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Crossed Flux Tubes Magnetic Reconnection Experiment ZACHARY TOBIN, PAUL BELLAN, Caltech — The dynamics of arched, plasma-filled flux tubes have been studied in experiments at Caltech. These flux tubes expand, undergo kink instabilities, magnetically reconnect, and are subject to magnetohydrodynamic forces. An upgraded experiment will arrange for two of these flux tubes to cross over each other. It is expected then that the flux tubes will undergo magnetic reconnection at the crossover point, forming one long flux tube and one short flux tube. This reconnection should also result in a half-twist in the flux tubes at the crossover point, which will propagate along each tube as Alfvén waves. The control circuitry requires two independent floating high energy capacitor power supplies to power the plasma loops, which will be put in series when the plasma loops reconnect. Coordinating these two power supplies requires the building of new systems for controlling plasma generation. Unlike with previous designs, all timing functions are contained on a single printed circuit board, allowing the design to be easily replicated for use with each independent capacitor involved. The control circuit sequencing has been tested successfully in generating a single flux tube. The plasma gun is currently under construction, with its installation pending completion of prior experiments.

Zachary Tobin
Caltech

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