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Hard X-ray Line Radiation from Tungsten Wire Array Z-pinches.
ALLA SAFRONOVA, VICTOR KANTSYREV, RYAN CHILDERS, AUSTIN STAFFORD, ISHOR SHRESTHA, VERONICA SHLYAPTSEVA, CHRISTOPHER BUTCHER, JEFFREY ROWLAND, University of Nevada, Reno, EMIL PETKOV, JOHN GIULIANI, Naval Research Laboratory — During the last few years, there is a renewed interest to study hard x-ray non-thermal inner-shell emission from Z-pinch plasmas of high-atomic-number materials on Sandia's Z and NRL Gamble II generators. For example, the cold (non-thermal) and thermal K-alpha emission from Nested Mo Cylindrical Wire Arrays (CWA) were investigated on Sandia's Z accelerator and it was shown that dominant characteristic cold K-alpha lines are most likely to be produced by hot electrons (Hansen et al, PoP, 2014). To better understand mechanisms of production of non-thermal plasmas in Z-pinches, it is essential to study time evolution of hard x-ray characteristic cold lines. Here we present and interpret the time history of relative intensities of cold L lines (alpha, beta, and gamma) from W wire arrays (in the energy range between 8 and 12 keV) produced on the UNR Zebra generator. The line intensity ratios and x-ray diode signals from Double Planar Wire Arrays and Nested CWAs (16 wires each) are analyzed from 12 ns before and up to 27 ns after the x-ray burst. In addition, our results were compared with cold atom and warm dense matter results on Gamble II (Seely et al, HEDP, 2013). Future work is discussed. This research was supported by NNSA under DOE grant DE-NA0003877 and in part by DE-NA0002075.

Alla Safronova
University of Nevada, Reno

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