DPP09-2009-000762

Abstract for an Invited Paper
for the DPP09 Meeting of
the American Physical Society

Experimental measurement of quasi-separatrix layers in magnetic flux ropes[1]

ERIC LAWRENCE, University of California, Los Angeles

A quasi-separatrix layer (QSL) is a region in a magnetic configuration where there are strong spatial gradients in the field line connectivity, and are thought to be favorable sites for 3D magnetic reconnection. Solar physicists have used QSLs extensively to identify reconnection sites in the complicated 3D magnetic configurations in solar flares, but we present the the first use of the technique in an experimental setting. In this experiment, performed in the Large Plasma Device (LAPD) at UCLA, two lanthanum hexaboride cathodes produce current channels initially parallel to the background magnetic field. The current channels create twisted helical structures, or flux ropes, in the magnetic field. The flux ropes rotate about their central axes, which causes them to periodically collide. Three dimensional magnetic measurements at 20000 spatial locations make the QSL calculation possible. During these collisions, QSLs, as well as reverse current sheets, are observed to form between the flux ropes. The structure of these QSLs is very similar to those seen in MHD simulations of merging currents.

[1]Research is conducted at the Basic Plasma Science Facility at UCLA, and is supported by the National Science Foundation and the Department of Energy.