Abstract Submitted for the DPP05 Meeting of The American Physical Society

Formation of Intense Plasma Outflows from Laboratory Prominences¹ S.K.P. TRIPATHI, P.M. BELLAN, Caltech — Solar prominences have been simulated in a laboratory experiment using a four-electrode magnetized plasma source [1]. An ultra-high speed intensified CCD camera records visual images of the laboratory prominence evolution and a magnetic probe array measures internal magnetic fields. Laboratory prominences produced using low pressure argon and krypton form localized outflow from the main structure. These outflows appear immediately after Ar and Kr prominences become unstable and contact surrounding metal structures. Within a few microseconds after this event, the main structure disappears and the outflow becomes extremely intense and elongated. An analytic model based on Hamiltonian formalism predicts the existence of a critical parameter below which ions lose confinement in a force-free magnetic field and subsequently form intense outflows. This escape of ions from force-free magnetic fields has been verified in numerical computations of ion trajectories.

 J. F. Hansen, S. K. P. Tripathi, and P. M. Bellan, Phys. Plasmas 11(6), 3177 (2004)

¹Work supported by US DOE

S. K. P. Tripathi Caltech

Date submitted: 18 Jul 2005

Electronic form version 1.4