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## **Studies of Non-Standard Effects in Atmospheric Neutrino Oscillations**

### **Abstract content**

Mass-induced oscillations between muon neutrinos and tau neutrinos have become the standard theory accounting for the zenith angle distributions of atmospheric neutrinos. However, there are other models which are able to produce similar effects and they are of both theoretical and experimental interest. In this talk, a neutrino oscillation analysis between muon neutrinos and tau neutrinos is first presented using the Super-Kamiokande atmospheric neutrino data. Then, this standard oscillation is compared with different categories of non-standard models: 1. oscillations between muon neutrinos and sterile neutrinos; 2. neutrino oscillations induced by violations of Lorentz invariance and CPT symmetry; 3. mass varying neutrinos. The minimum chi-square values of these different models are compared and it is found that the standard oscillation model fits the atmospheric neutrino observation better than non-standard ones significantly. The constraints on the allowable contributions of sterile neutrinos and the limits on violations of Lorentz invariance and CPT symmetry are provided.

**If this papers is presented for a collaboration, please specify the collaboration**

### **Summary**

### **Reference**

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