

Towards primary and secondary standards for dosimetry in Flash radiotherapy

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Abstract: The development of code of practice (CoP) for new radiotherapy modalities are usually based on existing dosimetry protocols (AAPM TG51 or IAEA TRS-398) which are modified for the specificity of the modality. The Flash radiotherapy is a new modality in which the prescribed dose is delivered with very high dose rate. Although in the early stage of development, it has already shown advantage over conventional dose rate as the adverse dose effect on healthy tissue is reduced. The challenge with Flash modality is that the use ionometry as secondary standard is not suitable due to high level of ion recombination, it can be larger than 50%. In addition, the dependence of the ion recombination is not linear with the dose per pulse. To be obtained, it require extensive measurements and intra-model variation is in the 2-5% range. The lack of precise accurate measurements and accurate theoretical model of the ion recombination hampers the progress of the Flash modality. The UHDPulse project is an EMPIR funded collaboration to develop reliable dosimetry methods for Flash modality and guidance for CoPs. Although the project is still in early stage, calorimetry is showing promising results for NMI and clinical use. Calorimetry gets simpler at Flash dose rate as the dose delivery is in a few seconds or less. The preliminary results show that advanced insulation is not required nor the use of an heat lost correction factor. For relative measurement, dosimeters such as plastic scintillators, diodes, or diamond detectors are under investigation to determine the best option. In this presentation, preliminary results of the investigation of calorimeter and other types of detectors will be show.