

Abstract for an Invited Paper  
for the APR06 Meeting of  
The American Physical Society

### **Modeling Astrophysical Jets in a Laboratory Experiment**

SERGEY LEBEDEV, Imperial College London

We will present experimental results on formation of supersonic radiatively cooled plasma jets with dimensionless parameters (Mach number  $\sim 20$ , cooling parameter  $\sim 1$  and density contrast  $\rho_j/\rho_a \sim 10$ ) similar to those in proto-stellar jets. Two different experimental configurations are used. In the first the produced jets are purely hydrodynamic and are used to study deflection of the jets by the cross-wind. The “cross wind” leads to deflection of the jet through formation of internal oblique shocks in the jet and we will discuss the relevance of these observations to the astrophysical systems. In the second configuration the jets have toroidal magnetic field and the plasma beta in these jets is of the order of unity. We will present experimental data on the dynamics of “magnetic bubble” surrounding the jet and on the development of  $m=0,1$  instabilities in the jet. Although at later times the jet column is observed to go unstable, we observe that the jet retains its collimation. Modifications of the experimental configuration allowing addition of the poloidal magnetic field and angular momentum to the jet will be also discussed. 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. In collaboration with A. Ciardi, D. Ampleford, S.N. Bland, S.C. Bott, J.P. Chittenden, G. Hall, C. Jennings, J. Rapley A. Frank, E. G. Blackman, T. Lery.