Contribution ID: **141** Type: **Oral**

Gaussian process for calibration and control of GlueX Central Drift Chamber

Thursday, 27 October 2022 17:00 (20 minutes)

We have developed and implemented a machine learning based system to calibrate and control the GlueX Central Drift Chamber at Jefferson Lab, VA, in near real-time. The system monitors environmental and experimental conditions during data taking and uses those as inputs to a Gaussian process (GP) with learned prior. The GP predicts calibration constants in order to recommend a high voltage (HV) setting for the detector that maintains consistent detector performance (gain and resolution) throughout data taking. This approach is in stark contrast to traditional detector operations in which the detector operates at fixed HV and its calibration parameters vary quite considerably with time. Additionally, the ML based system utilizes uncertainty quantification to correct the recommended control parameters when appropriate. We will present results from the ML system autonomously during the Charged Pion Polarizability (CPP) experiment conducted in Hall D at Jefferson Lab.

Significance

First instance of utilizing an ML based system to autonomously calibrate and control the GlueX Central Drift Chamber, with uncertainty quantification. Using this system eliminates the need to calibrate the experimental data after the experiment has completed.

References

Experiment context, if any

Charged Pion Polarizability, GlueX

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