Abstract Submitted
for the DPP19 Meeting of
The American Physical Society

Particle acceleration due to mildly relativistic reconnection in a proton-electron plasma PATRICK KILIAN, FAN GUO, XIAOCAN LI, HUI LI, Los Alamos National Laboratory — In astrophysical environments such as AGN jets the energy density in the magnetic field can exceed all other contributions, including the energy density contributed by the rest mass of particle. If magnetic reconnection can free a fraction of this energy by changing the magnetic topology it is the dominant source of free energy. Some of it will heat the plasma and drive bulk flows, but a significant fraction of the energy will go to energetic particles. These particles typically form a hard power law distribution (spectral indices up to -1, harder than shock acceleration) that extend to very high cut-off energies. We performed self-consistent kinetic simulations of relativistic reconnection in hydrogen plasma without resorting to a modified mass radio using VPIC. Based on those simulations we study the relevant mechanism for the acceleration of both protons and electrons and the resulting spectra. Understanding those allows to include particle acceleration in large scale simulations that are inaccessible to fully kinetic simulations and to predict observable signatures in real systems.

Patrick Kilian
Los Alamos National Laboratory

Date submitted: 09 Aug 2019 Electronic form version 1.4