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#7-72 Miniaturized single-head active dosimeter : application to extremities dosimetry

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Worker radiation protection is essential in many fields, from nuclear to medical. In particular, tasks such as decommissioning operations or interventional radiosurgery require accurate measurement of the dose received at the extremities. This measurement is efficiently performed using passive dosimeters, but the informations are delayed in time. As a result, incidents or dose exceedances are not monitored effectively.

In the frame of UDD@Orano, CEA-List Institute develop an active miniaturised dosimeter aiming to measure the equivalent dose to the extremities for risk prevention and radioprotection. This single head detector is based on plastic scintillator coupled to SiPM, connected to a miniaturized electronic and data acquisition system. The dimensions are carefully chosen to make the final head mounted on a ring and worn on the finger, the resulting scintillator is 3x3x3.5 mm³ and the SiPM is a single pixel 3x3mm², microFC 30035 SMT from SensL®. The X and gamma rays interaction in the scintillator produces visible photons which will be converted into electric signals in SiPM. The goal of our work is to rely information received by the detection head to the effective dose the worker is exposed.

We present a new procedure in two major steps, the calibration and the validation of the method that enables the determination of the dose received to the extremities. We compare our results to the ED3 commercial active dosimeter in same measurement condition using reference beams from Laboratoire National Henri Becquerel (LNHB). We demonstrate the applicability of our dosimeter and associated method in this measurement configuration.

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