Joint DESY and University of Hamburg Accelerator Physics Seminar

Wednesday, 06.06.2018

(10:15 in Room 459/30b)

Vlasov Simulation of Exotic Phase-Space Densities via Tree-Based Domain-Decomposition

(MSc defense talk)

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Abstract

Vlasov simulation of FEL-type electron bunches is encumbered by the "exotic" shape of their longitudinal phase-space density (PSD). Typically, the longitudinal PSD forms a thin, hair-like band meandering through phase-space. Any rectangular simulation domain therefore inevitably includes vast regions of unpopulated phase space which do not contribute to the dynamics of the system. As a consequence, naïve discretization approaches become highly inefficient, especially at high resolutions.

In this talk, a Vlasov simulation code will be presented which overcomes this problem by employing tree-based domain-decomposition, allowing for an adaptive discretization of the PSD. Furthermore, an ultra-relativistic, 1-DOF bunch compressor model is presented and analyzed using both the code and an arbitrary order perturbation theory with regard to the microbunching instability driven by longitudinal space charge.

NOTE THE UNUSUAL DATE AND TIME

W.Hillert, (Univ. HH), I.Agapov (MPY) and M.Vogt (MFL).

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