Contribution ID: **2147** Contribution code: **THPM059** Type: **Poster Presentation**

Development of reliable VHEE/FLASH passive dosimetry methods and procedures at CLEAR

Thursday, 11 May 2023 16:30 (2 hours)

The electron beam at CERN Linear Accelerator for Research (CLEAR) has been intensively used to study the potential use of Very High Energy Electrons (VHEE) for radiotherapy, including the so-called FLASH regime. An important part of these studies revolves around the development of reliable dosimetry methods, given that generally accepted standards are partly lacking for electron beams in the 100 MeV range and even more so in the ultra-high dose rates (UHDR) conditions needed for FLASH. Passive dosimetry methods, such as radiochromic films and alanine pellets are presumed to be energy- and dose-rate independent and constitute an indispensable tool for VHEE studies. Furthermore, the development and testing of new modalities for active UHDR dosimetry relies heavily on them for validation and cross-calibration. In this context, efforts have been made to establish reliable and systematic approaches for passive dosimetry at CLEAR. This paper describes studies related to the processing of radiochromic films, the energy dependence of the dose measurements and comparisons with alanine pellets and other media.

Funding Agency

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Session Classification: Thursday Poster Session

Track Classification: MC8: Applications of Accelerators, Technology Transfer and Industrial Relations and Outreach: MC8.U01: Medical Applications