Harsh Der: 4D Phase Space Reconstruction based on Neural Networks and Differentiable Simulations

Report of Contributions

https://indico.psi.ch/e/17803

Contribution ID: **3** Type: **not specified**

4D Phase Space Reconstruction based on Neural Networks and Differentiable Simulations

Tuesday 29 July 2025 10:45 (30 minutes)

A neural network-based framework enables precise reconstruction of the four-dimensional phase space of electron beams in particle accelerators. Utilizing a Transformer based Neural Network architecture and differentiable simulations, this approach captures complex features in beam distributions directly from experimental screen images which cannot be captured by measurement techniques used at SwissFEL. The reconstructed distribution provides access to the full (x, x', y, y') parameter space, enabling comprehensive analysis of beam properties including higher-order moments, correlations, and complex beam dynamics.

Presenter: DER, Harsh

Session Classification: Focus report