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Physics Prospects of the JUNO Experiment

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The Jiangmen Underground Neutrino Observatory (JUNO) is a 20 kton liquid scintillator detector with the main goal to determine the neutrino mass ordering (NMO). JUNO construction in southern China,in an underground laboratory with 650 m rock overburden, is expected to be completed by the end of 2023.
Thanks to high scintillation light yield, high transparency, 78% optical coverage and large photon detection efficiency, JUNO will achieve an unprecedented energy resolution of 3% at 1MeV. This challenging design is required in order to achieve a 3σ sensitivity to neutrino mass ordering within 6 years measurements of reactor antineutrinos, with 53 km baseline. JUNO is the only experiment that will tackle the NMO using the neutrino oscillation in vacuum, complementary to other experiments exploiting the matter effects on oscillation of atmospheric and accelerator neutrinos.
The precision measurements of the oscillation pattern, JUNO will determine the neutrino oscillation parameters $\Delta m^2_{12}, \theta_{12}, \Delta m^2_{13}$ with sub-percent precision. Furthermore, JUNO has a vast potential for other fields in (astro-)particle physics, with energies ranging from sub-MeV to several GeV, covering solar, geo, supernova, and atmospheric neutrinos, as well as the potential to search for rare processes and physics beyond the standard model. This poster gives an overview of the JUNO experiment with a focus on its physics potential on the various topics described above.

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