

5th ICFA Beam Dynamics Mini-Workshop on Machine Learning for Particle Accelerators



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Semi-supervised detection of optics errors in beamlines- 15'+5'

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Optics tuning in transfer lines and LINACs can be challenging due to the fact that multiple combinations of machine settings can lead to the same diagnostic output. Moreover, the lack of a periodic solution can limit the ability to infer optics in the same way as rings from BPM signals. Model based approaches are often used to assist with the optics tuning in combination with optimization or parameter estimation. Here we have developed a novel approach using machine learning inverse models trained on a known configuration to detect variations in quadrupole settings without explicitly including them in the model. This paper shows a comparison of neural network models and linear models on both a simulation-based study and experimental studies conducted at the AGS to RHIC transfer line at Brookhaven National Lab.

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