9. Annual MT Meeting



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FLASHlab@PITZ: current status and further development

Monday 9 October 2023 18:35 (5 minutes)

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. It can provide an extremely wide dose and dose rate parameter range, from conventional dose rate of a few Gy/min to ultra-high dose rate (UHDR) of 10^6 Gy/s to even 10^12 Gy/s. It will be used for dosimetry experiments and studying radiation effects in samples and small animals.

A startup beamline has been put into operation at PITZ for dosimetry studies and first in vitro experiments on chemical, biochemical and biological samples such as water, biopolymer, cancer and normal cells with various doses at the conventional dose rate and ultra-high dose rate. The ongoing installation of an animal lab will allow studying FLASH effects with small animals such as zebrafish embryos and mice. In addition, a dedicated beamline for FLASHlab@PITZ has been designed and is being built for better control of the high brightness 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. Start-to-end simulations have been performed, showing that tiny electron beam size (sub mm RMS) can be reached in a huge charge range (sub pC to 5 nC). The preparation of the full beamline and the first in vitro studies of the chemical and biological effects of FLASHlab@PITZ beam are reported.

Speed Talks

Normal

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