

The $\Sigma^- p \rightarrow \Sigma^- p$ and $\Sigma^+ p \rightarrow \Sigma^+ p$ Elastic Scattering Processes*

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Recent work by the CLAS Collaboration has pioneered the use of short-lived beams in nuclear physics research. The Σ^+ and Σ^- are underutilized particles for this research; with mean lifetimes of 8.0×10^{-11} s and 1.5×10^{-10} s respectively, they travel only a few centimeters before decaying. There have been only nine previous measurements of this process with the Σ^- , all at high energies, and none with the Σ^+ . These studies provide important tests of $SU(3)_F$ symmetry, which predicts that the cross sections for these processes should be related. Using only the scattered proton and the products of the Σ^+ and Σ^- decays, we reconstruct these processes to determine the number of events. Separate analyses of the processes $\gamma p \rightarrow \Sigma^+ X$ and $\gamma p \rightarrow \Sigma^- X$ will be used to determine the incident flux of the beam sigmas. The angle and momentum of the beam sigmas will determine the effective target thickness. Recent analyses of the processes $pp \rightarrow pp$ and $\Lambda p \rightarrow \Lambda p$ suggest that we will be able to observe a signal for this process. Very preliminary work with this process indicates the possibility of many more events than presently available in the world data sample. This poster will present the motivation and history of this work, the current status of our analysis, and prospects for the future of this process.

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