

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: National Metrology Institute of Turkey (UME)

Delegate: Özcan BAZKIR

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:
 - Outdoor irradiance measurement system was established for the calibration of pyranometers
 - UV irradiance measurement system was upgraded to measure spectral irradiance at UVB and UVC ranges.
 - The absolute optical power measurement system was developed. The cryogenic radiometer developed by NPL, and the stabilizer optics by UME.
 - (b) spectral radiometric quantities:
 - (c) photometric quantities:
 - Spectral luminous flux and near field LED based measurement system was established. (Capabilities: total luminous flux, spectral luminous flux, cct, color coordinates; spatial luminous intensity, spatial luminance)
 - Spectrally-tunable LED-based integrating sphere based source was developed. By which color temperature measurement capacity was extended from 2856 K to 2000 K- 8000K range. In addition, current luminance scale expanded from 27 cd/m² - 1064 cd/m² to 1 cd/m² - 500,000 cd/m² interval.
 - (d) other area(s) relevant to CCPR:
 - Robot based BRDF measurement system was established. Spectral and diffuse reflectance scales were realized traceable to UME.
 - The spectral reflectance and transmittance measurement facility was upgraded. The measurement scales were extended from 300 nm – 1800 nm to 250 nm - 2500 nm.
 - Photovoltaic measurement systems was established and accredited so as to perform measurements of photovoltaic modules according to IEC 61215-2 and IEC 61730-2 standards
 - Portable measurement system established for calibration of solar simulators
 - Fiber optic power measurement system was upgraded. Measurement capacity was extended from 10 uW - 380 uW range to 1 uW - 1 mW range.

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.

N/A

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

- Radiometry and Photometry training courses under TÜBİTAK UME BIPM Joint Capacity Building and Knowledge Transfer Programme – 3rd cycle of Project Placement in 2020

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

- 16ENG02 “PV-Enerate” Advanced PV Energy Rating (PTB, Aalto, INTA, LNE, NPL, TÜBİTAK-UME, FhG, ISFH, JRC, LU, LUH, TÜV Rheinland, SUPSI)
- 18SIB10 chipS-CALe, Self-calibrating photodiodes for the radiometric linkage to fundamental constants (JV, Aalto, MI, CNAM, INRIM, Metrosert, PTB, TÜBİTAK-UME, HSN, IFE, SINTEF)
- 19NRM02 RevStdLED, Revision and extension of standards for test methods for LED lamps, luminaires and modules (PTB, Aalto, CSIC, IPQ, LNE, TÜBİTAK-UME, DTU, KIT, NSC-IM, CandelTEC, JETI, NMISA, OSRAM OS, TechnoTeam)
- 19ENG01 METRO PV: Metrology for Emerging PV Applications (PTB, Aalto, IMBiH, LNE, TÜBİTAK-UME, FhG, ISFH, JRC, SUPSI, TÜV Rheinland, Certisolis, ITRI))
- 21GRD03 PaRaMetric, Metrological framework for passive radiative cooling technologies (INRIM, Aalto, CMI, CSIC, DFM, LNE, PTB, RISE, TÜBİTAK-UME, CNR, CP, CTI, FHWS-ZAE, FIW, ICN2, NKUA, POLITO, ALMECO)
- 20SCP01 Smart PhoRa, Smart specialization and stakeholder linkage in Photometry and Radiometry (PTB, Aalto, BIM, CNAM, CSIC, GUM, INM-MD, Metrosert, TÜBİTAK UME)
 - pilot study on Luminous Intensity with the participation of PTB / Germany, CNAM / France and TÜBİTAK UME/ Turkey
 - pilot study on BRDF with the participation of Aalto/ Finland, IO-CSIC/Spain and TÜBİTAK UME/ Turkey.
 - pilot study on the fiber optic power responsivity with the participation of Metrosert/Estonia, IO-CSIC/Spain and TÜBİTAK UME/ Turkey.
 - pilot study on measurements of electrical performance parameters of a bifacial PV module/a Si PV cell at Standard Test Conditions (STC) with the participation of Aalto/ Finland, PTB/Germany and TÜBİTAK UME/ Turkey. TÜBİTAK UME
- EURAMET.PR-K5.2022, spectral diffuse reflectance. Piloted by UME (UME, IO-CSIC, SASO NMCC)
- GULFMET.PR-K4.2021, luminous flux. Piloted by UME (UME, SASO NMCC, NIS)

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?

- Developing calibration procedure and uncertainty analysis of Near Field Measurements of LED sources
- Developing standard LED sources for integrating sphere and near field measurement systems
- Scotopic luminance measurements for night vision devices calibrations

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

No

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

N/A