



International Commission on Illumination  
Commission Internationale de l'Eclairage  
Internationale Beleuchtungskommission

## CIE liaison report to CCU, April 2024

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The definition of the candela is based on the SI defining constant  $K_{cd}$  that links the photometric units to the corresponding radiometric units together with the spectral luminous efficiency functions. The CIE is responsible for the standardization of the spectral luminous efficiency functions of the human eye, while the CIPM is responsible for the definition of the photometric units in the SI. The details of the usage of the spectral luminous efficiency functions in the photometric units are described in the CIPM/CIE joint publication: Principles Governing Photometry, 2nd Edition, Metrologia, 56, G1 (2019).

The most important one of the spectral luminous efficiency functions is the function for the 2° photopic vision, the so-called  $V(\lambda)$  function, which was adopted by the CIE in 1924. This year, the CIE and the CCPR of the CIPM are organizing a joint workshop to commemorate the 100<sup>th</sup> anniversary of  $V(\lambda)$  on 3 June at the BIPM. This workshop will review the history of the CIE spectral luminous efficiency functions and introduce the cone-fundamental-based functions  $V_F(\lambda)$  based on the latest physiological research. The workshop will also have a discussion on the future of photometry and colorimetry with the cone-fundamental-based functions.

Progress has been made in the field of colorimetry with the cone-fundamental-based functions, but a large-scale introduction will take more time. In the field of photometry, the benefits and impacts of the cone-fundamental-based functions are not sufficiently evaluated. At present, in the CIE's point of view, there is not a sufficient case to re-define the candela in terms of cone fundamentals – not until the cone fundamental functions are fully resolved, taking into account a more diverse cross-section of the human population than the current functions do. Furthermore, we need to ensure that the benefits of the change outweigh the disruption inherent in making the change. Work is ongoing in this space.

The CIE is constantly endeavouring to maintain the conformity and appropriate use of



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quantities and units in the field of photometry and radiometry and is therefore in the process of publishing an extension of the International Lighting Vocabulary (ILV) to include terms and definitions in the field of horticultural lighting. In horticultural applications, the spectral distribution of lighting is varied to match the needs of specific plants for growth, blooming, and harvesting. As most scientific publications and guidelines in this field define the amount of photon flux in a given spectral range through the Avogadro constant, photon-based quantities are expressed with unusual (but still SI) units such as  $\mu\text{mol}\cdot\text{s}^{-1}$  for these applications.