Abstract Submitted
for the DPP09 Meeting of
The American Physical Society

3D Magnetic Reconnection of Relativistic Pair Plasmas[1] WEI LIU, LIN YIN, LANL, BRIAN ALBRIGHT, balbright@lanl.gov, KEVIN BOWERS, HUI LI, LANL, EDISON LIANG, Rice University — Relativistic plasma physics plays an essential role in a number of famous and longstanding astrophysical problems. Using the ultrafast code VPIC, we present one of the largest scale 3D particle-in-cell (PIC) simulations to date to examine relativistic magnetic reconnection in pair plasmas. These simulations are large enough to accommodate a sufficient number of kink modes. It is demonstrated that multiple, patchy reconnection sites form during the initial stage and then self-organize to form an elongated diffusion region with increased system size. The secondary kinking folds the current sheet in the orthogonal direction. The interaction between kink and tearing instabilities results in plasmoids, which affect the particle acceleration and reconnection rate. The reconnection rate remains fast and time varying. The relativistic effects increase the linear kink mode wavelengths and results in almost identical growth rates for initial linear kink and tearing modes. Relativistic drift kink instability, reconnection, folding of the diffusion region due to the secondary kink and plasmoids all contribute to the particle energization.

[1]Supported by LANL-LDRD

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Date submitted: 16 Jul 2009 Electronic form version 1.4