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Medical imaging using a laser-wakefield driven x-ray source JASON COLE, JONATHAN WOOD, NELSON LOPES, KRISTJAN PODER, CHRISTOS KAMPERIDIS, SALEH ALATABI, JONATHAN BRYANT, STEFAN KNEIP, KATALIN MECSEKI, Imperial College London, DOMINIC NORRIS, LYDIA TEBOUL, HENRIK WESTERBURG, Medical Research Council, RICHARD ABEL, Charing Cross Hospital, ANDI JIN, Imperial College London, DAN SYMES, Central Laser Facility, STUART MANGLES, ZULFIKAR NAJMUDIN, Imperial College London — Laser-wakefield accelerators driven by high-intensity laser pulses are a proven centimetre-scale source of GeV electron beams. One of the proposed uses for these accelerators is the driving of compact hard x-ray synchrotron light sources. Such sources have been shown to be bright, have small source size and high photon energy, and are therefore interesting for imaging applications. By doubling the focal length at the Astra-Gemini laser facility of the Rutherford Appleton Laboratory, UK, we have significantly improved the average betatron x-ray flux compared to previous experiments. This fact, coupled to the stability of the radiation source, facilitated the acquisition of full 3D tomograms of hard bone tissue and soft mouse neonates, the latter requiring the recording of over 500 successive radiographs. Such multimodal performance is unprecedented in the betatron field and indicates the usefulness of these sources in clinical imaging applications, scalable to very high photon flux without compromising source size or photon energy.

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