Elastic Lambda-proton Scattering in CLAS

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The Λ-proton elastic scattering reaction is important to our understanding of the structure of the proton and the nature of the strong nuclear force. Previous measurements of this process typically used bubble chambers with kaon beams to produce the Λ "beam", which then interacted with a second proton inside the chamber. The Λ can also be produced in the photoproduction process $\gamma p \rightarrow K^{+}\Lambda$, which has been studied extensively at the Thomas Jefferson National Accelerator Facility by the CLAS Collaboration. The relatively long decay length of the Λ makes it possible for the Λ to travel along the target and interact with a second proton in the target, leading to the elastic scattering process $\Lambda p \rightarrow \Lambda p$. The large acceptance of the CLAS detector makes it a good choice for the study of such a complicated final state. In an attempt to observe this process, a data-mining project was initiated with the CLAS g12 run, which used a tagged photon beam with $3.6<E_{\gamma}<5.4$ GeV incident on a 40-cm liquid hydrogen target. Although neither the CLAS detector nor the g12 run was designed to search for this process, the apparent non-conservation of baryon number in the final state leads to a very stringent cut which results in a good signal for the process $\Lambda p \rightarrow \Lambda p$. Future work will look at the possibility of increasing the detection rate for $\Lambda p \rightarrow \Lambda p$, using the upgraded CLAS12 detector, along with possible improvements to the target design. This talk will discuss the motivation for this work, the analysis and initial results, and the possibilities for future studies.