Contribution ID: **233** Contribution code: **MOP034** Type: **Poster Presentation**

Efficient 6-dimensional phase space measurements and applications to autonomous monitoring at LCLS-II

Monday 11 August 2025 16:00 (2 hours)

Increasing the performance and capabilities of free electron lasers, such as LCLS-II, hinges on our ability to precisely control and measure the 6-dimensional phase space distribution of the beam. However, conventional tomographic techniques necessitate a substantial number of measurements and computational resources to characterize a single beam distribution, using many hours of valuable beam time. Novel diagnostic techniques are needed to significantly reduce the number of measurements required to reconstruct detailed, 6-dimensional beam features to enable feedback for precision beam shaping for accelerators and characterize unknown physical phenomena. In this work, we present a novel approach to analyzing experimental measurements using differentiable beam dynamics simulations and generative representations of 6-dimensional phase space distributions. We discuss developments in combining this work with advanced accelerator control algorithms and parasitic beam measurements to autonomously monitor the 6-dimensional phase space distribution of the beam at LCLS-II during accelerator operations.

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

I have read and accept the Privacy Policy Statement

Yes

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