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Guide Field Plasmoid Statistics and Fast Electrons in MRX STEPHEN MAJESKI, HANTAO JI, Princeton University, JONATHAN JARA-ALMONTE, JONGSOO YOO, WILL FOX, Princeton Plasma Physics Laboratory — Understanding the behaviors of a plasmoid unstable current sheet can provide insight into how reconnection generates fast electrons in processes from solar flares to sawtooth crashes. To extend the work of Huang and Bhattacharjee[1], a model for the distribution of plasmoids in a moderate guide field is presented based on the concepts of helicity and Taylor relaxation. Following their approach, a statistical equation is developed to determine the distribution of cylindrical plasmoids as a function of helicity assuming that it is conserved in plasmoid collisions. The in-plane flux distribution differs only slightly from the non-relaxing -2 power law, but the guide field flux distributions for the relaxing and non-relaxing cases are distinct, with -1 and -3/2 power laws respectively. The design of a non-swept multi-channel electron energy analyzer is also presented, with the goal of measuring fast electrons produced from plasmoid mergers in the Magnetic Reconnection Experiment.

[1]Yi-Min Huang and A. Bhattacharjee. Distribution of plasmoids in high-lundquist number magnetic reconnection. Physical Review Letters, 109(26), 2012.

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