EMPIR Call 2017 – Industry, Fundamental, Normative and Research Potential

Selected Research Topic number: **SRT-r07**
Version: 1.1

Title: Research capabilities for radiation protection dosimeters

Abstract

EU regulation on ionising radiation requires states to have adequate equipment and procedures for measuring and assessing exposure of persons and radioactive contamination of the environment, assure effectiveness of measures and ensure regular calibration of measuring equipment. Similar requirements come from local stakeholders. Some European NMI/DIs in the area of radiation protection dosimetry do not have sufficient metrological capacity in the calibration of radiation protection dosimeters. Proposals in response to this SRT should aim at enhancement of research potential in these institutions, in order to provide measurement capabilities that fulfil documented stakeholder needs.

Keywords

Radiation protection dosimetry, ionising radiation, environmental dosimeters, area dosimeters, personal dosimeters

Background to the Metrological Challenges

Ionising radiation, typically X-rays, is commonly used in medical diagnostics, and will usually account for the majority of the radiation exposure of the general public due to artificial sources. People may however be exposed to ionising radiation through other sources. Some radioactive materials, such as radon, occur naturally through geological based processes. The level of natural radioactivity will depend on the location within Europe and the underlying geology, and hence will affect a person's annual exposure to ionising radiation. Industries processing naturally-occurring radioactive material extracted from the earth's crust subject workers and, if material is released into the environment, members of the public to increased exposure. In addition, people working in industries such as nuclear power generation or healthcare professionals using ionising radiation for diagnostic or therapeutic purposes, will also potentially be subject to raised levels of ionising radiation.

The European regulation on ionising radiation (COUNCIL DIRECTIVE 2013/59/EURATOM of 5 December 2013) laying down basic safety standards for protection against the dangers arising from exposure to ionising radiation therefore requires that member states:

(a) achieve and maintain an optimal level of protection of members of the public,

(b) accept into service adequate equipment and procedures for measuring and assessing exposure of members of the public and radioactive contamination of the environment,

(c) check the effectiveness and maintenance of equipment as referred to in point (b) and ensure the regular calibration of measuring instruments,

(d) seek advice from a radiation protection expert in the performance of the tasks referred to in points (a), (b) and (c).

In addition, individual monitoring by a dosimetry service is required by the directive for workers that are exposed to ionising radiation.

Effective monitoring of the dose received by the public and workers is therefore important. Several European laboratories performing calibration/verification tasks in dosimetry do not have CMCs in the BIPM KCDB, supported by comparisons, in order to formally prove their metrological capabilities. As such, they meet neither European legislative requirements nor stakeholder needs.

EURAMET MSU, Hampton Road, Teddington, Middlesex, TW11 0LW, UK
Phone: +44 20 8943 6666 Email: msu@npl.co.uk
msu.euramet.org

The EMPIR initiative is co-funded by the European Union's Horizon 2020 research and innovation programme and the EMPIR Participating States

Objectives

Proposers should address the objectives stated below, which are based on the PRT submissions. Proposers may identify amendments to the objectives or choose to address a subset of them in order to maximise the overall impact, or address budgetary or scientific / technical constraints, but the reasons for this should be clearly stated in the protocol.

The JRP shall focus on the development of metrological capacity in the calibration of radiation protection dosimeters.

The specific objectives are

1. To develop traceable measurement capabilities for operational radiation protection quantities, including full characterisation of a measurement setup conversion procedure from air kerma to ($H_p(0.07)$, $H_p(3)$, $H_p(10)$, $H'(0.07)$, $H'(3)$, $H^*(10)$ operational quantities with an uncertainty of 5 % (k=2) or less. The applicable photon energy range and dose rate range are 5 keV - 7000 keV and 0.05 µSv/h to 100 Sv/h respectively.
2. To validate the newly developed measurement capabilities for operational radiation protection quantities by organising and undertaking a comparison in dosimetry, including activities related to travelling standards, technical protocols, logistical provisions, and evaluation of comparison results.
3. To develop and submit draft CMCs under the internationally agreed categories for the traceable calibration of dosimeters.
4. For each participant, to develop an individual strategy for the long-term operation of the capacity developed, including regulatory support, research collaborations, quality schemes and accreditation. They should also develop a strategy for offering calibration services from the established facilities to their own country and neighbouring countries. The individual strategies should be discussed within the consortium and with other EURAMET NMIs/DIs, to ensure that a coordinated and optimised approach to the development of traceability in this field is developed for Europe as a whole.

Joint Research Proposals submitted against this SRT should identify

- the particular metrology needs of stakeholders in the region,
- the research capabilities that should be developed (as clear technical objectives),
- the impact this will have on the industrial competiveness and societal needs of the region,
- how the research capability will be sustained and further developed after the project ends.

The development of the research potential should be to a level that would enable participation in other TPs.

Proposers should note that the programme funds the activity of researchers to develop the capability, not the required infrastructure and capital equipment, which must be provided from other sources.

EURAMET has defined an upper limit of 500 k€ for the EU Contribution to any project in this TP, and a minimum of 100 k€.

EURAMET also expects the EU Contribution to the external funded partners to not exceed 10 % of the total EU Contribution to the project.

Potential Impact

Proposals must demonstrate adequate and appropriate participation/links to the “end user” community, describing how the project partners will engage with relevant communities during the project to facilitate knowledge transfer and accelerate the uptake of project outputs. Evidence of support from the “end user” community (e.g. letters of support) is also encouraged.

You should detail how your JRP results are going to:

- address the SRT objectives and deliver solutions to the documented needs,
- provide a lasting improvement in the European metrological capability and infrastructure beyond the lifetime of the project,
- facilitate improved industrial capability or improved quality of life for European citizens in terms of personal health or protection of the environment,
- transfer knowledge to the radiation protection sector and the metrology community.

You should detail other impacts of your proposed JRP as specified in the document “Guide 4: Writing Joint Research Projects (JRPs)”.

You should also detail how your approach to realising the objectives will further the aim of EMPIR to develop a coherent approach at the European level in the field of metrology and include the best available contributions from across the metrology community. Specifically the opportunities for:

- improvement of the efficiency of use of available resources to better meet metrological needs and to assure the traceability of national standards,
- the metrology capacity of EURAMET Member States whose metrology programmes are at an early stage of development to be increased,
- organisations other than NMIs and DIs to be involved in the work.

Time-scale

The project should be of up to 3 years duration.