

Accelerator Simulations “Reframed”

Objective: Use advanced simulation tools to study feasibility, and optimize conceptual design, of plasma-based linear colliders.

Implications: Development of acceleration methods more than 1,000 times greater than conventional technology.

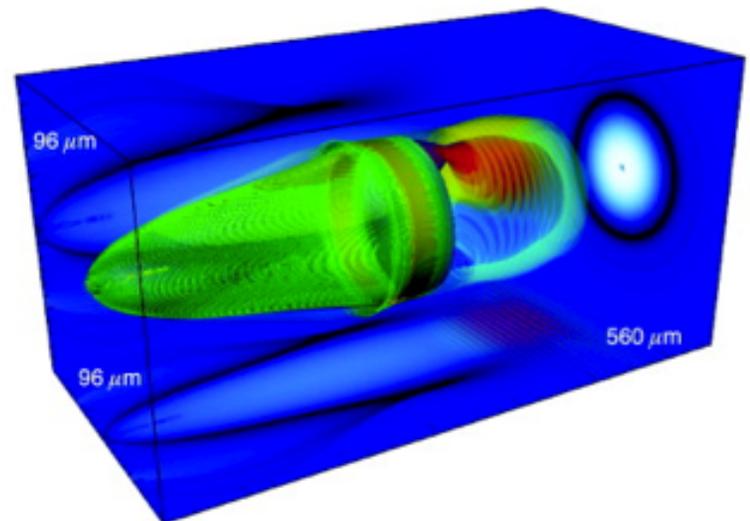
Accomplishments: Developed a new Lorentz frame simulation method.

- Minimizes disparity in scales between the laser and plasma, thus reducing the number of required time steps.
- Simulations run 20-300X faster.

NERSC: Uses OSIRIS code on Franklin; scales to more than to 16,000 cores.

- NERSC resources + INCITE used to develop method and code; runs now on BG, XT5, elsewhere.

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Simulation results in the boosted frame for a 1.5-GeV self-injected electron beam in a single-stage laser-wakefield accelerator. The laser propagates from left to right and drives the wakefield that traps and accelerates electrons (green isosurfaces and blue projections).

*Nature Physics 6, 311 - 316 (2010)
Computer Physics Communications 181, 869-875 (2010)*