Consultative Committee for Electricity and Magnetism

Gert Rietveld, CCEM President

November 2022
Electrical measurements in daily life

Sustainable society

Telecom

Fair trade

Nanoelectronics

CCEM
Introducing the CCEM community

Key objective: advise CIPM on electromagnetic metrology

26 members
(CMI new member)
2 observers

Meetings: 2019, 2021 (web)

WGLF + GTRF, WGRMO
WGKG, WGSI

- Revised SI – support CCM
- CCEM Strategy
- Workshop on microwave measurements (2019)
- BIPM work programme

https://www.bipm.org/en/committees/cc/ccem/publications
CCEM Strategy

**Vision:** To be the recognized international focus for electrical metrology, serving the global community by providing a reliable measurement foundation for science, innovation in industry and emerging technologies.

**Mission:** To foster equivalence and promote harmonization of electrical measurement worldwide, by providing:

- an international forum for coordination of global comparability of electromagnetic measurements and
- collective leadership in progressing the science and the application of electrical metrology.
Electrical measurements: back into the SI!

Reminder: electrical quantum standards are based on $h, e$

$\iff$ final values of $h, e$ did not perfectly align with 1990 values

Consequence: CCEM was the only CC with a step change!

*Good news: no issues with implementation of the revised SI in industry!*

Present progress in state-of-the-art:

- AC quantum voltage standard
- QHE based on graphene

for voting

to the revised SI...
Facilitating dialogue between NMIs and stakeholders

Workshop on microwave metrology

• S-parameters in coax systems
• Communications, 5G
• Chip characterisation (on-wafer)

Webinars

https://www.youtube.com/watch?v=w2F1FB_Id0w

Aim: promote knowledge sharing within wider CCEM community, with presentations on state-of-the-art and topic introductions

CCEM workshop on “Metrology for radiofrequencies and microwaves,” to be held at the BIPM, 27 March 2019
Venue: Pavillon du Mail, BIPM, Sèvres, France
Global comparability of measurements

‘Run’ the CIPM MRA as smoothly and effectively as possible:

• KCDB2.0
• Efficient CMC review
• BIPM laboratory programme

Comparisons:

• Strategic planning of comparisons
• BIPM completed K4 comparison in ‘star mode’ in 20 months!
• Others still take very long – issues with transport / customs, pandemic, ...

https://www.bipm.org/kcdb/
Summary and Outlook

Extending quantum basis of electrical measurements
⇒ Trend: enhanced support of society challenges

New ways of implementing coordination and dialogue
⇒ Workshops, webinars, hybrid meetings

Continued attention to efficient implementation of the CIPM MRA, with crucial support from BIPM laboratories

(see the posters!)
Merci de votre attention!

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