Abstract Submitted
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Evolution of plasma parameters during impulsive eruption of a laboratory arched magnetic flux rope[1] SHREEKRISHNA TRIPATHI, WALTER GEKELMAN, University of California, Los Angeles — Arched magnetic flux ropes (AMFRs) are arched-shaped current-carrying magnetized plasma structures that ubiquitously exist in the solar atmosphere. A laboratory plasma experiment has been built to produce AMFRs (n$\sim 10^{19}$ m^{-3}, Te$\sim$10 eV, B$\sim$1 kG, L$\sim$0.5 m) using a LaB_6 plasma source. Two laser beams (1064 nm, $\sim$1 J/pulse) are used to produce controlled plasma flows from the foot-points of the AMFR that trigger the impulsive eruption of the AMFR. The erupting AMFR evolves in a large magnetized plasma produced by an additional LaB_6 source. Since the experiment is highly reproducible and runs continuously with a 0.5 Hz repletion rate, several thousands of identical loop eruptions can be generated and their spatiotemporal evolution can be recorded using computer-controlled movable probes. The AMFR images recorded using a high-speed CCD camera and measurement of plasma parameters using 3 axis magnetic loop and Langmuir probes demonstrate striking similarities between erupting laboratory AMFRs and solar flare loops. Results on the role of the ambient magnetic field in destabilizing the AMFR will also be presented. Reference: S. K. P. Tripathi and W. Gekelman, Phys. Rev. Lett. 105, 075005 (2010)

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