Abstract Submitted
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High energy Betatron x-ray production in the ionization-induced trapping regime[1] FELICIE ALBERT, BRADLEY POLLOCK, LLNL, JESSICA SHAW, UCLA, LEIGH ANN KESSLER, MIT, SARAH MILLS, University of Arkansas, JOSEPH RALPH, ARTHUR PAK, LLNL, KENNETH MARSH, CHRISTOPHER CLAYTON, WARREN MORI, CHAN JOSHI, SIEGFRIED GLENZER, UCLA — Betatron x-rays with photon energies larger than 20 keV have been observed from a GeV-class laser-plasma accelerator. The 250 TW Callisto laser at LLNL was used to produce and simultaneously observe GeV-class electron beams and keV Betatron x-rays. The laser was focused into various gas cells with sizes ranging from 3 to 8 mm, and containing mixed gases (He, N, O2) to accelerate large amounts of charge in the ionization induced trapping regime. Electron spectra were measured on large image plates with the two-screen method after being deflected by a large 0.4 Tesla magnet spectrometer. Betatron oscillations observed on the electron spectra were benchmarked against a simple analytical model (Runge-Kutta algorithm solving the equation of motion of an electron in the wakefield) as well as against PIC simulations using OSIRIS. This analysis allowed to retrieve the electron injection conditions into the wake. This analysis, combined with spectral and spatial measurements of the produced x-rays suggest an enhancement of the betatron mechanism, x-ray yield and photon energy in the ionization induced trapping regime of laser-wakefield acceleration.

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