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JUNO Experiment: Advancing the Next Generation of Reactor Neutrino Research

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Abstract: Since the discovery of neutrinos, nuclear reactor has played a major role in understanding neutrino physics, from the observation of neutrino oscillations with the precise measurement of Δm_{21} and θ_{12}, to the more recent breakthrough precise measurement of θ_{13} by the Daya Bay, Double Chooz and RENO. With the Jiangmen Underground Neutrino Observatory (JUNO), reactor neutrino physics is entering a new era in terms of precision and physics reach. Situated 52.5 km from two nuclear power plants within a newly established 700-meter-deep underground laboratory, JUNO aims to determine neutrinos mass ordering by precisely measuring the energy spectrum of reactor neutrinos. In addition, it will measure, with sub-percent precision, most of the neutrino oscillation parameters. Thanks to its excellent characteristics in terms of an unprecedented active mass and excellent energy resolution, the JUNO physics program comprises also solar neutrinos, atmospheric neutrinos, supernova neutrinos, and geoneutrinos, as well as beyond standard model physics topics such as nucleon decay.
This talk will present the JUNO experiment in the context of current reactor neutrino experiments and upcoming long-baseline neutrino oscillation programs, highlighting the complementarity and synergies between JUNO and these initiatives in understanding the fundamental properties of neutrinos.

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