Abstract Submitted
for the DPP20 Meeting of
The American Physical Society

Connecting X-Line Heating Efficiency to the Reconnection Rate Problem[1] YI-HSIN LIU, SHAN-CHANG LIN, Dartmouth College, MICHAEL HESSE, University of Bergen, FAN GUO, Los Alamos National Lab., XIAOCAN LI, Dartmouth College, HAOCHENG ZHANG, Purdue University, SARAH PEERY, Dartmouth College — During magnetically dominated relativistic reconnection, inflowing plasma depletes the initial relativistic pressure at the x -line, and collisionless plasma heating inside the diffusion region appears to be insufficient to overcome this pressure loss. The resulting significant pressure drop causes a collapse at the x -line, essentially a localization mechanism of the diffusion region necessary for fast reconnection. The extension of this low-pressure region (into the outflow) further explains the bursty nature of antiparallel reconnection because a once opened outflow exhaust can also collapse, which repeatedly triggers secondary tearing islands. However, a stable single x -line reconnection can be achieved when an external guide field exists, since the reconnecting magnetic field component rotates out of the reconnection plane at outflows, providing additional magnetic pressure to keep the exhaust open.

[1]NSF-DoE 1902867 and NASA MMS 80NSSC18K0289 NASA

Yi-Hsin Liu
Dartmouth College

Date submitted: 10 Jul 2020 Electronic form version 1.4