Abstract Submitted
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Measurement of Doppler implosion velocity in wire array z pinches[1] B. JONES, J.E. BAILEY, G.A. ROCHAU, C.A. COVERDALE, M.E. CUNEO, Sandia National Laboratories, Y. MARON, V. FISHER, V. BERNSHTAM, A. STAROBINETS, Weizmann Institute, C. DEENEY, NNSA/DOE — Determination of z-pinch implosion velocity and thus coupled kinetic energy is key to understanding energy balance in wire array radiation sources. We discuss diagnosis of velocity via observation of Doppler shifts in K-shell lines for Al implosions on the 20 MA Z machine. For a small-mass load, classic oval-shaped Mg dopant lines are observed with a time- resolved, 1D-imaging (radial) spectrometer; Doppler splitting corresponding to $\sim$50 cm/μs is seen in the view through the pinch axis, while no splitting is seen in the view tangent to the imploding shell. Velocity can also be inferred from Doppler-shifted absorption lines observed in a large-mass wire array implosion when analyzed with a collisional-radiative and radiation transport model of a multi-shell plasma (emission from the hot core backlights the colder imploding mass).

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