The main goal is to determine the neutrino mass hierarchy and precisely measure oscillation parameters. The detector will be located at 700 m underground and will consist of 20 ktons of liquid scintillator contained in a 35 m diameter acrylic sphere, instrumented by 17612 20-inch photomultiplier tubes (PMT) and 25600 3-inch PMTs. It will achieve unprecedented 3% energy resolution (at 1 MeV). The objective is to detect 100 000 events after 6 years of data taking. Two vetoes are foreseen to reduce the different backgrounds. A 40 ktons ultrapure water Cherenkov pool instrumented by 2400 20-inch PMTs surrounds the central detector. It will tag events coming from outside the neutrino target. It will also act as a passive shielding for neutrons and gammas. In addition, a muon tracker will be installed on top of the detector (top muon veto) in order to tag cosmic muons and validate the muon track reconstruction. JUNO will be an exceptional multipurpose detector with a rich physics program in neutrino oscillation, geo-neutrinos, astrophysical neutrinos and the search for physics beyond the Standard Model (sterile neutrinos, dark matter, proton decay and others). A general introduction of the JUNO system as well as the main progress since 2019 will be reported.

Primary experiment

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