



Contribution ID: 419

Type: **Poster Presentation**

Machine learning at the Spallation Neutron Source accelerator and target

We describe the ongoing efforts to apply Machine Learning techniques to improve the performance of our accelerator and target. Specially, we are looking to minimize halo beam losses in the absence of a proper physics model, automatically detect and log anomalies in the target support systems such as cooling, and detect and prevent errant beam pulses in the linac. We also describe the infrastructure we use to acquire and stream data to the GPU cluster for training, our code development cycle, and edge computing for model inference. To minimize halo beam losses, we use a Reinforcement Learning technique tested on a virtual accelerator. The target anomaly detection is trained on archived data using incomplete physics models and is made part of the existing target reporting system. The errant beam prevention analyzes beam current and beam phase waveforms as well as accelerator configuration data to predict errant pulses. We also develop continual learning to adapt to changes in the accelerator.

Please consider my poster for contributed oral presentation

Yes

Would you like to submit this poster in student poster session on Sunday (August 10th)

No

Footnotes

Funding Agency

ORNL/SNS is managed by UT-Battelle, LLC, for the U.S. Department of Energy under contract DE-AC05-00OR22725

I have read and accept the Privacy Policy Statement

Yes

Author: Dr BLOKLAND, Willem (Oak Ridge National Laboratory)

Co-authors: ZHUKOV, Alexander (Oak Ridge National Laboratory); Dr RAY, Anant (Oak Ridge National Laboratory); WINDER, Drew (Oak Ridge National Laboratory); RAJPUT, Kishansingh (Thomas Jefferson National Accelerator Facility); SCHRAM, Malachi (Thomas Jefferson National Accelerator Facility)

Presenter: Dr BLOKLAND, Willem (Oak Ridge National Laboratory)

Session Classification: MC6

Track Classification: MC6 - Beam Instrumentation, Controls, AI/ML, and Operational Aspects