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Experimental Investigation of Trigger Problem in Magnetic Reconnection[1] N. KATZ, J. EGEDAL, W. FOX, A. LE, A. VRUBLEVSKIS, J. BONDE, M. PORKOLAB, MIT, PSFC — In order for magnetic reconnection to be explosive there must be a sudden transition from slow to fast reconnection. This so-called "trigger mechanism," which is responsible for the spontaneous and explosive release of magnetic energy in solar flares, magnetospheric substorms, and sawtooth crashes in magnetic fusion devices, is not yet well-understood. We use the Versatile Toroidal Facility (VTF) at MIT to study this transition [1], focusing specifically on its 3D nature. To this end, we use multiple arrays of Langmuir probes, magnetic probes, and Rogowski coils to map out the full 3D structure of the reconnecting plasma. The emerging picture is one in which a global plasma mode ($q = 2$ or $q = 3$) plays a key role in the onset of reconnection, by breaking the axi-symmetry of the device and allowing 3D effects to arise.

[1] J. Egedal et al., Phys. Rev. Lett. **98**, 015003 (2007).

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