Abstract Submitted
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Multiscale simulations of particle acceleration in astrophysical shocks ANATOLY SPITKOVSKY, Princeton University — Particle acceleration in astrophysical shocks is central to the production of nonthermal radiation from a large variety of astrophysical sources, ranging from supernova remnants to GRB jets. The process of acceleration is an intrinsically multi-scale problem, connecting plasma microphysics at the shock to self-generated instabilities driven by accelerated particles far from the shock. While considerable progress has been made in studying acceleration with ab-initio particle-in-cell (PIC) simulations, future studies will need to address the range of scales with more computationally efficient methods. I will discuss the efforts at studying shock acceleration with fully kinetic and "hybrid" simulations, that combine the salient features of PIC schemes with computational efficiency of fluid methods. These methods allow the study of long-term back-reaction of accelerated particles on the shock structure, and the effects of global shock geometry on the local acceleration physics.

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