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Silicon carbide detectors for particle therapy within the SAMOTHRACE ecosystem

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The cancer treatment using different methods and with high profile clinical approach is an important challenge in the current era. Several methods are used to treat cancer, among which the well knows X-rays. However, while X-rays inevitably damage healthy tissue during the irradiation for tumor cells killing, it was shown that the irradiation with charged particles (such as protons, alphas, carbon ions) allows a more precise definition of the deposited energy in the tumor cells, saving the healthy tissues [1]. Even more, recently, radioactive ion beams, as the Carbon-11, are indicated as promising ions to be used in such a field: Carbon-11 particles, in fact, have the advantage of being used both in hadron therapy and medical imaging. In this context, SiC detectors are being characterized within the SAMOTHRACE ecosystem for their employment as dosimeter, micro-dosimeter and tagging for RIBs such as the Carbon-11 [2, 3, 4]. In this contribution the characterization of two Silicon Carbide devices, will be discussed. In particular, a detector with a surface of 1 cm2 and 10 um thick, intended to be used as a dosimeter and micro-dosimeter, has been characterized with a radioactive source. A second detector, with the same surface area and 100 um thick, has been characterized with radioactive sources and a comparison with a Silicon detector of similar capacity has been performed.

[1] D. Schardt, "Hadrontherapy." Basic Concepts in Nuclear Physics: Theory, Experiments and Applications, 2016.
[2] https://samothrace.eu/. [Online].
[3] N. S. Martorana, "Radioactive ion beam opportunities at the new FRAISE facility of INFN-LNS," Frontiers in Physics, vol. 10 (2022): 1058419.
[4] M. Durante, Frontiers in Physics, vol. 8 (2020).

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