Uncertainties of the energy loss by inelastic interactions of muons with nuclei

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ICRC 2021

1. What is this contribution about?

   This process is about one of the energy loss processes of high-energy muons, inelastic nuclear interaction.

2. Why is it relevant/interesting?

   The process considered is the one with the largest relative uncertainty. In addition, at the energies in the PeV range, it is expected to become the dominant process, while at a few TeV its share in the total energy loss is noticeably smaller than the other processes of electron-positron pair production, bremsstrahlung and ionization.

3. What have we done?

   We have refitted the free parameters in several commonly used parametrizations of the nucleon structure functions to the data on photoabsorption and deep inelastic scattering available today, in particular the precise combined data from the HERA experiments H1 and ZEUS.

4. What is the result?

   The uncertainties on the energy loss derived from the covariance matrix of the fit is smaller than the difference in the predictions between different models. This indicates the need to work out further models which explain the existing data with good accuracy and clear theoretical fundament.