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:

## Delegate:

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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:

(b) spectral radiometric quantities:

(c) photometric quantities:

METAS has further developed the calibration facility for photometers. Thus, illuminance meters can now be automatically characterized and calibrated against various LED spectra. Also, the alignment of the normal light sources is now camera-based. This will be important for the key comparison EURAMET.PR-K3.2020, which will be led by nearly 20 laboratories with about 80 lamps.

To improve the calibration of LED-based luminous flux standard lamps, a spectroradiometer was mounted on the luminous flux goniophotometer and allows the correction of spectral matching depending on spectral and spatial distribution.

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

Fibre Optics:

- Development of a system for the calibration of the spectral responsivity of fibre-coupled photodetectors and for the calibration of the spectral properties of fibre optics components, based on a filtered supercontinuum laser source.

Appearance:

The "appearance" area was significantly expanded. Among other things, a measuring station was set up to determine the gloss level. It allows in-plane measurements with any angle of incidence. The automated measuring station also has various apertures so that measurements can be carried out in accordance with various standards.

sensLAB:

METAS has established a test laboratory for motion sensors based on the principle of passive infrared radiation. In a temperature-stabilized large hall, various dummies are moved through the room at given body temperatures and the behavior of the sensors is tested.

1. 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.

none

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

METAS is supporting the Swiss Lighting Society for introductory course on basic photometric principle. The target audience are lighting designers, testing laboratories, technical experts for lighting evaluations.

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

In the framework of EURAMET EMPIR METAS has participated or is participating at the following projects (only recent projects are mentioned):

* EMPIR 15SIB07 PhotoLED - Future Photometry Based on Solid-State Lighting Products (MIKES-Aalto (coordinator), BFKH, CMi, IO-CSIC, INRIM, METAS, Metrosert, PTB, RISE)
* EMPIR 16NRM08 - Bidirectional Reflectance Definitions (CNAM (coordinator), MIKES-Aalto, CMi, IO-CSIC, METAS, PTB, RISE)
* EMPIR 16NRM02 SURFACE – Pavement surface characterisation for smart and efficient road lighting (INRIM (coordinator), Metrosert, METAS, Rise, MIKES-Aalto)
* EMPIR 18SIB03 New quantities for the measurement of appearance (CNAM (coordinator), MIKES-Aalto, CMi, IO-CSIC, DFM, METAS, PTB, RISE
* EMPIR 19NRM02, RevStdLED, Revision and extension of standards for test methods for LED lamps, luminaires and modules (PTB (coordinator), MIKES-Aalto, IO-CISC, IPQ, LNE, PTB, UME, METAS (collaborator).

1. 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?

none

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

none

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

* Castagna, N., & Morel, J. (2022). Fibre-coupled tunable source based on a supercontinuum laser for the spectral characterisation of fibre optics components and systems. In Metrologia (Vol. 59, Issue 3, p. 035005). IOP Publishing. <https://doi.org/10.1088/1681-7575/ac5e08>
* Stuker, F., Rinderer, F., & Blattner, P. (2021). sensLAB: TESTING MOTION AND PRESENCE SENSORS FOR SMART LIGHTING. In Proceedings of the Conference CIE 2021. CIE 2021 Conference. International Commission on Illumination, CIE. <https://doi.org/10.25039/x48.2021.op40>
* Ruggaber, B., Vollrath, T., Krüger, U., Blattner, P., & Gerloff, T. (2021). DEGREE OF EQUIVALENCE OF TRISTIMULUS VALUES OF LEDS UNDER CONSIDERATION OF MEASUREMENT UNCERTAINTY AND CORRELATION. In Proceedings of the Conference CIE 2021. CIE 2021 Conference. International Commission on Illumination, CIE. <https://doi.org/10.25039/x48.2021.op14>
* Stampfli, J. R., Lazar, R., Spitschan, M., Schrader, B., di Battista, C., Häfliger, R., Schälli, O., Wichmann, G., Zumbühl, C., Blattner, P., & Cajochen, C. (2021). THE LIGHT-DOSIMETER – A NEW DEVICE TO HELP ADVANCE RESEARCH ON THE NON-VISUAL RESPONSES TO LIGHT. In Proceedings of the Conference CIE 2021. CIE 2021 Conference. International Commission on Illumination, CIE. <https://doi.org/10.25039/x48.2021.op18>
* Ferrero, A., Perales, E., Basic, N., Pastuschek, M., Porrovecchio, G., Schirmacher, A., Velázquez, J. L., Campos, J., Martínez-Verdú, F. M., Šmid, M., Linduska, P., Dauser, T., & Blattner, P. (2021). Preliminary measurement scales for sparkle and graininess. In Optics Express (Vol. 29, Issue 5, p. 7589). The Optical Society. <https://doi.org/10.1364/oe.411953>
* Husmann, D., Bernier, L.-G., Bertrand, M., Calonico, D., Chaloulos, K., Clausen, G., Clivati, C., Faist, J., Heiri, E., Hollenstein, U., Johnson, A., Mauchle, F., Meir, Z., Merkt, F., Mura, A., Scalari, G., Scheidegger, S., Schmutz, H., Sinhal, M., … Morel, J. (2021). SI-traceable frequency dissemination at 157206  nm in a stabilized fiber network with ring topology. In Optics Express (Vol. 29, Issue 16, p. 24592). The Optical Society. <https://doi.org/10.1364/oe.427921>
* Muzet, V., Bernasconi, J., Iacomussi, P., Liandrat, S., Greffier, F., Blattner, P., Reber, J., & Lindgren, M. (2020). Review of road surface photometry methods and devices – Proposal for new measurement geometries. In Lighting Research & Technology (Vol. 53, Issue 3, pp. 213–229). SAGE Publications. <https://doi.org/10.1177/1477153520958454>
* Ferrero, A., Basic, N., Campos, J., Pastuschek, M., Perales, E., Porrovecchio, G., Šmid, M., Schirmacher, A., Velázquez, J. L., & Martínez-Verdú, F. M. (2020). An insight into the present capabilities of national metrology institutes for measuring sparkle. In Metrologia (Vol. 57, Issue 6, p. 065029). IOP Publishing. <https://doi.org/10.1088/1681-7575/abb0a3>
* Jallageas, A., Nürnberg, J., Alfieri, C. G. E., Waldburger, D., Link, S. M., Emaury, F., Morel, J., & Keller, U. (2019). Calibration of high-accuracy spectrometers using stabilized 11-GHz femtosecond semiconductor laser. In Optics Express (Vol. 27, Issue 26, p. 37552). The Optical Society. <https://doi.org/10.1364/oe.27.037552>
* Kokka, A., Poikonen, T., Blattner, P., Jost, S., Ferrero, A., Pulli, T., Ngo, M., Thorseth, A., Gerloff, T., Dekker, P., Stuker, F., Klej, A., Ludwig, K., Schneider, M., Reiners, T., & Ikonen, E. (2018). Development of white LED illuminants for colorimetry and recommendation of white LED reference spectrum for photometry. In Metrologia (Vol. 55, Issue 4, pp. 526–534). IOP Publishing. <https://doi.org/10.1088/1681-7575/aacae7>