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Detectors for ultra-fast radiation therapy

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FLASH radiation therapy is a new cancer treatment technique. It provides the same tumour control as conventional radiation therapy but shows increased tissue sparing. Tumours are irradiated with the same dose but with increased dose rate ($\gg 40$ Gy/s) compared to conventional dose rate (0.05 Gy/s).

A new R&D facility for radiation therapy studies, called FLASHlab@PITZ, is being setup at the Photo Injector Test facility at DESY in Zeuthen (PITZ). It can provide worldwide unique beam parameters regarding delivered dose and dose rate. With an average dose rate within one RF pulse of up to 10^9 Gy/s and peak dose rates up to 4×10^{13} Gy/s, PITZ is fully capable of ultra-high dose rate experiments.

Nevertheless, dosimetry is a major challenge. Traditional detectors suffer from saturation and cannot provide reliable measurements up to such high dose rates. The goal is to test and benchmark detectors that cover the whole range of dose rates available at PITZ.

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