ANALYSIS OF RADIATION FROM SILVER HED PLASMA SOURCES WITH THE potential FOR LASING*

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Silver (Ag) high energy density plasmas were produced using uniform and combined single planar wire array (SPWA) z-pinch. Ag SPWAs were recently introduced as an efficient x-ray radiator and have shown to create L-shell plasmas that have the highest electron temperature (>1.8 keV) observed on Zebra so far and upwards of 30 kJ of energy output, which is of interest for future applications of inertial confinement fusion1. A set of diagnostics included fast, filtered x-ray diodes; a Ni bolometer; laser shadowgraphy and optical streak cameras; time-gated and time-integrated x-ray pinhole cameras; and time-integrated spatially resolved (TISR) and time-gated spatially-integrated (TGSI) x-ray spectrometers. In particular, a new time-gated hard x-ray spectrometer was fielded to attain first results to understand how Ag plasmas evolve in time. In addition, an important question about such Ag plasmas is whether lasing occurs in the Na-like and Ne-like soft x-ray range, and if so, at what gains? Our suite of theoretical diagnostics was expanded with HELIOS-CR code, that was utilized to study implosion characteristics and radiative characteristics of Ag wire arrays as well as to calculate possible lasing gains. Lastly, the results of new experiments on Zebra with the load current multiplier (LCM) at enhanced current of 1.5 – 1.7 MA were analyzed and compared to those of standard configurations.


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