MODELING CU WIRE ARRAY IMPOLOSIONS ON THE REFURBISHED Z GENERATOR*

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Fast z-pinches produce intense K-shell radiation from wire arrays and for Cu arrays these photon energies can exceed 8 keV. Experimental investigations of pinches on ZR using Cu arrays have already begun and more are planned for the near future. However to produce significant K-Shell emissions from moderately high atomic number plasmas such as Cu, they must be rapidly ionized through their L-shell ionization stages. Diagnostics based on L-shell emissions are inherently more difficult than those for K-shell emissions, but they provide a lot more information about the L-shell experimental ionization dynamics and the extent to which a Z-pinch plasma has reached temperatures and densities near those required for significant K-shell x-ray production. We will analyze the ionization dynamics and generate K- and L-shell spectrum of Cu using the temperature and density conditions obtained from 1-D non-LTE radiation hydrodynamics simulations of Cu wire array implosions on ZR. These results will be compared with K- and L-shell experimental spectrum of shot z1975. Our self-consistently generated atomic model employs an extensive atomic level structure and data for all dominant atomic processes that are necessary to accurately model the pinch dynamics and the spectroscopic details of the emitted radiation.

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