

DEVELOPMENT OF AN 85KJ STAINLESS STEEL K-SHELL X-RAY SOURCE ON THE Z GENERATOR*

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We will discuss experiments on the Z generator using large diameter stainless steel wire arrays to produce K-shell emission ($h\nu \sim 6.7\text{keV}$). Large array diameters and fast implosion times are needed to obtain high velocities and high temperatures in order to excite Fe K-shell emission.

Since the refurbishment of the Z generator, nested stainless steel wire arrays have been fielded at 65mm, 70mm and 75 diameters, with multiple masses at each diameter. Experiments have achieved ~ 85 kJ of K-shell yield, with a fast rise ($< 2\text{ns}$) to a peak K-shell power of 35TW. These data demonstrate a 40% increase in K-shell yield relative to pre-refurbishment experiments. K-shell spectroscopy is used to infer plasma densities and temperatures for these array configurations. The trends in K-shell output and plasma parameters from these mass and diameter variations will be presented. We will also discuss differences in pre- and post-refurbishment Z that are potentially responsible for this improvement.

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