

Prospects for geo-neutrinos and supernova neutrinos with JUNO

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The Jiangmen Underground Neutrino Observatory (JUNO) is a medium-baseline reactor neutrino experiment under construction in China. It consists of a 20 kt liquid scintillator detector designed for neutrino physics. The main objective of the experiment is to determine the neutrino mass ordering by measuring the energy spectrum of reactor antineutrinos from eight neighboring cores. Also, JUNO will be sensitive to neutrinos emitted by natural sources such as geo-neutrinos and supernova neutrinos.

The measurement of the geo-neutrino provide information about the abundance of Uranium and Thorium in the Earth's crust and mantle, as well as our planet's heat budget. Within the first year of data taking, JUNO will be able to exceed the statistics on existing geo-neutrino flux results from Borexino and KamLAND experiments. With increased statistics, JUNO will be able to measure Uranium and Thorium fluxes individually and to establish their ratio, giving insights about Earth's formation processes.

In addition to geo-neutrinos, JUNO will allow measurements of the diffuse supernova neutrino background, pre-supernova neutrinos and the all flavor neutrino flux from a Galactic core-collapse supernova (CCSN) with high statistics, low threshold and high energy resolution. For maximizing the physics reach of JUNO as a neutrino telescope, two trigger systems will operate to search for a transient astrophysical signal in real time: (i) a dedicated multi-messenger trigger system, (ii) a prompt CCSN monitor embedded in the global trigger system. With those two systems, we will be able to collect precise data that will help us understand the physics of CCSN and other astrophysical phenomena.

This talk will present the expected JUNO sensitivity to geo-neutrinos and the expected performance of JUNO for the detection of different supernova neutrino fluxes.

Abstract title

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