Abstract Submitted
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Radiobiological applications of ultrashort pulse laser-accelerated proton beams KARL ZEIL, S. KRAFT, M. BUSSMANN, T.E. COWAN, T. KLUGE, J. METZKES, T. RICHTER, R. SAUERBREY, U. SCHRAMM, Forschungszentrum Dresden-Rossendorf, C. RICHTER, E. BEYREUTHER, W. ENGHARDT, L. KARSCH, L. LASCHINSKY, D. NAUMBURGER, J. PAWELKE, Oncoray, TU Dresden, Germany — Ultrashort pulse laser proton acceleration is demonstrated to yield energies hitherto only accessible with high energy lasers. Up to 20 MeV protons are observed with the FZD Draco Ti:Sa laser with 30 fs pulses and only 2 J. This proton energy range allows for first well controlled applications. The radiation dose per shot observed for energies above 10 amounts to few Gy and thus provides excellent starting conditions for the irradiation of in vitro tumour cells with the aim of determining dose dependent biological damage. A first experiment demonstrates the availability of all components indispensable for systematic radiobiological studies: A laser-plasma accelerator providing stable proton spectra with maximum energy exceeding 15MeV over hundreds of pulses and applicable doses of a few Gy within few minutes, a beam transport and filtering system, an in-air irradiation site, a dedicated dosimetry system providing both online dose monitoring and a precise absolute dose information applied to the cell sample, and the full infrastructure for analysing radiation induced damage in cells.

[1] S.D. Kraft, K. Zeil, et al., *New J. Phys.* **12**, 085003 (2010).

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