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EPM 22NRM07 GuideRadPROS: Harmonisation, update, and implementation of standards related to radiation protection dosimeters for photon radiation

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Abstract

The European Partnership for Metrology (EPM) 22NRM07 GuideRadPROS metrology normative research project has been funded from June 1st, 2023, for 36 months, to address several key aspects related to measurements in radiation protection dosimetry, following the publication of both the ISO 4037:2019 series of standards and the ICRU Report 95. The recent update of these standards has presented significant challenges to calibration laboratories and industry, such as high costs and manpower.

The specific objectives of the project are:

1. to develop a harmonised spectrometry methodology with metrological traceability in accordance with the ISO 4037:2019 standard series, which would help produce data to update requirements for reference X-ray fields as well as provide required data to reintroduce ²⁴¹Am as a reference field; to evaluate the dosimetric capabilities of x-ray spectrometry and compare to ionisation chamber-based dosimetry; Furthermore, an investigation on the parameters of influence and their associated uncertainty over the measured x-ray fluence spectra such as the additional filtration, tube voltage, and HVL needs to be performed to re-evaluate uncertainties on conversion factors as prescribed in ISO 4037:2019;

2. To develop cost-effective procedures and guidance for the calibration of dosimeters, to enable smaller metrology institutes and other calibration laboratories to implement the ISO 4037:2019 standard series, as well as to provide training to emerging metrology institutes;
3. To produce guidance on validated procedures for harmonized type testing based on IEC standards for the commonly used dosimeters with valid metrological solutions;
4. To assess future standardisation needs and to produce a guidance document for the implementation of the new operational quantities of ICRU Report 95 into standards and regulations, and to disseminate this to policymakers, manufacturers, regulators, metrology networks, standardisation bodies, and laboratories.

The GuideRadPros metrology research project will provide protocols and guidance to metrology institutes, standardisation bodies, and regulators, for a harmonized approach to radiation protection measurements and calibrations and will offer input towards the updates of the key radiation protection standards. By exploration of the implications of ICRU 95 report on radiation protection dosimetry, it will assess the impact on the society, including the medical world, and the producers of instrumentation.

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References

ISO 4037:2019-1 Radiological protection - X and gamma reference radiation for calibrating dosimeters and dose rate meters and for determining their response as a function of photon energy - Part 1: Radiation characteristics and production methods

ISO 4037:2019-3 Radiological protection - X and gamma reference radiation for calibrating dosimeters and dose rate meters and for determining their response as a function of photon energy - Part 3: Calibration of area and personal dosimeters and the measurement of their response as a function of energy and angle of incidence

ICRU Report 95, Operational Quantities for External Radiation Exposure. <https://www.icru.org/report/icru-report-95-operational-quantities-for-external-radiation-exposure/> (2020).