



2023 CCPR TG10

September 8, 2023

Maria E. Nadal, NIST

Chair



TG10: CCPR Strategy Document Report

Term of Reference: to establish and maintain a strategic planning document for the CCPR in line with the CIPM guidance document for CCs.

Members: Peter Blattner, Joaquin Campos Acosta, Paul Dekker, Nigel Fox, Annette Koo, Stefan kück, Dong-Hoon Lee, Maria Luisa Rastello, Gael Obein, Marek Smid, Emma Woolliams and Tressa Goodman, Li-Lin Tay, Maria Nadal (Chair), and Joële Viallon (ex-officio member).

Thank you to TG10
members

Updates on TG10

2022 CCPR Survey to gain better understanding of the metrological needs and priorities of the CCPR stakeholders (members and observers)

- ✓ 33 Questions
 - Radiometry, Photometry, and Optical properties of materials
 - Needs for Workshops
 - Needs for Comparisons and Pilot Studies
 - Needs for New CMCs
 - Likert scale, ranking, and comments
- ✓ 24 Responses (all members (except 2) and all observers)
- ✓ Responses guided TG10 members in the strategic document and to formulate CCPR roadmap for 2022 - 2032
- ✓ Survey results will be available as part of the documents for this meeting

Updates on TG10

CCPR strategy document

- ✓ Comply with new CCs template
- ✓ To reflect the work accomplished and advances in the field during the period of December 2017 to 2022
- ✓ Published on May 25, 2022
- ✓ <https://www.bipm.org/documents/20126/41532221/CCPR+Strategy/cf06f769-aec9-f0dc-53a8-c47adbf5574d>



1. Executive summary
2. Scientific, economic and social challenges
 - 2.1 Lighting:
 - 2.2 Optical properties of materials/Appearance:
 - 2.3 Energy/Photovoltaics (PVs):
 - 2.4 Environment and climate observation:
 - 2.5 Quantum photonics:
 - 2.6 General Challenges:
3. Vision and mission
4. Strategy
5. Activities to support the strategy
 - 5.1 Progressing metrology science
 - 5.1.1 Lighting
 - 5.1.2 Optical properties of materials/Appearance
 - 5.1.3 Energy/Photovoltaics (PVs)
 - 5.1.4 Environment and climate observation
 - 5.1.5 Quantum photonics
 - 5.2 Improving stakeholder involvement
 - 5.3 Promoting global comparability
 - 5.3.1 CCPR Key Comparisons
 - 5.3.2 CCPR Pilot Studies
 - 5.3.3 RMO Comparisons
 - 5.4 Capacity building and knowledge transfer
6. Work programme of the BIPM laboratories
7. Document revision schedule

Updates on TG10: CCPR Roadmap

Strategic Priority	Plans for 2022-2025	Long Term Plans (2025-2032)
SI-future of the candela	<ul style="list-style-type: none">• Form task group under SP• Select task group chair• Establish term of reference• Workshop on cone fundamentals	<ul style="list-style-type: none">• Develop a strategy for implementing a new photometry system based on cone fundamentals
SI framework for digitalization in photometry and radiometry	<ul style="list-style-type: none">• Form task group under SP• Select task group chair• Establish term of reference	<ul style="list-style-type: none">• Address challenges in the field of photometry and radiometry caused by digital revolution in the global measurement system• Work with WG-CMC to address metrological needs for digitization of calibration certificates for photometry and radiometry CMCs.

<p>Development of LED-based standard lamps to replace incandescent standard lamps in the field of photometry</p>	<ul style="list-style-type: none"> • Survey to determine the best suitable LED-based standard sources for photometry (TG12) 	<ul style="list-style-type: none"> • To develop a strategy to deal with the rapid changes in technology to ensure availability and stability of the selected artefacts. • Conduct and complete pilot study on selected candidates for <ul style="list-style-type: none"> ○ Luminous Intensity ○ Luminous flux ○ Total spectral radiant flux • Workshop on capacity transfer to all members and observers of the CCPR • If needed, new CMCs
<p>Replacement of source-based photometry by detector-based spectroradiometry</p>	<ul style="list-style-type: none"> • Form task group under WG-SP • Select task group chair • Establish term of reference 	<ul style="list-style-type: none"> • Workshop/webinar on Methodologies for calibration of detector based spectroradiometry for luminous intensity and total luminous flux measurements
<p>Development of near-field gonio-photometry standards</p>	<ul style="list-style-type: none"> • WG-SP to investigate if interested NMIs have the need to form a new task group • If needed, form new task group under WG-SP 	<ul style="list-style-type: none"> • If needed, Workshop to determine current capabilities and calibration needs for Imaging Luminance Measurement Devices (ILMDs) and then workshop on near-field gonio-photometers capabilities and needs

<p>Few photons metrology</p>	<ul style="list-style-type: none"> • Survey for best available few photon detectors and sources for the realization of SI traceable radiometry 	<ul style="list-style-type: none"> • Workshop on traceability chain to classical radiometry by overlapping power ranges • If needed, pilot study of selected candidates for the measurand of total spectral radiant flux • If needed, new CMCs
<p>UV metrology</p>	<ul style="list-style-type: none"> • Form task group under WG-SP • Select task group chair • Establish term of reference 	<ul style="list-style-type: none"> • To develop a strategy to deal with the rapid changes in technology today to ensure availability and stability of the artefacts. • Survey to determine best available UV sources and detectors • Workshop on UV metrology emerging technologies
<p>Climate and environmental observations</p>	<ul style="list-style-type: none"> • Study the 2022 BIPM-WMO metrology workshop for climate action report. • Ensure representation in the CIPM Sectorial Task Group on Climate Change and Environment 	<ul style="list-style-type: none"> • Establish Task Group on metrology for satellite observations (as it relates to radiometry) to engage WMO and Space Agencies – <i>New Business</i>

<p>Standards to replace incandescent lamps in the field of radiometry</p>	<ul style="list-style-type: none"> • Form task group under SP • Select task group chair • Establish term of reference 	<ul style="list-style-type: none"> • To develop a strategy to deal with the rapid changes in technology and to ensure availability and stability of the artefacts. • Identified artifacts for pilots studies on: <ul style="list-style-type: none"> ○ Total spectral radiance flux ○ Spectral irradiance ○ Spectral radiance
<p>Optical properties of materials</p>	<ul style="list-style-type: none"> • Survey on specific metrology needs and priorities • SP to investigate if interested NMIs have the need to form a new task group • If needed, form new task group under WG-SP Form task group under WG-SP and establish term of reference 	<ul style="list-style-type: none"> • Workshop on optical properties of materials measurands, methodologies, and standards

Additional technical areas were considered during the 2022 CCPR survey but not enough interest was demonstrated by the respondents. This roadmap is not excluding any activities but prioritizing the activities of the CCPR as identified from the results of the 2022 CCPR survey. The CCPR will revisit these technical areas in a future survey including imaging photometry and radiometry, standards for optical quantum technologies, comparison on luminance and source colors for display, photovoltaic standards, 3D manufacturing, health and life sciences, radiative energy transfer, radiometric traceability for THz sources and detectors for security applications, and extreme UV lithography.