

CCPR

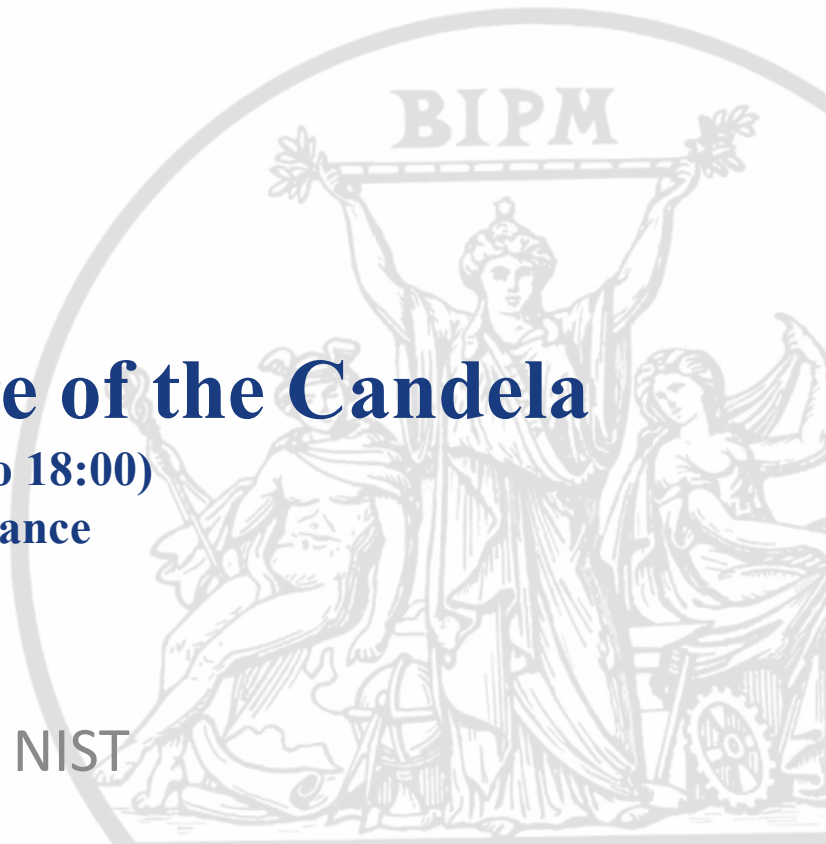
Workshop on the Future of the Candela

4 June 2024 (14:00 to 18:00)

BIPM, Sèvres, France

Maria E. Nadal, NIST

Chair



Thank you to the BIPM

SI base unit: candela (cd)

The candela, symbol cd, is the SI unit of luminous intensity in a given direction. It is defined by taking the fixed numerical value of the luminous efficacy of monochromatic radiation of frequency 540×10^{12} Hz, K_{cd} , to be 683 when expressed in the unit lm W^{-1} , which is equal to cd sr W^{-1} , or $\text{cd sr kg}^{-1} \text{m}^{-2} \text{s}^3$, where the kilogram, metre and second are defined in terms of h , c and $\Delta\nu_{\text{Cs}}$.

This definition implies the exact relation $K_{\text{cd}} = 683 \text{ cd sr kg}^{-1} \text{m}^{-2} \text{s}^3$ for monochromatic radiation of frequency $\nu = 540 \times 10^{12}$ Hz. Inverting this relation gives an exact expression for the candela in terms of the defining constants K_{cd} , h and $\Delta\nu_{\text{Cs}}$:

$$1 \text{ cd} = \frac{K_{\text{cd}}}{683} \text{ kg m}^2 \text{ s}^{-3} \text{ sr}^{-1}$$

A quote from Richard Brown (NPL): *“on the discussion of unit redefinition, several questions need answering when considering a change:”*

- ✓ Does a real problem exist in the user community that we are trying to solve?
- ✓ Will the solution actually benefit all end users?
- ✓ Will any change be fully adopted by all stakeholders? If not, there is the likelihood that we will cause more problems than we will solve.
- ✓ Can the problem be adequately solved instead by updates to supporting documentation (for instance the mise-en-pratique or the CIPM/CIE Principles Governing Photometry)?

Logistics:

All talks (including Q&A) are 20 minutes

On-line participants: please enter your questions in the chat.

Program:

- 14:00 Opening Remarks
Organizing committee: Maria Nadal (NIST, Chair CCPR WG-SP), Maria Luisa Rastello (INRIM, CCPR President), Stefan Kück (PTB), and Joële Viallon (BIPM)
- 14:15 What is the purpose of the SI?
Annette Koo (MSL)
- 14:35 CCU interest in the future of the Candela.
Richard Brown (NPL, CCU)
- 14:55 No changes to the current definition of the Candela.
Arming Sperling (PTB)
- 15:15 Adopt cone fundamentals to the Kcd definition.
Yoshi Ohno (NIST)
- 15:35 Bring photometry to individuals by applying a specific Kcd value for each person.
Gael Obein (LNE-CNAM)
- 15:55 Coffee Break (30 minutes)
- 16:25 Go back to the definition using a source (like a platinum blackbody) instead of the spectral responsivity of the human eye.
Boris Khlevnoy (VNIIOFI)
- 16:45 Photon-based Candela
Stefan Kück (PTB) and Angela Gamouras (NRC)
- 17:05 A proposal for three categories of units within the SI.
John Lehman (NIST)
- 17:25 Speakers panel discussion
- 17:50 Concluding remarks
Maria Luisa Rastello (INRIM, CCPR President)
- 18:00 End

*Thank you to the
Organizing Committee
and to all Speakers*