

Abstract

The Charged Pion Polarizability (CPP) experiment at Jefferson Lab is a precision measurement of the pion electromagnetic polarizability using the GlueX detector. The electromagnetic polarizability is a fundamental property of particles that provides a test of effective field theories, dispersion theories, and lattice calculations. In contrast to past experiments of this measurement, the CPP experiment utilizes a new technique to measure the pion polarizability, Primakoff photo-production of $\pi^+\pi^-$ pairs on a lead target at 6 GeV incident photon energy, where the forward kinematics are dominated by the process $\gamma\gamma \rightarrow \pi^+\pi^-$. A dedicated muon detector system was added to the GlueX apparatus, in tandem with a machine-learning based particle-identification algorithm to separate $\pi^+\pi^-$ from e^+e^- and $\mu^+\mu^-$ background. This approach uses a neural network classifier known as a multi-layer perceptron with performance evaluated over physics distributions relevant for the Primakoff selection region. Preliminary measurements of key physics observables will be presented along with a strategy for an amplitude analysis to extract $\gamma\gamma \rightarrow \pi^+\pi^-$ cross sections from the Primakoff contribution. This work is supported by D.O.E. grant DE-FG02-88ER40415 A022.