Abstract Submitted
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High Fidelity Kinetic Modeling of Magnetic Reconnection in Laboratory Plasmas[1] ADAM STANIER, WILLIAM DAUGHTON, ARI LE, Los Alamos Natl Lab, SAMUEL GREESS, JAN EGEDAL, University of Wisconsin Madison, JONATHAN JARA-ALMONTE, HANTAO JI, Princeton Plasma Physics Laboratory — Some of the most outstanding challenges in reconnection physics [1] involve the coupling between MHD and kinetic scales, the development of 3D magnetic turbulence via the plasmoid instability, and the influence of kinetic scale plasma instabilities on the dissipation physics. New progress on these difficult issues will require close collaboration across the three main approaches used to study reconnection: theory and simulation, in-situ and remote observations, and laboratory experiments. Here, we present new results from efforts to model the FLARE and TREX reconnection experiments using particle-in-cell simulations. These simulations feature the realistic experimental 3D toroidal geometries, boundary conditions, current drive, and collisions. For the TREX experiment, we will present results from a validated study of collisionless electron-scale reconnection layers that are modulated by a 3D toroidal drift instability. For the new FLARE experiment, we study the role of 3D effects on the transition from collisional-to-kinetic reconnection via the oblique plasmoid instability, and present scoping simulations for the upcoming FLARE experimental campaigns. [1] H. Ji et al. (2020). https://arxiv.org/abs/2004.00079

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