A New Way to Generate Collimated Plasma Jets?

R. P. Young[1], C. C. Kuranz[1], R. M. Sweeney[1], and R. P. Drake[1]

[1]University of Michigan

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Abstract

We may have a new way to generate collimated, high-Mach-number plasma jets for laboratory astrophysics experiments. Analytic calculations show that irradiating the rear side of a cone-shaped foil can produce a collimated plasma jet with a Mach number of more than 2. Preliminary numeric simulations confirm this. We intend to test this method with a day of experiments at OMEGA (Laboratory for Laser Energetics, Rochester, New York) in April 2012.

If successful, this will be the first step in an experimental campaign to investigate the affects of magnetic fields on mixing plasma jets. We hope to create a swirling disk of magnetized plasmaand possibly witness the turbulent dynamoby firing roughly half a dozen such jets towards each other. However, for such an experiment to succeed, the disk must rotate more quickly than it expands, requiring the contributing jets to have $M > 2$.

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