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Effect of an axial wire on wire array z-pinch dynamics¹ R. PRESURA, D. MARTINEZ, S. WRIGHT, C. PLECHATY, S. NEFF, L. WANEX, University of Nevada, Reno, D. AMPLEFORD, Sandia National Laboratories — Conical wire arrays have previously been studied at Imperial College mainly as a source of plasma flows similar to astrophysical jets. The central region of the array itself is well suited to studying the z-pinch stability in the presence of axial flows. Supersonic plasma streams converge on the array axis, where the energy associated with the radial momentum is thermalized and radiated, whilst the axial component is maintained. Placing a wire on axis is expected to introduce a radial profile of the axial velocity and to provide early on a current carrying path for the plasma flowing along the axis. The experiment investigated the effect of a central wire upon Al wire arrays at 1 MA. The results were compared with reference results - conical arrays without central wire and cylindrical arrays with and without central wire. The inclusion of the axial wire significantly affected the dynamics of the conical wire array implosion. Time integrated self-emission pinhole imaging shows that the axial wire allows the stagnated pinch to become significantly more uniform. The broad spectral range radiation measured with bolometers indicates that the presence of the axial wire on axis causes an enhancement in the total energy emitted.

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