PhD Summer School on Neutrinos

Here, There & Everywhere

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Prospects of neutrino oscillation physics with JUNO

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The Jiangmen Underground Neutrino Observatory (JUNO) is a 20 kt multi-purpose experiment under construction in southern China, expecting to begin data taking in 2023. JUNO will detect electron antineutrinos generated from the beta decays of fission products inside nuclear reactors and is located at about 53 km from two nuclear power plants to maximize the effect of neutrino oscillations. JUNO is expected to determine the neutrino mass ordering with a 3σ significance in 6 years of data-taking, and to measure three oscillation parameters, Δm^2_{21}, Δm^2_{31}, and $\sin^2\theta_{12}$, with sub-percent precision.

JUNO is expected to reach these physics goals thanks to its large active volume, a total photo-coverage of 78 %, an effective energy resolution of 3 % at 1 MeV, and by keeping energy-related systematic uncertainties below 1 %. In light of the recent results from short-baseline experiments, proper modeling of the electron antineutrino spectrum from nuclear reactors is also required to take into account both the reactor antineutrino anomaly and the spectral distortion at 5 MeV.

This contribution will focus on the neutrino oscillation analysis with JUNO.

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