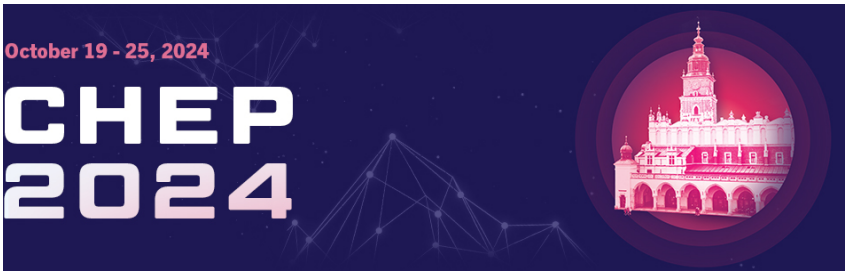

Contribution ID: **411** Type: **Talk**

Machine Learning for Optimized Polarization at Jefferson Lab

Wednesday 23 October 2024 15:00 (18 minutes)

Polarized cryo-targets and polarized photon beams are widely used in experiments at Jefferson Lab. Traditional methods for maintaining the optimal polarization involve manual adjustments throughout data taking– an approach that is prone to inconsistency and human error. Implementing machine learning-based control systems can improve the stability of the polarization without relying on human intervention. The cryo-target polarization is influenced by temperature, microwave energy, the distribution of paramagnetic radicals, as well as operational conditions including the radiation dose. Diamond radiators are used to generate linearly polarized photons from a primary electron beam. The energy spectrum of these photons can drift over time due to changes in the primary electron beam conditions and diamond degradation. As a first step towards automating the continuous optimization and control processes, uncertainty aware surrogate models have been developed to predict the polarization based on historical data. This talk will provide an overview of the use cases and models developed, highlighting the collaboration between data scientists and physicists at Jefferson Lab.

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