Contribution ID: **2275** Contribution code: **SUPS029** Type: **Student Poster Presentation**

Extracting symplectic maps for space-charge dominated beams

Sunday 1 June 2025 14:00 (2 hours)

Symplecticity of the transfer maps is important for reliable evaluation of space-charge dominated beams in accelerators. Unfortunately, most simulation codes that include collective effects, such as space charge, do not use canonical phase-space variables and therefore are not symplectic in the presence of electromagnetic fields. In this paper, we present a numerical method to extract symplectic transfer maps using particle tracking simulation code IMPACT-T for space-charge dominated beams. We demonstrate this method by obtaining symplectic transfer maps in the photo-injector (113 MHz SRF gun) section of the Coherent electron Cooling (CeC) Proof of Principle (POP) experiment.

Footnotes

Paper preparation format

LaTeX

Region represented

America

Funding Agency

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Session Classification: Student Poster

Track Classification: MC5: Beam Dynamics and EM Fields: MC5.D11 Code Developments and Simulation Techniques