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Charge Symmetry Violation in the Valence Parton Distributions and Fragmentation Functions

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Charge symmetry of the nucleon has been critically important in understanding the partonic structure of nuclei because halves the number of quark PDFs – $u^p(x) = d^n(x)$ and $u^n(x) = d^p(x)$. Going back to the charge independence of the nuclear force, this symmetry is well founded, however, there are known sources of charge symmetry violation (CSV) such as the quark masses and electromagnetic coupling. We report on a measurement of pion electroproduction in semi-inclusive deep-inelastic scattering on hydrogen and deuterium targets. The experiment was conducted at Jefferson Lab in Hall C in the winter of 2019 and measured the charged pion SIDIS cross section ratio of $\sigma(\pi^-)/\sigma(\pi^+)$ for $0.3 < z < 0.75$, $3.0 < Q^2 < 5.0$ GeV^2, and $0.3 < x < 0.6$. We extract the charge symmetry violating parton distribution in the valence region and the ratio of favored to unfavored fragmentation functions. We will discuss the results of CSV in the valence parton distributions and emphasize the need for a global analysis which includes charge symmetry violation.

Submitted on behalf of a Collaboration?

No

Participate in poster competition?

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