Contribution ID: **306** Type: **Tutorial**

Particle Trapping and Beam Loading Physics in Plasma-Based Accelerators

Monday, 7 November 2022 17:00 (2h 30m)

With accelerating gradients of tens of GeV/m, plasma accelerators have a great potential for replacing RF cavities in future colliders and FEL light sources. However, the beams generated by these accelerators need to satisfy stringent quality metrics before they can be considered for the aforementioned applications. One such metric is the relative energy spread ΔE/E, which needs to be at a sub-percent level for colliders and on the order of 10-3 for FEL applications. In this tutorial, the physics of beam loading required for achieving low energy spread will be discussed in the context of a highly nonlinear plasma wakefields. This discussion will be followed with an overview of the physics of injection mechanisms for electrons in laser-driven and beam-driven plasma-wakefield accelerators as well as methods for reducing the energy spread of the generated electron beams. A review of the co-moving coordinate system, the equations of electrodynamics in this coordinate system, and the Hamiltonian as the constant of motion will be presented at the beginning of the tutorial as well.

Acknowledgments

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Session Classification: Student Tutorials

Track Classification: Tutorial Session: Student Tutorial