

Abstract Submitted
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Laboratory Studies of Solar Flux Loops in MRX ERDEM OZ, MASA AKI YAMADA, BRENDAN MCGEEHAN, SETH DORFMAN, HANTAO JI, NATE WILLIAMS, STEWART ZWEBEN, Princeton Plasma Physics Laboratory — Energetic solar phenomena such as solar flares occur as a result of interplay between solar magnetic fields and plasma. The physics of these events is unexplained because of the scarcity of experimental data which can only be obtained using remote sensing. We will present an experimental study of the dynamics of half-toroidal plasma arcs relevant to solar coronal activities in the existing MRX facility with extensive measurements of magnetic topology. Two electrodes are used to generate a variety of plasma flux loops which contain variable toroidal guide field. The three dimensional evolution of the simulated flux loops is monitored by an ultra fast frame rate camera. Discharges of Ar, He and H show the time evolution of flux loops with variety of currents and reveal the stability condition for the plasma flux loop with the presence of line-tying. Our experimental results will contribute to the understanding of evolution of magnetic topology in the solar atmosphere and concepts such as current sheets, flow patterns, and line-tying, which are vitally important for understanding the Solar/Heliospheric and Interplanetary Environment.

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