

HAW14-2014-000511

Abstract for an Invited Paper
for the HAW14 Meeting of
the American Physical Society

Electromagnetic Strangeness Production at GeV Energies

REINHARD SCHUMACHER, Carnegie Mellon University

An overview of a decade of elementary strangeness production results from various labs will be discussed, with emphasis on CLAS at Jefferson Lab. Kaon photoproduction off the nucleon of the ground state Λ and Σ^0 states has been instrumental in identifying the N^* resonance structure of the nucleon around 2 GeV. Spin observables, aiming at “complete” determination of the photoproduction amplitudes, promise to further constrain the excitation spectrum of nucleons. Electroproduction measurements have extended structure function information to non-zero Q^2 . Photoproduction of the excited hyperons, the $\Sigma^0(1385)$, $\Lambda(1405)$, and $\Lambda(1520)$ in the reactions $\gamma p \rightarrow K^+ Y^* \rightarrow K^+ \Sigma \pi$, can be compared to the hyperon ground state reactions for the first time. These cross sections have been compared to current theoretical models based on the effective Lagrangian approach, with varying success. The cross sections for the $\Lambda(1405)$ region are strikingly different for the $\Sigma^+ \pi^-$, $\Sigma^0 \pi^0$, and $\Sigma^- \pi^+$ decay channels, indicating the effect of isospin interference, especially at W values close to the threshold. We show how this behavior is reflected in the $\Sigma \pi$ mass distributions of the $\Lambda(1405)$. Chiral unitary models of the $\Lambda(1405)$ and related non-strange baryonic states suggest how the $\Lambda(1405)$ is a structure of several interfering poles, which may explain the peculiar shapes. We highlight also the first measurement of the spin and parity of the $\Lambda(1405)$. Finally, we outline the next experimental steps to be taken in strangeness electromagnetic production in the Jefferson Lab 12 GeV era.