

## An analytical treatment of three neutrino oscillations in the Earth

It is shown that the Magnus expansion for the evolution operator, when implemented in the adiabatic basis, provides a convenient formalism to find approximate solutions to the problem of three neutrino oscillations in a medium with an arbitrarily varying density. This method allows us to incorporate in a simple way the Earth matter effects on the transition probabilities for neutrinos with a wide interval of energies, making possible an accurate description of such effects in the case of solar and atmospheric neutrinos.

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