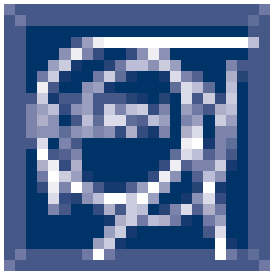

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ON-LINE GAMMA RADIATION AND NEUTRON FLUENCE MONITORING

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Radiation present in an accelerator poses a real threat to electronic devices and systems placed in the main tunnel. Radiation in the accelerator tunnel is produced as a result of the electron beam's interaction with high-Z materials. Because of the Total Ionizing Dose effect gamma radiation is responsible for a long term degradation of all devices installed in the accelerator's chamber. Neutrons are responsible for Single Event Effects that generate malfunctions in digital systems and they could result in repairable or hard damage of the devices. Therefore gamma radiation and neutrons monitoring is strictly recommended to avoid the unwanted breakdown of the control system. The paper presents the system dedicated for gamma radiation and neutrons monitoring in a linear accelerator in real-time. The presented detector is intended to be used in the newly installed X-Ray Free-Electron Laser X-FEL at DESY research centre in Hamburg. Two different detectors were used to monitor gamma radiation and neutrons. The radiation sensitive transistor RADFET is responsible for gamma radiation measurement whereas SRAM-based detector was used to measure neutron fluence in the tunnel. The radiation-selective sensors are connected to the microcontroller-based read-out system. The system was built with the usage of redundant elements to assure radiation tolerance. Measured data are gathered in a database, thus gamma radiation and neutron fluence history is accessible. These parameters help to predict damage of electronic systems that are placed in the tunnel. We have conducted a few experiments with the system at DESY. The devices were exposed to a neutron field from an Americium-Beryllium neutron source 241AmBe. The systems were installed in two accelerators: VUV-FEL as a prototype of X-FEL accelerator and Linac II. The results of the operation within a few months are discussed in the paper.

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