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Z-pinch Plasma Temperature and Implosion Velocity from Laboratory Plasma Jets using Thomson Scattering[1] JACOB BANASEK, TOM BYVANK, BRUCE KUSSE, DAVID HAMMER, Cornell University — We discuss the use of collective Thomson scattering to determine the implosion velocity and other properties of laboratory plasma jets. The plasma jet is created using a 1 MA pulsed power machine with a 15 μm Al radial foil load. The Thomson scattering laser has a maximum energy of 10 J at 526.5 nm with a pulse duration of 3 ns. Using a time gated ICCD camera and spectrometer system we are able to record the scattered spectrum from 9 or 18 regions along the laser path with sub-mm spatial resolution. Collecting scattered radiation from the same area at two different angles simultaneously enables determination of both the radial and azimuthal velocities. The scattered spectrum for non-magnetized jets indicates a radial implosion velocity of 27 km/s into the jets. A determination of ion and electron temperatures from the scattered spectrum is in progress. Comparing results using a laser energy of 10 J and 1 J shows noticeable effects on plasma jet properties when using 10 J. Therefore the lower laser energy must be used to determine the plasma properties.

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