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## Optimization of high-performance 3D/4D surface scanning technology for patient monitoring in radiotherapy environment

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Nowadays different electronic devices are used in radiotherapy to improve and optimize the treatments. The scattered radiation in the radiotherapy environment can cause failures and/or damages to the electronics and therefore the devices must be radiation resistant in order to assure a secure treatment.

ViALUX developed in the last years a new 3D scanning technology that allows increasing the performance of its previous 3D scanners, in particular in terms of speed, precision and interface. Since these new devices will be used also in radiotherapy for patient positioning and monitoring, a radiation hardness test is necessary to assess their reliability in this environment.

The devices were tested during short tests in the conventional radiotherapy and carbon therapy environment and during a 2-day radiation test at FRM II nuclear reactor. Temporary malfunctions due to Single Event Effects and permanent damages due to the Total Ionizing Dose were investigated.

The ViALUX 3D scanners showed a good reliability in the radiotherapy environment, except from rare and recoverable interruptions of functionality detected during the tests at the nuclear reactor. The CMOS image sensor, which is a key part of the 3D scanners, showed an increase in the number of bright pixels after the irradiation. Further analysis showed that these bright pixels don't affect the 3D image quality in the typical working conditions (no gain, exposure time < 10 ms). Hardware and software solutions to further improve the 3D scanners radiation hardness are currently under study.

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