



Contribution ID: 1055 Contribution code: TUPS64

Type: **Poster Presentation**

## Estimation and control of particle accelerators in simulation using latent space tuning

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

In this work we explore the estimation and control of a particle accelerator simulation of the 800 MeV linac at Los Alamos National Lab. We use a convolution neural network model with a low dimensional latent space to predict the phase space projections of the beam and beam loss, which are mapped from accelerator settings. In deploying the model, we assume phase space predictions cannot be measured but beam loss can, and we apply a feedback using the error in beam loss prediction to tune the latent space. With beam loss and phase space predictions well correlated, we apply constrained optimization techniques, simultaneous with phase space prediction, to control the beam phase space while keeping beam loss from reaching unsafe levels.

### Footnotes

### Funding Agency

Work supported by the Los Alamos National Laboratory, Los Alamos, NM, USA, through the Laboratory Directed Research and Development Project, under Grant 20220074DR

### Paper preparation format

LaTeX

### Region represented

North America

**Primary author:** WILLIAMS, Alan (Los Alamos National Laboratory)

**Co-author:** SCHEINKER, Alexander (Los Alamos National Laboratory)

**Presenter:** WILLIAMS, Alan (Los Alamos National Laboratory)

**Session Classification:** Tuesday Poster Session

**Track Classification:** MC6: Beam Instrumentation, Controls, Feedback, and Operational Aspects: MC6.D13 Machine Learning