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Broadband, high-flux x-ray source from a hybrid laser plasma accelerator driven by picosecond lasers

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A broadband (keV to MeV), high flux (1e12 photons/keV/sr) x-ray source from a hybrid laser plasma accelerator driven by picosecond lasers is characterized. The hybrid laser plasma accelerator uses self-modulated laser wakefield acceleration combined with direct laser acceleration to generate low divergence (<100 mrad), relativistic electron beams. These electrons are then used to produce broadband x-rays through a combination of three mechanisms: betatron, inverse Compton scattering, and/or bremsstrahlung. This x-ray source is used to radiograph static and dynamic objects and can be tuned to provide better contrast depending on the target being radiographed. This source has uses for many single shot experiments in high energy density science and laboratory astrophysics.

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