Abstract Submitted
for the DPP20 Meeting of
The American Physical Society

Statistical Properties of Magnetic Reconnection in Multiple X-Line Phases HANTAO JI, Princeton University and PPPL, WILLIAM DAUGHTON, LANL — Magnetic reconnection has been widely recognized as a fundamental plasma process underlying many explosive energetic phenomena observed throughout the Universe, within (heliophysics) or beyond (astrophysics) our solar system. These plasmas are characterized by their large Lundquist numbers, S, and normalized system sizes, λ. In two dimensions, different phases of magnetic reconnection can be organized in phase diagrams in terms of these parameters. When at least one of S or λ is sufficiently large, magnetic reconnection enters a multiple X-line phase exhibiting its dynamic nature of interacting plasmoids. The statistical properties of these phases are of crucial importance in determining the energetic consequences of magnetic reconnection, including acceleration of electrons to nonthermal values, responsible for observational signatures of magnetic reconnection. This talk provides a concise summary of recent progress in quantifying statistical properties of these regimes from both observations and numerical simulations, including distribution functions of plasmoids or magnetic structures, and magnetic dissipation with regards to magnetic structures. Implications for laboratory experiments will be discussed.

Hantao Ji
Princeton University

Date submitted: 29 Jun 2020 Electronic form version 1.4