

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

Friday 16 July 2021 19:18 (12 minutes)

High-energy muons lose their energy by ionization, pair production, bremsstrahlung and inelastic interaction with nuclei. The process with the largest uncertainty is the inelastic interaction with nuclei. Since the energy loss is dominated by soft interactions with small momentum transfer, parton distribution functions are not applicable and phenomenological parametrizations have to be used. The parametrizations of the proton structure functions that are commonly used in muon transport simulation tools such as PROPOSAL, MUM, MUSIC or Geant4 were determined on the basis of the data available about 20 years ago. In this contribution, we refit several commonly used parametrizations to the data on deep inelastic scattering available today, including the precise combined data from the HERA experiments H1 and ZEUS, which have become available a few years ago. We compare the goodness of fit and calculate the uncertainty of the average energy loss from the uncertainties and correlations of the fit parameters.

Keywords

Collaboration

other Collaboration

Subcategory

Theoretical Results

Primary authors: Dr SANDROCK, Alexander (MEPhI); BUGAEV, Edgar (Institute for Nuclear Research of the Russian Academy of Sciences); KOKOULIN, Rostislav (MEPhI); PETRUKHIN, Anatoly (MEPhI)

Presenter: Dr SANDROCK, Alexander (MEPhI)

Session Classification: Discussion

Track Classification: Scientific Field: NU | Neutrinos & Muons