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QCD analysis of leading-neutron production at HERA: Determination of neutron fracture functions

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In recent years, several dedicated experiments at the e^-p collider HERA have collected high precision data on the spectrum of leading-neutron and leading-proton carrying a large fraction of the proton's energy. In [Phys. Rev. D 95, 074011 (2017), \, arXiv:1703.04369 [hep-ph]], we propose a technique based on the fractures functions framework and extract the neutron fracture functions (neutron FFs) from global QCD analysis of leading-neutron production data measured by H1 and ZEUS collaborations. We have shown that an approach based on the fracture functions approach allows us phenomenologically parametrize the neutron FFs. In order to asses the uncertainties in the resulting neutron FFs as well as the corresponding observables, associated with the uncertainties in the data, we have made an extensive use of the well-known Hessian method. The theory predictions based on the obtained neutron FFs are in good agreement with all data analyzed, for a wide range of scaled fractional momentum variable β as well as the longitudinal momentum fraction x_L .

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