

**NUMERICAL ANALYSIS OF HOHLRAUM  
EXPERIMENTS USING DIRECT AXIAL FLUX DONE  
ON THE SPHINX (6MA, 800NS) Z-PINCH MACHINE\***

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The Sphinx generator is a 6 MA, 1  $\mu$ s pulsed-power driver based on the LTD technology. It is used to drive large diameter, long implosion time (800 ns) aluminum wire-array z-pinch implosions for k-shell radiation sources production<sup>1</sup>. Side to these experiments made for radiation effects studies, investigations have been performed to study the potential of black body radiation field in hohlraum on this system. Simple scaling shows that the temperature is maximized with a configuration using the axial flux of the z-pinch source and setting the hohlraum below the z-pinch column. Measurements of the power feeding the hohlraum and the temperature have both been done using bolometers and x-ray detectors. First experiments have been done using vacuum gold coated hohlraum, 7 mm height, 5 mm diameter. We demonstrated that radiation temperature up to 30 eV could be achieved<sup>2</sup>. Analyses of the experimental results using a 2D radiative hydrodynamic code is shown. Analysis point out the influence of the zippering of the z-pinch load on the temperature waveform in the hohlraum<sup>3</sup>.

In this paper, we present recent analysis that allowed us to explain the full history of the temperature pulse shape and highlights the importance of the interaction between the axial plasma jet and the hohlraum wall in expansion, which artificially increases the temperature seen by diagnostics. Experimental/numerical results confrontation will be shown. Conclusion on this kind of vacuum hohlraum configuration is given.

1. H. Calamy et al., "Use of microsecond current prepulse for dramatic improvements of wire array z-pinch implosion", *Phys. Plasmas* 15, 012701, (2008).

2. F. Hamann et al., "First hohlraum experiments using axial flux on the Sphinx machine", 33th IEEE International Conference On Plasma Science, June 04-08, (2006)

3, P. Maury et al., "2D R-Z analysis of hohlraum experiments on Sphinx machine using axial radiation from a wire-array z-pinch", 34th IEEE International Conference On Plasma Science, June 17-22, (2007)

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