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Disrupting high-pressure, current-carrying filaments using cross-field injection of laser ablation plasmas[1] S. VINCENA, W. GEKELMAN, J. BONDE, UCLA — In a magnetized plasma, laser-irradiated targets may be used to produce localized, expanding plasmas. Such laser-produced plasmas (LPP's) share characteristics with injected fuel pellets in tokamak plasmas: localized high pressure, can become polarized and move via ExB motion. Pellet injection has recently been demonstrated to mitigate the intensity of edge-localized modes [1]. We present results of a basic plasma physics experiment to study the disruption of a high-pressure, current-carrying filament. The experiments are performed on UCLA's Large Plasma Device (LAPD). This is a linear device with L=17m, d=60cm, B_0 =750G, n_e=2×10^{12}cm^{-3}, T_e=6eV,T_i ≈1eV, H^+). The LPP is produced by a pulsed (8ns, 1J) Nd:YAG laser ablation of a carbon target. The current is produced using a LaB_6 cathode, with $T_e = 20$eV, $n \approx 4 \times 10^{12}$cm^{-3}, yielding cross-field dimensions $h = 0.9c/\omega_{pi}$ and $w = 3.8c/\omega_{pe}$ for a H plasma, and a Lundquist number $S = 8 \times 10^3$ Using probes and a 1Hz experiment repetition, maps of the plasma potential, electron temperature, magnetic fields (and derived currents), and induced current-sheet oscillations are presented as the current is disrupted.

[1][1] L.R. Baylor, et al., PRL 110, 245001 (2013). These experiments were conducted at UCLA's Basic Plasma Science Facility, which is jointly funded by the US DoE and the NSF.

Stephen Vincena
UCLA

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