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12.17 Bremsstrahlung x-ray source generation for high-Z radiography applications on the National Ignition Facility

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In order to perform x-ray radiography measurements of high-opacity samples on the National Ignition Facility, we have developed a slit-projection x-ray source that is optimized to produce Bremsstrahlung x-ray emission. Unlike x-ray sources that generate characteristic atomic transition (often the 1s2 – 1s2p transition in ionized He-like atoms), but are generally limited to <30 keV x-rays (from solid targets), the design presented here optimizes for intense, broadband Bremsstrahlung radiation with energy greater than 30 keV. We present the spatial resolution of this source in a slit-projection configuration, as well as the relative intensity and effective electron temperature for a range of laser conditions. This source permits x-ray radiography through exceedingly high opacity experiments where traditional x-ray sources would be nearly completely attenuated and ineffectual.

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