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Prospects for measuring the Earth's outer core composition with neutrino oscillations

In the last 70 years, geophysics has established that the Earth's outer core is a Fe-Ni alloy containing a few percent of light elements, whose nature and amount remain controversial today. Besides the classical combinations of silicon and oxygen, hydrogen has been advocated as the only light element that could account alone for the density and velocity profiles of the outer core. Neutrino oscillations through the Earth open a new window into this puzzle by providing sensitivity to the electron density of the outer core. In this contribution we will show that the upcoming generation of neutrino detectors, KM3NeT/ORCA, Hyper-Kamiokande and DUNE, have the potential to detect a 1 wt% contribution of hydrogen in the core in 50 years. We then identify the requirements for a next-generation detector to take this measurement further and probe realistic models of the outer core with different light element contents.

Attendance type

In-person presentation

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