

Abstract

This is a re-submission of the Conditionally Approved PR94-108. The experiment will measure exclusive kaon production cross sections in the $H(e,e'K^+)Y$ reaction. This experiment will measure how kaons are produced – the electromagnetic structure and which to what extent the various production mechanisms contribute. Three of the four unpolarized response functions will be separated over a large range in Q^2 , W , and t .

The longitudinal and transverse response functions will be separated through the detection of kaons along the direction of the virtual photon, where only these terms contribute to the cross section. For each Q^2 kinematic the longitudinal and transverse responses will be separated at three different points in t . By appropriately extrapolating the longitudinal term in t , the electromagnetic form factor of the kaon will be determined. The separation of the longitudinal-transverse interference term will also be performed for selected kinematics, forming a sensitive test of the production model. The t -dependence of the cross section (and additionally of the separated transverse response at small $|t|$) will also be measured to very large values of $|t|$, covering the transition from a semiphenomenological description in terms of mesons and baryons to a pQCD-based description in terms of quarks (or diquarks).

The square of the 4-momentum transferred by the electron will cover the range $2 \leq Q^2 \leq 3$ (GeV/c)², the hadronic 4-momentum transfer squared will cover the range $-0.3 \geq t \geq -3.0$ GeV², and the invariant mass will cover the range $1.8 \leq W \leq 2.2$ GeV. The measured cross sections will be compared to both hadronic and subnucleonic reaction models. This will considerably extend the present electroproduction data. Incident beam energies from 3.245 to 6.045 GeV will be utilized, along with the Hall A spectrometers. It should be emphasized that with 520 hours, this experiment will provide a consistent data set in a wide region of Q^2 , W , and t , which cannot be accessed elsewhere at CEBAF.