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New Milestones in Comparing Experimental and Simulated Reconnection: Results from TREX and Cylindrical VPIC[1]

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Magnetic reconnection is studied in the Terrestrial Reconnection Experiment (TREX) under collisionless conditions relevant to the Earth's magnetosphere [1]. The thickness of the reconnection current layer normalized to electron kinetic length scales is one of the features that is most commonly used to identify different sets of reconnection dynamics. Previous studies suggest that experimental current layer widths are larger by a factor of four compared to those observed in kinetic simulations [2]. Contrary to those results, in this talk we will present results from TREX which closely match the current width scaling and geometry seen in both prior 2D laminar kinetic reconnection simulations and new 3D VPIC models that have been developed specifically to reflect the TREX geometry. The results of the newest TREX run, with an adjustable guide field and a pressure anisotropy probe, and their associated VPIC simulation outputs will also be featured. 1. Olson, J. et al. Experimental Demonstration of the Collisionless Plasmoid Instability below the Ion Kinetic Scale during Magnetic Reconnection. Phys. Rev. Lett. (2016). 2. Ji, H. et al. New insights into dissipation in the electron layer during magnetic reconnection. Geophys. Res. Lett. 35, L13106 (2008).

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