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6.38 Characterization of Selenium He x-ray source on the National Ignition Facility

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There are many high-energy-density experiments that require efficient atomic line emission x-ray sources for diagnostic applications such as imaging (e.g. backlit radiography) and material testing (e.g. diffraction measurements). To date, most well-characterized laser-generated line sources efficient enough for these purposes have photon energies ≤10.2 keV. They are typically created by irradiating a thin foil using a 351nm, long pulse laser (≥1 ns) in the range of 1015 W/cm2. The dominant line emission, Heα, from these sources is the result of 2p –> 1s transitions from He-like ions. For the new Crystal Backlighter Imager at the National Ignition Facility (NIF), we developed a Selenium Heα source at 11.652 keV. The Se He-like line emission was investigated in terms of absolute spectra and laser conversion efficiency into the lines as a function of viewing angle relative to the foil normal. Time-integrated and time-resolved data from multiple NIF shots will be presented. This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344 and by General Atomics under Contract DE-NA0001808.

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