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Back-Side Emission from Filtered Gold Targets

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Abstract. An investigation of the rapid rise time of incoherent x-ray emission from targets heated by an ultra-short pulse (USP) high-intensity optical laser was conducted for use as the x-ray source for inner-shell photo-ionized (ISPI) x-ray lasing. Previous studies considered front-side x-ray emission; however, ISPI x-ray lasing requires a filtered x-ray source. Modeling using the hydrodynamic/atomic kinetics code LASNEX of a 100 fs USP driving laser with an energy of 1 J absorbed on a flat target of thin Au layered on a Be filter is done showing psec time-resolved integrated spectrum to be compared with experiment. We show the influence of the filter on the temerature and x-ray emission of the Au and the reduction of the filtering at late time due to heating and ionization of the Be. Back-side emission from micron thick targets of Cu and Zn are discussed and shown to also provide the needed emission and self filtering of low energy x rays to achieve high gain in C at 45Å.

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