

APR08-2008-000102

Abstract for an Invited Paper
for the APR08 Meeting of
the American Physical Society

Episodic “Magnetic Tower” Plasma Jets in a Laboratory Experiment¹

SERGEY LEBEDEV, Imperial College

We will present experimental results on formation of supersonic magnetically driven plasma jets with dimensionless parameters similar to those in proto-stellar jets. The jets are driven by the pressure of the toroidal magnetic field and the plasma beta in these jets is of the order of unity [1,2]. The experimental configuration allows generation of several episodes of the magnetic tower jet eruptions. The subsequent magnetic bubbles have higher propagation velocities and are catching up the previously ejected, producing shocks. These experiments suggest that periodic formation of magnetic tower jets in the astrophysical situations could be responsible for some of the variability of the astrophysical jets. The experiments are scalable to astrophysical flows in that critical dimensionless numbers such as the plasma collisionality, the plasma beta and the magnetic Reynolds number are all in the astrophysically appropriate ranges. The experimental results will be compared with computer simulations performed with laboratory plasma codes and with astrophysical codes. [1] S.V. Lebedev et al., Mon. Not. R. Astron. Soc., 361 97 (2005) [2] A. Ciardi et al., Physics of Plasmas, 14, 056501 (2007). In collaboration with: A. CIARDI, F.A. SUZUKI-VIDAL, S.N. BLAND, S.C. BOTT, J.P. CHITTENDEN, G. HALL, A. HARVEY-THOMSON, A. MAROCCHINO, A. FRANK, E. G. BLACKMAN, T. RAY, C. STEHLE

¹supported by EU Marie Curie MRTN-CT-2004 005592 and by NNSA under DOE Cooperative Agreement DE-FC03-02NA00057