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Radiative Relativistic Reconnection in 3D[1] GREGORY WERNER, JOHN MEHLHAFF, DMITRI UZDENSKY, University of Colorado, Boulder — X-rays and gamma-rays from astrophysical sources, such as pulsar wind nebulae and blazar jets, are key observational probes that imply a source of high-energy electrons (and likely positrons) emitting via synchrotron and inverse Compton (IC) mechanisms. 2D particle-in-cell (PIC) simulation has shown that relativistic magnetic reconnection converts magnetic energy to plasma energy, powering nonthermal particle acceleration (NTPA) that might explain observations. Using PIC simulation including the radiation reaction force, we study the effects of synchrotron and IC cooling on 3D reconnection in collisionless relativistic pair plasma with large upstream magnetization and weak guide field. We find that 2D and 3D reconnection with radiative cooling yield similar reconnection rates and NTPA, just as in non-radiative reconnection (in this large-magnetization regime). While the emitted IC spectra are also similar, the synchrotron spectra differ: in 3D fewer particles accelerate beyond the synchrotron burnoff limit. Importantly, kinetic beaming (which requires radiative cooling) degrades in 3D, likely reducing observed intensity and variability. Thus 2D simulation accurately yields global reconnection rates and NTPA, but 3D simulation is required to obtain observational signatures.

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