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Laser-Driven, tunable, high-yield x-ray source from a hybrid laser plasma accelerator used for radiography[1] PAUL KING, University of Texas at Austin/ Lawrence Livermore National Laboratory, NUNO LEMOS, Lawrence Livermore National Laboratory, JESSICA SHAW, Laboratory for Laser Energetics, KENNETH MARSH, University of California Los Angeles, ART PAK, Lawrence Livermore National Laboratory, BRIAN KRAUS, Princeton University, ADEOLA AGHEDO, Florida AM University, ISABELLA PAGANO, University of Texas at Austin, MATTHEW THIBODEAU, Lawrence Livermore National Laboratory, JESUS HINOJOSA, ALEC THOMAS, University of Michigan, MANUEL HEGELICH, University of Texas at Austin, PIERRE MICHEL, Lawrence Livermore National Laboratory, CHAN JOSHI, University of California Los Angeles, FELICIE ALBERT, Lawrence Livermore National Laboratory — A broadband (10 keV to MeV), high yield (>10ˆ10 photons/keV/Sr), small source size (<20-100 um) x-ray source has been developed using a hybrid laser plasma accelerator on the Titan laser (700 fs, 140 J). The hybrid laser plasma accelerator uses a combination of self-modulated laser wakefield acceleration and direct laser acceleration to generate a high energy (>200 MeV) low divergence (<100 mrad), high-charge (70nC) beam of electrons. The electrons are used to generate x-rays using a combination of three mechanisms: betatron radiation, inverse Compton scattering, and bremsstrahlung radiation. The combination of these x-ray generation mechanisms and control over the electron beam provides a method for tuning the emitted x-ray energy spectra, source size, and yield. In this work we optimize and characterize the x-ray source to radiograph several high and low-Z objects with several spatial resolutions.

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