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Modeling laser-wakefield accelerators using the time-averaged ponderomotive approximation in a Lorentz boosted frame

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Future, high-fidelity simulations of multi-GeV-class Laser Wakefield Accelerators (LWFAs) will need to model the propagation of high-intensity laser drivers over meter-scale plasmas with high spatial and temporal resolutions, thus requiring high amounts of computational resources.

Various techniques have been devised over the years to reduce the computational cost of such simulations, including the time-averaged ponderomotive approximation, and the use of the Lorentz boosted frame technique.

In this presentation the combination of these two computational techniques will be discussed, highlighting the resulting significant reduction in the computational cost of LWFA simulations and the limitations of this approach.

The combination of the two techniques can potentially become essential for the modeling of a multi-TeV, LWFA-based collider.

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