Contribution ID: **513** Type: **Poster**

A 3D imaging system for dosimetry in FLASH radiotherapy

Tuesday, 28 May 2024 08:50 (1 minute)

In recent years, the advent of Flash radiotherapy has called for a paradigm shift in dosimetry. The Flash effect demands an administration of an average dose rate higher than 40 Gy/s, as opposed to 1 Gy/min in conventional radiotherapy, introducing saturation challenges in standard dosimeters. Moreover, rapid optimization of beam settings and quality assurance protocols require detectors for online, accurate volumetric measurement of delivered dose distributions at high dose rates. Given the limitations of commonly used 3D dosimeters in terms of reusability and signal readout speed, there is a growing interest in plastic scintillators for their real-time capability, tissue equivalence and cost-effectiveness. Although some 3D dosimetric systems based on plastic scintillators have been developed for conventional radiotherapy, there is a lack of validation and optimization of techniques specific for Flash radiotherapy.
In this study, we present the first results of an imaging system made by an EJ200 (Eljen Technology) plastic scintillating block measuring 10x10x10 cm^3, irradiated with a high dose rate beam of 9 MeV electrons at the Pisa Center for Flash Radiotherapy (CPFR). Images were captured at various doses per pulse within the flash regime using a scientific CCD camera (Hamamatsu ORCAII-BT-512G) coupled to an objective (Schneider Optics Xenon). During irradiation, the camera and the objective were positioned at a distance of 10 cm orthogonally to the block, which was aligned along the beam axis. This imaging system will enable the validation of a dose delivery reconstruction algorithm based on acquiring multi-projections of 2D light distributions with a single CCD camera and a set of mirrors.

Collaboration

Role of Submitter

I am the presenter

Primary author: RAVERA, Eleonora (Università di Pisa / INFN)

Co-authors: ANZALONE, Rebecca (Università di Pisa); CAVALIERI, Andrea (Università di Pisa); CIARROCCHI, Esther (Istituto Nazionale di Fisica Nucleare); DEL SARTO, Damiano (Università di Pisa); DI MARTINO, Fabio (U.O. Fisica Sanitaria, AOUP); MORROCCHI, MATTEO (Istituto Nazionale di Fisica Nucleare); BISOGNI, Maria Giuseppina (Istituto Nazionale di Fisica Nucleare)

Presenter: RAVERA, Eleonora (Università di Pisa / INFN)

Session Classification: Applications to Industrial and Societal Challenges - Poster session

Track Classification: T5 - Applications to Industrial and Societal Challenges