Abstract Submitted
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Particle Acceleration and Radiation in Relativistic Collisionless Shocks EDISON LIANG, KOICHI NOGUCHI, Rice University — We summarize PIC simulation results of particle acceleration and radiation mechanisms in both strongly magnetized and unmagnetized relativistic collisionless shocks, using advanced 2-and-3D PIC codes including radiation and radiation damping. We demonstrate the critical roles played by macroscopic electromagnetic fields in both acceleration and radiation processes, by varying the amplitude and direction of the comoving magnetic field in both upstream and downstream plasmas. We also study the effects of varying the Lorentz factor, density contrast, plasma temperature and electron:ion mass ratio. In the weak-field (Alfven speed << c) limit, particles are accelerated diffusively by Weibel-instability-generated magnetic turbulence, nonlinear plasma oscillations and longitudinal electric fields caused by charge separation. In the ultrastrong field (electron Alfven speed >> c) limit, electrons are accelerated mainly by the ponderomotive (**jxB**) force while ions are accelerated by charge separation electric fields. In the latter case we find the formation of well-defined power-law but highly anisotropic momentum spectra. The radiation mechanisms are also distinct in the different regimes. We will present the results of radiation power output, spectra and polarization.

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