WHAT CAN SPECTROSCOPY AND IMAGING OF MULTI-PLANAR WIRE ARRAYS REVEAL ABOUT Z-PINCH RADIATION PHYSICS?*

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The planar wire array research on Zebra at UNR that started in 2005 continues experiments with new types of planar loads with results for consideration and comprehensive analysis [see, for example, Kantsyrev *et al*, HEDP 5, 115 (2009)]. The detailed studies of radiative properties of such loads are important and spectroscopy and imaging constitute a very valuable and informative diagnostic tool. The set of theoretical codes is implemented which provides non-LTE kinetics, wire ablation dynamic, and MHD modeling. This talk is based on the results of new recent experiments with planar wire arrays on Zebra at UNR. We start with results on radiative properties of a uniform single planar wire array (SPWA) from alloyed Al wires and move to combined triple planar wire arrays (TPWA) made from two materials, Cu and Al. Such combined TPWA includes three planar wire rows that are parallel to each other and made of either Cu or Al alloyed wires. Three different configurations (Al/Cu/Al, Cu/Al/Cu, and Cu/Cu/Al) are considered and compared with each other, and with the results from SPWA of the same materials. X-ray time-gated and time integrated pinhole images and spectra are analyzed together with bolometer, PCD, and XRD measurements, and optical images. Emphasis is made on the radiative properties and temporal and spatial evolution of plasma parameters of such two-component plasmas. The opacity effects are considered and the important question of what causes K-shell Al lines to be optically thin in combined TPWAs is addressed. In conclusion, the new findings from studying multi-planar wire array implosions are summarized and their input to Z-pinch radiation physics is discussed.

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