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Global analysis on determination of fracture functions considering sea quark asymmetries in the nucleon

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In recent years, several experiments at the $e^{-}p$ collider HERA have collected high precision data on the spectrum of leading-baryons carrying a large fraction of the proton's energy. In this paper, we have analyzed recent experimental data on the production of forward proton and neutrons in deep inelastic scattering at HERA in the framework of a perturbative QCD.
We propose a technique based on the fractures functions framework, and extract the fracture functions (FFs) $M_2^{(B/p)}(\beta, Q^2, x_L)$ from global QCD analysis of DIS data measured by H1 and ZEUS collaborations. We have shown that an approach based on the fracture functions approach allows us phenomenologically parametrize the FFs.
Considering both leading proton as well as leading neutron production data in reaction $\gamma p \rightarrow BX$ and applying isospin symmetry, we present the results for the separate parton
distributions for all parton species, including valence quark densities, the anti-quark densities, the strange sea distribution functions, and the gluon distribution.
We proposed several parameterizations for the FFs and open the possibility of these asymmetries.
The extracted results for the t-integrated fracture functions $F_2^{\mathrm{LB}(3)}(\beta, Q^2, x_L)$ 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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