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4P55 - SIMULATIONS OF NOZZLE GAS FLOW AND GAS-PUFF Z-PINCH IMPLOSIONS WITH MAGNETIC FIELDS IN THE WEIZMANN Z-PINCH*

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Till recently, measurements of the magnetic field in gas-puff z-pinch implosions were limited to low density and temperatures typically found at very early times and outside the pinch radius ($r \geq 9$ mm and $t \leq -90$ ns). However, recent, more accurate measurements at higher densities and temperatures at various R and Z-locations on the generator at the Weizmann Institute of Science (WIS) have yielded information close to stagnation and beyond. These measurements seem to be inconsistent with earlier 2D radiation-magneto-hydrodynamics simulations using MACH2-TCRE as well as simple snowplow models when using the inductive current notch, pinch length the pinch radius.

In this presentation, it will be shown that some of these inconsistencies can be resolved by simulating the entire Anode-Cathode gap of 18mm. Simulations of magnetic field evolution using the 2D radiation-magneto-hydrodynamic code, MACH2-TCRE are presented in two steps as follows. In the first step, simulations of the initial density profile by modeling the neutral gas-flow of subsonic oxygen through De-Laval nozzles are made and compared to measurements. In the second step, the density profile from the previous step is used as initial condition for investigating the radial profile and evolution of the magnetic field during the gas-puff implosions. Comparisons are made with the measured data of magnetic field and radius. It is shown that simulating the nozzle geometry and outflow significantly improves the comparison between the measurements and the pinch simulations.

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