

IMPACTX space charge modeling of high intensity linacs with mesh refinement

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High intensity linacs pose a challenge to efficient beam dynamics modeling due to the high numerical resolution required for accurate prediction of beam halo and losses. The code ImpactX represents the next generation of the particle-in-cell code IMPACT-Z, featuring s-based symplectic tracking with 3D space charge, parallelism with GPU acceleration, adaptive mesh-refinement, modernized language features, and automated testing. While the code contains features that support the modeling of both linear and circular accelerators, we describe recent code development relevant to the modeling of high-intensity linacs (such as beam transport for the Fermilab PIP-II linac), with a focus on space charge benchmarking and the impact of novel code capabilities such as mesh refinement.

Footnotes

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