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Simultaneous corrections of nonlinear errors in the LHC triplets using machine learning

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Non-linear optics commissioning for the LHC has faced challenges with higher order errors using a diverse array of correction techniques. Feed down of these errors complicates the correction process, demanding significant time and effort. As machine complexity increases and IP beta functions decrease, there is a growing need for efficient and reliable correction methods. This study explores the use of new machine learning methods to simultaneously correct errors of multiple orders. Leveraging MAD-NGs computation speeds presents great promise in the realm of machine learning for optics. Results from simulations using these novel methods are presented and show significant improvements compared to classical approaches currently used.

Primary Keyword

uncertainty quantification for ML

Secondary Keyword

ML-based optimization

Tertiary Keyword

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