Abstract Submitted
for the DPP06 Meeting of
The American Physical Society

Multidimensional Radiation Emission and Absorption Processes in a Large Diameter Krypton Gas Puff Z-Pinch Plasma on the ZR Simulator Y. CHONG, J.W. THORNHILL, R.W. CLARK, A. DASGUPTA, J.P. APRUZESE, J. DAVIS, Plasma Physics Division, NRL — In a hot and dense plasma environment, such as that expected to be produced in a large diameter krypton gas puff load implosion on the ZR simulator, the radiation plays a significant and influential role on the time and space evolution of the plasma. An investigation of the multidimensional radiation emission, absorption, and transfer processes as well as their effects on the energetics & dynamics of the krypton Z-pinch plasma on the simulator, is made using the mach2 2D radiation MHD code. The incorporation of the dynamical domain tabular collisional radiative equilibrium (DDTCRE) radiation transport model [Y. K. Chong, et. al., ICOPS 2005, Monterey, CA.] into mach2 affords a realistic description of the self-consistent non-local non-LTE ionization dynamics & radiation transport physics in a computationally efficient manner. An extensive krypton atomic structure model including the M-, L-, and K-shells forms the basis for the transport model. In addition, the K- and L-shell radiation yield and power signatures, as well as their spectral & spatial characteristics are highlighted through a detailed postprocess analysis of the plasma during various stages of the implosion process using the AXSTRAN 2D non-LTE radiation ionization dynamics code & the SPECAM 3D multifrequency non-LTE spectra/image synthesizer code.
*Work supported by DTRA.

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Date submitted: 19 Jul 2006 Electronic form version 1.4