

Atmospheric Neutrino Oscillations for Earth Tomography

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Modern proposed atmospheric neutrino oscillation experiments, such as PINGU in the Antarctic ice or ORCA in Mediterranean sea water, aim for precision measurements of the oscillation parameters including the ordering of the neutrino masses. They can, however, go far beyond that: Since neutrino oscillations are affected by the coherent forward scattering with matter, neutrinos can provide a new view on the interior of the earth. We show that the proposed atmospheric oscillation experiments can measure the lower mantle density of the earth with a precision at the level of a few percent, including the uncertainties of the oscillation parameters and correlations among different density layers. While the earth's core is, in principle, accessible by the angular resolution, new technology would be required to extract degeneracy-free information.

Summary

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