# Consultative Committee for Photometry and Radiometry (CCPR)

25th Meeting (on-line 10-11 May 2022)

## CCPR member report on activities in radiometry and photometry since the last CCPR meeting (2019)

**Reply from: INRIM**

**Delegate: Giorgio Brida and Alice Meda**

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1. Summarize the recent progress in your laboratory with respect to measurement standards, research projects, and metrology services to fulfill the demands of customers in:

   (a) broad-band radiometric quantities:
   no progress in this area since the previous report.

   (b) spectral radiometric quantities:
   **Spectral responsivity**
   INRIM participates to the EU EMPIR project chipS·CALe, "Self-calibrating photodiodes for the radiometric linkage to fundamental constants", devoted to the realization of the candela based on electrical substitution and quantum standards
   **Metrology for single photon source and detectors**
   INRIM is active in the realization and characterization of single-photon sources based on colour centers in nanodiamonds and in the design, realization and testing of cryogenic photon number sensitive detectors (TES). It is also active in the characterization of single photon detector and sources parameters and testing methods for QKD security evaluation.

   (c) photometric quantities:
   no progress in this area since the previous report.

   (d) other area(s) relevant to CCPR:

   INRIM partecipates to the following comparisons :
   CCPR pilot study on the detection efficiency of single-photon detectors (850 nm);
   EURAMET.PR K6 –spectral regular transmittance;
   EURAMET.PR K3 – luminous intensity;
   EURAMET.PR S4 – UVA power meters.

2. What work in PR has been/will be terminated in your laboratory, if any, in the past /future few years? Please explain the reasons and provide the name of the institution if it has been/will be substituted by a DI or accredited laboratory.

   No metrological activity has been terminated in the laboratory during this period.

3. Summarize the Capacity Building and Knowledge Transfer activities undertaken by your institute in photometry and radiometry (courses, training, …):

   INRIM support space industry involved in the realization of an imaging system for the exploration of the Moon (Prospect package).

4. Summarize the research projects currently performed within a collaboration with one or more NMIs or DIs (name of the project, participants):

   INRIM is involved in active coordination of European measurement science research to maintain competitiveness in the field of quantum technologies through the EMN-Q European Metrology Network for Quantum Technologies. EMN-Q is participated by 18 NMIs and it is chaired by INRIM and vice chaired by PTB, LNE and NPL (2020-2024). https://www.euramet.org/european-metrology-networks/quantum-technologies/?L=0

   INRIM is coordinating:
   - the EURAMET EMPIR-H2020 project MeTISQ-Metrology for Testing the Implementation Security of Quantum Key Distribution Hardware (2020 -2024) www.euramet.org/project-19net02;

   - the EURAMET EMPIR project QaDET - Quantum sensors for metrology based on single-atom-like device technology (2021-2024) https://qadet.cmi.cz/

   INRIM contributes with expertise in single photon radiometry to the European Commission OQTAVO Study for the European Quantum Communication Infrastructure (EuroQCI) Initiative, with the study of a dedicated testing and validating facility.

   INRIM participates to the EURAMET EMPIR projects SEQUME: Single and entangled photon sources for quantum metrology (2021-2024) https://sequme.cmi.cz/ , follow up of the project SIQUST: Single-photon sources as new quantum standards (2018–2021).

   INRIM participates also to the following ongoing EU EMPIR projects in the technological areas relevant to the CCPR:
   - BeCOMe: Light-matter interplay for optical metrology beyond the classical spatial resolution limits (2018–2020);
   - Chip SCALe: Self-calibrating photodiodes for the radiometric linkage to fundamental constants (2019-2021);

- SURFACE: Pavement surface characterisation for smart and efficient road lighting (2018-2020);
- POLight: Pushing boundaries of nano-dimensional metrology by light (2021-2024)

5. Are there any other research projects where you might be looking for collaborators from other NMIs or are there studies that might be suitable for collaboration or coordination between NMIs?

   The techniques developed in quantum radiometry field can be applied in the photometry frame for the investigation of the linearity and spectral yeld of the eye response at different regimes and the relationship with V(λ) and V'(λ).

   Have you got any other information to place before the CCPR in advance of its next meeting?

   none

6. Bibliography of radiometry and photometry papers of your laboratory since the last CCPR (September 2019):

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