

Abstract Submitted  
for the DPP05 Meeting of  
The American Physical Society

**Detailed Observations of Magnetic Flux Tube Collimation** SETTHIVOINE YOU, GUN SU YUN, PAUL M. BELLAN, Caltech — In the Caltech spheromak formation experiment, eight distinct magnetic flux tubes are observed to merge forming a plasma column that jets out into the vacuum vessel. The eight flux tubes are initially flared but quickly collimate while exhibiting strong plasma flows and high densities. The measurements show that in a few microseconds, MHD acceleration processes accelerate plasma from gas sources into the flux tubes. The acceleration is consistent with the gobble/collimation theory [1] and achieves flow velocities of the order of  $\sim 100$  km/s and densities  $\sim 10^{22}$  m $^{-3}$ . Measurements show that the density of the initial neutral gas cloud required for breakdown cannot account for such a large jet density. The jet is a high-density, collimated, current-carrying magnetic flux tube located where, before breakdown, the magnetic field was negligible and the neutral density was negligible. The results [2] suggest that magnetically dominated astrophysical jets and current-carrying solar prominences may be collimated by the same process.

[1] Bellan P. M., Phys. Plasmas, 10, 1999-2008 (2003).

[2] You S., Yun G. S., Bellan P. M., PRL, (2005) in press

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Date submitted: 20 Jul 2005

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