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Investigating Neutrino Oscillations with Reactor Antineutrinos in JUNO

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The Jiangmen Underground Neutrino Observatory (JUNO) is a 20 kton multi purpose underground liquid scintillator detector currently under construction in the Guangdong Province of South China and scheduled for completion in 2023. By featuring a 78% photon sensor coverage achieved via a primary calorimetry system consisting of 17,612 20 inch PMTs and an additional calorimetry system of 25,600 3 inch PMTs, JUNO is expected to enable an unprecedented 3% energy resolution at 1 MeV, aiming at the determination of the neutrino mass ordering.

The main detector is located at a baseline of about 52.5 km from eight nuclear reactors, a distance that will enable to resolve for the first time the interference pattern between the solar and atmospheric oscillation modes. In this respect, thanks to its unprecedented size and energy resolution, JUNO will enable the simultaneous observation of the Δm^2_{21}, Δm^2_{31}, $\sin^2\theta_{12}$, and $\sin^2\theta_{13}$ oscillation parameters and is expected to determine the first three to a world leading precision better than 0.5% within six years of data collection. The new precision will represent a tenfold improvement over the existing limits for these three parameters.

In this talk I will present the role of JUNO in a new era of precision in the neutrino sector which will put to the test the flavor mixing neutrino framework and pave a way to more precise searches for physics beyond the Standard Model.

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