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First results of an oncological brachytherary fiber dosimeter

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The ORIGIN project aims to deliver photonics-enabled, adaptive, and more effective diagnostics-driven brachytherapy for cancer treatment through advanced real-time radiation dose imaging and radioactive source localization. This goal will be achieved by developing a 16 to 32 optical-fiber-based system where scintillating light is detected by Silicon Photomultiplier. This work reports the results achieved in laboratory and hospital conditions with single-sensor prototypes for low and high dose rate brachytherapy, requiring different specifications. The former requires high sensitivity and low minimum detectable signal, whereas an extended linearity range is crucial for the latter. Laboratory activities were essential to identify the optimal silicon photomultiplier. Preliminary tests, performed at the hospital premises for both treatments, assessed the viability of the proposed solution. The first results were also relevant to identify the ASIC-based readout system that will allow the project to reach the final goal of engineering a multi-fiber real-time dosimetry imager.

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