Radiation of particles accelerated by the first−order Fermi process at relativistic shocks

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Particle in cell simulations of relativistic, collisionless shocks show clear evidence for the first−order Fermi acceleration mechanism. This process is most effective in weakly magnetised shocks, where the turbulence is self−generated on small length−scales, on the order of the plasma skin−depth. The transport and radiation of particles in such fields differs from the standard Bohm diffusion and synchrotron emission pictures. We present analytic estimates of the photon spectrum generated by such shocks and describe an algorithm for evaluating the radiation spectrum of relativistic particles in an arbitrary prescribed field configuration, such as that generated by a PIC simulation.

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