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Overview of FLASHlab@PITZ: the new R&D platform for FLASH radiation therapy and radiation biology

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An R&D platform for electron FLASH radiation therapy and radiation biology is being prepared at the Photo Injector Test facility at DESY in Zeuthen (FLASHlab@PITZ). This platform is based on the unique beam parameters available at PITZ: ps scale electron bunches of up to 22 MeV with up to 5 nC bunch charge at MHz bunch repetition rate in bunch trains of up to 1 ms in length repeating at 1 to 10 Hz. These beams allow to study an uniquely wide parameter range for radiation biology and FLASH radiation therapy, which is a new treatment modality against cancer.
A startup beamline has been installed to allow dosimetry studies and irradiation experiments on chemical, biochemical and biological samples and cell cultures after a 60-degree dispersive arm. The measured dose and dose rates under different beam conditions and first experimental results will be reported in this paper.
In addition, a dedicated beamline for FLASHlab@PITZ has been designed for better control of the electron beams. This includes a dogleg to translate the beam and a 2D kicker system to scan the tiny beam focused by quadrupoles across the samples within less than 1 ms. Simulation studies will be presented to demonstrate the extremely flexible dose parameters with various irradiation options for FLASH radiation therapy and radiation biology studies.

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Footnotes

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