

Abstract Submitted
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Development of a Pre-Ionization Method and X-Ray Imaging System for the Caltech Laboratory Plasma Experiments VERNON H. CHAPLIN, PAUL M. BELLAN, DEEPAK KUMAR, Caltech — The Taylor relaxation of plasmas at the Caltech spheromak experiment is qualitatively similar to the evolution of plasma jets emitted from protostars and active galaxies. However, the parameter regimes which can be accessed by the laboratory experiment are limited by the Paschen criterion for the breakdown of hydrogen in a DC electric field, which sets a lower bound on the initial neutral gas density that is required to achieve plasma formation. Pre-ionizing hydrogen in the gas nozzles before discharging the experiment's high voltage capacitors would allow for the formation of lower density, faster jets. We are investigating pre-ionization schemes using a battery-powered 13.56 MHz RF source capable of producing over 3.5 kW pulsed output. RF power may be efficiently coupled to the plasma through the excitation and subsequent damping of helicon waves. We also report on the development of a UV/x-ray imaging system for the solar coronal loop experiment at Caltech. The imaging system is sensitive to photons with energies 5 eV and above and is gated for exposure times as short as 10 ns.

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