

Tau neutrino appearance and the measurement of neutrino mass ordering in the flux of atmospheric neutrinos at Super-Kamiokande

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Electron and muon neutrinos are produced in the atmosphere by cosmic rays, and neutrino oscillations in the atmospheric flux lead to the production of tau neutrinos. Since 1996, Super-Kamiokande (SK) has been collecting data on atmospheric neutrinos, with an energy threshold for the detection of tau neutrinos set at 3.5 GeV. In the same energy range, matter effects give rise to a resonance of electron neutrinos or anti-neutrinos, depending on whether the neutrino mass-ordering is normal or inverted. Thus, SK can unveil the neutrino mass-ordering contingent on reducing the tau neutrino background. We present the latest measurement of tau neutrino appearance at SK and potential enhancements to the experiment's sensitivity to neutrino mass-ordering by constraining tau neutrinos with a neural network.

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