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Experimental studies of magnetic reconnection in 3D geometries[1]

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— Magnetic reconnection has been predominantly investigated in two dimensions. However, depending on the topology and geometry of the magnetic field, a rich collection of magnetic reconnection scenarios is possible in 3D including configurations with magnetic nulls. In the experiments at the Versatile Toroidal Facility (VTF) we form a flux rope along the background toroidal magnetic field and then pulse a separate coil locally producing an opposing time varying dipole field. This drives asymmetric reconnection as well as produces a pair of 3D null points along the flux rope. We can explore configurations where a field line (spine) directly connects the nulls as well as the more complex configurations where the nulls are no longer directly linked. We diagnose the plasma with arrays of Rogowski coils, magnetic coils, and Langmuir probes and observe the effects of different topologies on the nature of reconnection.

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