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Betatron X-ray spectra from a laser wakefield accelerator using ionization injection[1] W. SCHUMAKER, C. MCGUFFEY, A.G.R. THOMAS, A. MAKSIMCHUK, G. KALINTCHENKO, V. CHVYKOV, V. YANOVSKY, K. KRUSHELNICK, University of Michigan , S. KNEIP, M. BLOOM, S. MANGLES, Z. NAJMUDIN, Imperial College London — Electron beams typically produced by the HERCULES laser wakefield accelerator can be characterized as being of relatively high charge (∼100 pC) in femtosecond duration, quasi-monoenergetic bunches. Oscillations of these electrons in the electromagnetic fields of the plasma bubble cavity created by laser driven ponderomotive expulsion can lead to extremely bright sources of X-rays in the 5-100 keV energy range. Such configurations are proposed as future sources of radiation for a number of applications, as their compact size and potential low cost is highly attractive, and may enable such facilities to be more widely available to the scientific, medical and engineering communities. To help understand and explore this phenomena, experimental measurements of X-ray spectra from laser wakefield accelerated electrons that are ionization-injected will be presented in comparison to X-ray spectra resulting from self-injection across various plasma densities and laser powers.

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