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Operation the Accelerator Test Facility linac transport beamline by using Artificial Intelegence and Machine Learning Methods

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Brookhaven National Laboratory Accelerator Test Facility is working on development software tools to achieve automated instrument for tuning and alignment of electron source and beam transport line. The end goal is a robust, efficient, and autonomous method of alignment that can operate on a generalized notion of beam fitness, that can optimize any quantifiable metric about the beam (size, shape, position, intensity, etc.) with live feedback. The algorithm should be able to operate with as little prior knowledge of the problem as possible and be adaptable to the preferences of a user. The developed set of tools will be made available for other beamlines at BNL and beyond and will help to reduce the preparation time for the scientific experiments at these facilities.
The project aims to address the alignment/tuning tasks with the help of Machine Learning (ML) based optimization tools as well as domain-specific simulation codes, seamlessly integrated with the Bluesky data collection framework (https://blueskyproject.io). The beam transport model will be applied through Sirepo-Bluesky interface which will let to use "digital twins"of the actual beamlines represented in the Sirepo simulation framework (https://www.sirepo.com) with the same Bluesky data collection system as in operating the beamlines.

Funding Agency

Footnotes

I have read and accept the Privacy Policy Statement

Yes

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