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Numerical simulations of relativistic collisionless shocks and their radiation[1] EDISON LIANG, JULIA SCHEEVEL, ORESTES HASTINGS, Rice University — Using 2.5D and 3D PIC codes, we simulate the collisions of relativistic electron-positron and electron-ion plasmas with and without upstream background magnetic fields. We study the growth and saturation of Weibel and other instabilities, and the diffusive acceleration of high energy particles. Using post-processing codes we also compute the in-situ radiation output of the accelerated particles. We find that in general the radiation output of Weibel mediated shocks without upstream background magnetic fields is small. Shocks mediated by strong background fields tend to radiate more efficiently due to stronger coupling between the accelerated particles and penetrated fields. The structure of e-ion shocks is complicated by electron-ion charge separation, which transfers energy from high energy electrons to ions. Particle acceleration is facililated by both charge separation and Langmuir waves in this case.

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