Abstract Submitted
for the DPP16 Meeting of
The American Physical Society

Nonthermal Particle Acceleration in 3D Relativistic Magnetic Reconnection in Pair Plasma[1] DMITRI UZDENSKY, GREGORY WERNER, VLADIMIR ZHDANKIN, University of Colorado, Boulder — Magnetic reconnection is a fundamental plasma process that converts magnetic energy into particle kinetic energy. "Relativistic" reconnection is of interest in astrophysical contexts because it can accelerate particles to relativistic energies high enough for synchrotron (or inverse Compton) emission to explain observed high-energy radiation. After several 2D particle-in-cell (PIC) simulations of reconnection in pair plasmas demonstrated power-law electron-energy spectra extending to high energies, a few 3D simulations surprisingly confirmed the robustness of nonthermal particle acceleration, despite fundamental differences, such as the development of the relativistic drift-kink instability (RDKI) in 3D. We present a comprehensive PIC study of 3D relativistic pair-plasma reconnection characterizing the effect of the third dimension. We investigate how reconnection dynamics and particle acceleration depend on guide magnetic field B_z and on the simulation box length L_z in the third dimension. We find that, while the RDKI does indeed grow in 3D reconnection, it does not inhibit particle acceleration, even in the absence of guide field.

[1]This work was funded by NSF, DOE, and NASA.

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Date submitted: 15 Jul 2016 Electronic form version 1.4