The Proton-Proton Elastic Scattering Processes in the CLAS Detector*

Gavin R. Acosta, A. Flores, A.H. Scott, A.V. Tran, and J.W. Price
(California State University, Dominguez Hills)

The CSUDH Hadronic Structure Laboratory is conducting a program of nuclear physics using short-lived beams. The beam particle, which travels only a few cm before decaying, is produced inside a liquid hydrogen target, and rescatters on a second proton in the same target. To verify this technique, we are analyzing the process pp→pp with this same approach. A peak at m_x=0.938 GeV/c^2 in the missing mass plot of the process Xp→pp is evidence for the pp elastic scattering process. In contrast to traditional accelerator-based nuclear physics experiments, both the beam flux and effective target thickness are complicated to determine. The beam flux is determined in a separate analysis of the same dataset, requiring only a single proton. The effective target thickness is determined by a simple geometrical calculation. The acceptance and analysis efficiency are determined using a simulation designed to produce events that are initiated within the target, with beam particles at directions not along the target axis. A successful comparison of the results of this measurement with existing pp→pp data will enable us to extend this technique to short-lived beam particles. This poster will present the motivation behind this research, discuss the current status of our analysis, and future applications of this technique.

*This work is supported by the US Department of Energy and the CSUDH Office of Undergraduate Research.