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A compact laser-driven X-ray synchrotron radiation source for biomedical imaging — •KLAUS ACHTERHOLD¹, RONALD RUTH², ROD LOEWEN³, and FRANZ PFEIFFER¹ — ¹Physik-Department und Institut für Medizintechnik, Technische Universität München, 85748 Garching, Germany — ²SLAC National Accelerator Laboratory, 2575 Sand Hill Road, Menlo Park, CA 94025, USA — ³Lyncean Technologies Inc., Palo Alto 94306, California, USA

Nearly monochromatic, tunable X-rays in the keV energy regime can be produced by inverse Compton scattering of infrared laser photons at electrons of some MeV energy. For the brilliant X-ray source presented in this contribution a photon pulse stored in a laser cavity interacts

with a counter-propagating electron bunch revolving in a small sized storage ring. The interaction region has a small transverse size leading to a highly coherent beam. The angular divergence is a few milliradians. The small footprint, relative low cost and excellent beam quality of the X-ray source provide the prospect for valuable preclinical use. In computed tomography, the monochromaticity of the beam prevents beam hardening effects that are a serious problem in quantitative determination of absorption coefficients. The coherence of the produced X-rays can be exploited in high-sensitivity differential phase-contrast imaging with a grating-based interferometer. We present the design of the Munich Compact Light Source, MuCLS, currently being built up at the Technische Universität München and results obtained at the prototype operated at Lyncean Techn., Palo Alto, USA.