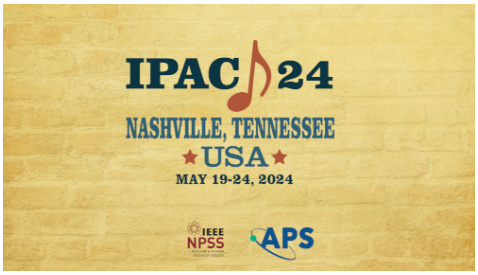

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Non-invasive beam diagnostics using differentiable simulations and computer vision methods

Wednesday, 22 May 2024 16:00 (2 hours)

The direction of particle accelerator development is ever increasing beam quality, currents, and repetition rates. Advanced control techniques using machine learning are required for the optimization and operation of such accelerators. These techniques greatly benefit from having single-shot beam measurements. However, high intensity beams poses a challenge for traditional interceptive diagnostics due to the mutual destruction of both the beam and the diagnostic.
An alternative approach is to infer beam parameters non-invasively from the synchrotron radiation emitted in bending magnets. In this talk, we will discuss the development of such a diagnostic at FACET-II. Inferring the beam distribution from a measured radiation pattern is a complex and computationally expensive task. To address these challenges we use differential simulations and computer vision techniques. This enables both fast inference and uncertainty quantification of the beam parameters.

Footnotes

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