Contribution ID: **220** Type: **Talk**

Neutrino Earth tomography in DUNE

Sunday, 31 July 2022 17:00 (25 minutes)

This talk will show how the Earth's density profile can be measured in the DUNE experiment using atmospheric neutrinos. After crossing the Earth, neutrinos give us access to a rich oscillation phenomenology that strongly depends on the matter potential sourced by the Earth. By performing a detailed simulation of the event reconstruction capabilities of liquid argon time projection chambers, where we have included the particle identification and the nuclear effects, we find that DUNE can measure the Earth's total mass at 8.4% precision with an exposure of 400~kton~year. In this result, we also include the different uncertainties that affect the atmospheric neutrino flux. Considering an effective Earth model with 3 layers, we have explored the sensitivity to each layer by combining DUNE with external measurements of the total mass and the moment of inertial of the Earth. Our analysis indicates that the core, lower mantle, and upper mantle densities can be determined with 8.8%, 13%, and 22% precision for the same exposure.

Attendance type

Virtual presentation

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Session Classification: Workshop

Track Classification: Multi-messenger Tomography of Earth (MMTE 2022)