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3D Tomographic imaging of colliding cylindrical blast waves R.A. SMITH, J. LAZARUS, M. HOHENBERGER , J. ROBINSON, A. MAROCCHINO, J. CHITTENDEN, M. DUNNE, A. MOORE, E. GUMBRELL, Imperial College, London. — The interaction of strong shocks & radiative blast waves is believed to give rise to the turbulent, knotted structures commonly observed in extended astrophysical objects. Modeling these systems is however extremely challenging due to the complex interplay between hydrodynamics, radiation and atomic physics. As a result we have been developing laboratory scale blast wave collision experiments to provide high quality data for code benchmarking, & to improve our physical understanding. We report on experimental & numerical investigations of the collision dynamics of counter propagating strong (>Mach 50) cylindrical thin-shelled blast waves driven by focusing intense laser pulses into an extended medium of atomic clusters. In our test system the blast wave collision creates strongly asymmetric electron density profiles, precluding the use of Abel inversion methods. In consequence we have employed a new tomographic imaging technique, allowing us to recover the full 3D, time framed electron density distribution. Tomography & streaked Schlieren imaging enabled tracking of radial & longitudinal mass flow & the investigation of Mach stem formation as pairs of blast waves collided. We have compared our experimental system to numerical simulations by the 3D magnetoresistive hydrocode GORGON.

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