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Test beam results of a fluorescence-based monitor for ultra-high dose rates

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The great interest around the experimental evidence of the FLASH effect has led to an intense research activity on the development of monitoring techniques for charged beams at ultra-high dose rates. FLASH poses an unprecedented challenge since the performances of conventional detectors are usually compromised by non-linear effects due to the very high flux of particles.

The FlashDC (Flash Detector beam Counter) exploits the air fluorescence to monitor in real time the beam fluence and spatial distribution with high accuracy and minimal impact on treatment delivery. According to literature data this mechanism could provide a linear response for any charged beam and in a wide range of dose rates and energies.

Several prototypes have been developed for proof-of-principle studies. The latest results, obtained irradiating the monitor with an electron FLASH beam delivered by the ElectronFlash LINAC at CPFR (Pisa, Italy), provided strong indication that fluorescence is linearly correlated with the relevant parameters under study, in particular with the dose delivered within each micro-pulse.

In this contribution the detailed study on the expected performances will be presented together with the characterization of the readout system and preliminary test beam measurements taken at CPFR.

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