Contribution ID: **1620** Contribution code: **TUPS77**   Type: **Poster Presentation**

Applications of machine learning in ultrafast laser control

Tuesday, 21 May 2024 16:00 (2 hours)

In our pursuit to tailor a precise electron bunch with a photoinjector, fine-tuning laser parameters, especially those influencing the photocathode pulse, is pivotal. Our ongoing research integrates machine learning, training neural networks with experimental data from ATF. The first approach involves generating a downstream photocurrent image to replicate the emission profile, serving as a fitness function for neural network training. The second approach employs an emittance scan during each iteration of the neural network-controlled laser profile, using magnetic optics and beam profile monitors, with calculated beam emittance as an additional fitness function. Our research aims to demonstrate the potential superiority of the neural network in achieving precise laser shaping for electron beam optimization. Leveraging real data, our goal is to reduce electron beam emittance through optimized laser profiles, underscoring the impactful applications of machine learning in advancing photoinjector technology.

Footnotes

I am working with Professor Sandra Gail Biedron and working with Marcus Babzian at BNL. I could not add them as a co-author but will figure out later and add them as well.

Funding Agency

Paper preparation format

Region represented

Asia

Primary author: BIEDRON, Sandra (University of New Mexico)

Co-authors: ASLAM, Aasma (University of New Mexico); BABZIEN, Marcus (Brookhaven National Laboratory)

Presenter: BIEDRON, Sandra (University of New Mexico)

Session Classification: Tuesday Poster Session