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# Upgrade of Honda atmospheric neutrino flux calculation with implementing recent hadron interaction measurements

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Atmospheirc neutrino flux calculation by M. Honda (Honda flux [1]) has used as a flux prediction in many experiments including the oscillation analysis in Super-Kamiokande, and has greatly contributed in the neutrino physics. In this talk, we will present an upgrade of the neutrino flux calculation with accelerator-data-driven modifications.
The dominant uncertainty of the Honda flux arises from insufficient understanding of the hadron interactions inside air showers. Such uncertainty has been evaluated by using atmospheric muon observation data at the ground. This introduces relatively large uncertainties in the momentum regions below 1 GeV and above O(10) GeV, the former is due to energy deposition of muons before reaching the ground and the latter is due to the kaon contribution to the neutrino production.
Several precise measurements for hadron production using accelerator beams have been recently performed or planned, like NA61, HARP, and BNL-E910. These data will compensate the muon observation by providing information for different phase space and kaon production. We incorporate these accelerator-data-driven modifications into the flux calculation. This allows the systematic uncertainty of atmospheric neutrino oscillation analysis to be evaluated based on the accelerator measurements.
[1] M. Honda, et. al., Phys. Rev. D 92, 023004 (2015)

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## Subcategory

Theoretical Methods

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