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Enhancing Bremsstrahlung Radiation using Front Surface Target Structures[1] SHENG JIANG, ANDREW KRYGIER, DOUGLASS SCHUMACHER, RICHARD FREEMAN, KRAMER AKLI, The Ohio State University — X-ray or γ-ray sources generated by laser solid interactions have many potential applications in different fields including X-ray radiography, pair production and photonuclear physics. Recent studies with 3D PIC modeling have shown that large scale front-surface target structures can significantly increase the energy and narrow the angular distribution of hot electrons compared to that for a regular flat target.[2] These characteristics of electrons are crucial for further Bremsstrahlung production using a high-Z converter target. The corresponding Bremsstrahlung radiation covers a wide energy range and can be as high as 100 MeV. By performing the Monte-Carlo simulations we find that the peak γ-ray brightness is $6.0*10^{19}$ $s^{-1}mm^{-2}mrad^{-2}$ at 10MeV and $1.4*10^{19}$ $s^{-1}mm^{-2}mrad^{-2}$ at 100MeV (0.1% bandwidth), which is comparable to other tunable γ-ray sources. The brightness for high energy γ-rays (>50MeV) is one or a few orders of magnitude higher using the structured target than the flat target. Simulation and preliminary experimental results will be presented.

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[2]S. Jiang, A. G. Krygier, et al., Phys. Rev. E 89, 013106 (2014)

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