Hadronic uncertainties of inclusive atmospheric lepton fluxes from fixed-target experiments

Anatoli Fedynitch, and Matthias Huber

Executive summary

What is this contribution about?

A new data-driven, inclusive hadronic interaction model (DDM) that can be used for atmospheric lepton calculations and for uncertainty estimation.

***

Why is it relevant / interesting?

- DDM is a parameterization of secondary particle yields and their uncertainties measured by fixed-target experiments NA49/NA61 at CERN SPS;
- A novelty is the self-consistent prediction of fluxes together with the uncertainties from the same hadronic interaction model;
- The new result is a significantly smaller neutrino ratio uncertainty at low and high energies, staying in compatibility with previous references..

***

What have we done?

- We reduced the hadronic uncertainty on atmospheric lepton flux calculations;
- We obtained a new framework to further calibrate the result using indirect muon data, and reduce the uncertainties to the few-percent level in future.

***

What is the result?

The result is a satisfactory agreement with atmospheric muon and neutrino measurements over a wide energy range and reduced uncertainty in some energy ranges. The largest sources of error remain the forward pion production at high energies and high values of x_{lab}.