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Probing the Sea Quark Content of the Proton with One-Particle-Inclusive Processes

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We investigate the feasibility of constraining parton distribution functions in the proton through a comparison with data on semi-inclusive deep-inelastic lepton-nucleon scattering. Specifically, we reweight replicas of these distributions according to how well they reproduce recent charged kaon multiplicity measurements and analyze how this procedure optimizes the determination of the sea quark densities and improves their uncertainties. The results can help to shed new light on the long standing question on the size of the flavor and charge symmetry breaking among quarks of radiative origin. An iterative method is proposed and adopted to account for the correlation with what is assumed about the parton-to-hadron fragmentation functions in the reweighting procedure. It is shown how the fragmentation functions can be optimized simultaneously in each step of the iteration. As a first case study, we implement this method to analyze kaon production data.

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