

Intrabeam scattering simulation with a novel hybrid-kinetic Monte Carlo method for linear accelerators

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Recent studies have identified intra-beam scattering (IBS) as one of the processes that can have a significant impact on the beam dynamics of linacs with high-density and low-energy beams, such as in free electron sources (FELs), where IBS appears to be one of the effects that most limits their performance. Most existing simulation codes have been developed for circular lattices or assume Gaussian beams and thus cannot accurately simulate the desired scenario. Motivated by this problem, this work presents the implementation of IBS in RF-Track, a tracking code developed for linear accelerators. The numerical simulation follows a novel methodology based on a hybrid-kinetic Monte Carlo approach. The method has proven to be stable using different input parameters and has shown emittance and a Sliced-Energy-Spread (SES) growth in different scenarios, demonstrating the accuracy of the tool and making it a promising solution to understand SES growth in FELs.

Footnotes

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