

Abstract Submitted  
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**Multi-Scale Kinetic Model of Ultrafast Laser-Matter Interaction<sup>1</sup>**

ALLA BATISHCHEVA, Delta Search Labs Inc., 400 Technology Sq, Cambridge, MA 02139, OLEG BATISHCHEV, MIT, Cambridge, MA 02139 — Interaction of ultrafast laser pulses with solid density targets is characterized with multiple temporal and spatial scales. Predictive simulation with traditional methods (e.g. PIC) is restricted due to computational costs and high statistical noise. A hybrid multi-scale approach combines moving adaptive mesh, which automatically follows physical parameters such as electro-magnetic fields, target density, their gradients, etc. with dual representation of the distribution functions by discrete particles and continuous grid-function in velocity space. These elements allow us to control computational cost while providing required accuracy of simulations. For instance, an ablation of a micron-size droplet in a cm-sized domain can be simulated on a desktop computer. We present results of simulations, discuss code parallelization, and interfacing with molecular dynamics at nano-scale and fluid codes at macro-scale.

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Oleg Batishchev  
MIT

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