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AI/ML for PID in the Charged Pion Polarizability Experiment at Jefferson Lab}

Wednesday 26 October 2022 11:00 (30 minutes)

A precise measurement of the polarizability of the charged pion provides an important experimental test of our understanding of low-energy QCD. The goal of the Charged Pion Polarizability (CPP) experiment in Hall D at JLab, currently underway, is to make a precision measurement of this quantity through a high statistics study of the $\gamma\gamma \rightarrow \pi^+\pi^-$ reaction near 2π threshold. The production of Bethe-Heitler electron and muon pairs present significant backgrounds, which demand high discrimination between e/π and μ/π to select a clean pion-pair signal. Two independent AI/ML projects were developed to classify μ/π and e/π respectively: a tensorflow-lite model (training in python, inference in C++) for μ/π , and the TMVA package from ROOT for e/π . A new detector, consisting of iron absorbers interspersed with multi-wire proportional chambers, was constructed to enhance the discrimination between muons and pions. Both models were deployed in real time data monitoring to verify good experimental conditions.

Significance

References

Experiment context, if any

Charged Pion Polarizability Experiment (JLAB E12-13-008), The GlueX Collaboration

Primary authors: SCHICK, Andrew; LAWRENCE, David; KALRA, Nikhil

Presenter: SCHICK, Andrew

Session Classification: Poster session with coffee break

Track Classification: Track 2: Data Analysis - Algorithms and Tools