Abstract Submitted
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Relativistic Particle Wakes and Their Impact on Electron Stopping[1] IAN ELLIS, LLNL and UCLA, FRANK GRAZIANI, DAVID STROZZI, LLNL, FRANK TSUNG, VIKTOR DECYK, WARREN MORI, UCLA — A detailed understanding of electron stopping and scattering in plasmas with variable values for the number of particles within a Debye sphere is still not at hand. Presently, there is some disagreement in the literature concerning the proper description of these processes. Detailed theoretical models exist for the stopping power of a single relativistic electron in a plasma, including quantum mechanical effects. However, few theories take into account correlation effects, in which the wake produced by an electron modifies the dynamics and stopping power of the electrons that travel behind it. Some have performed simple studies of correlated stopping, but have neglected the tendency of electrons to move around inside the wake. Developing and validating proper descriptions requires studying the processes using first-principle plasma simulations. We are using the particle-in-cell (PIC) codes OSIRIS and QuickPIC to perform these simulations. As a starting point, we examine the wake of a particle passing through a plasma in 3D relativistic electromagnetic simulations using various cell sizes and compare the results with cold plasma theory. We also present some initial stopping power results. The relevance of the work to Fast Ignition is discussed.

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Ian Ellis
LLNL and UCLA

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