Separated Response Functions in Exclusive, Forward $\pi^\pm$ Electroproduction on $^2$H

GARTH HUBER, University of Regina, PION FORM FACTOR COLLABORATION — The study of exclusive $\pi^\pm$ electroproduction on the nucleon, including separation of the various structure functions, is of interest for a number of reasons. The ratio $R_L = \sigma_L^- / \sigma_L^+$ is sensitive to isoscalar contamination to the dominant isovector pion exchange amplitude, which is the basis for the determination of the charged pion form factor, $F^\pi(Q^2)$, from electroproduction data. Furthermore, $R_L$ is an experimentally accessible ratio of longitudinal photon observables, and its value may have implications for constraining polarized GPDs. A change in $R_T = \sigma_T^- / \sigma_T^+$ from unity at small $-t$, to 1/4 at large $-t$, would suggest a transition from coupling to a (virtual) pion to coupling to individual quarks. If there is a partial cancellation of nonperturbative QCD contributions, the ratio may show an earlier approach to pQCD than the individual cross sections. We report the results of our study from Jefferson Lab Hall C, where the first complete separation of the four unpolarized electromagnetic structure functions were obtained in forward, exclusive $\pi^\pm$ electroproduction at central $q^2$ values of 0.6, 1.0, 1.6 gev sq at $W=1.95$ GeV, and $Q^2 = 2.45$ gev sq at $W=2.22$ GeV.

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