CCM Working Group on the Realisation of the Kilogram

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Preconditions for a new kg definition

- New calibrations using the IPK
- 3 independent determinations of $h$ with rel. unc. $\leq 5 \times 10^{-8}$
- Two different methods
- 1 determination of $h$ with rel. unc. $\leq 2 \times 10^{-8}$
- Consistent results
- Ensemble of reference mass standards at BIPM
- *Mise en pratique*
- Procedures of realization and dissemination validated
Ian Robinson reports on Recent Experimental Results and Outlook
Extraordinary Calibrations Using the IPK

Estefania de Mirandes and Michael Stock report about the Status of the Extraordinary Calibrations Using the IPK
Mise en pratique
Joint CCM and CCU roadmap for the new SI

Now

Metrologia special edition (with references for the mep)

Initial pilot study (kg) (preparation, measurements & report)

updated mep kg approved

22 CCU

Consultation / announcement

01.07.2017 Closing date for new data

CODATA (final LSA)

23 CCU

CIPM

25 CGPM

Metrologia special edition (with references for the mep)

updated mep kg approved

16 CCM

R4

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Mise en pratique

Mise en pratique of the definition of the kilogram

• Version 9 distributed December 2014

Open questions

• SI Brochure
• Periodicity of NMI participation for CMCs
• Technical protocol of the pilot study and the BIPM.M-K1
• Use of the ensemble of reference mass standards, validation?
• Special issue of Metrologia

Update of mise en pratique after the Pilot Study!
Mise en pratique

*Mise en pratique* of the definition of the kilogram

Questions or Comments?
Michael Stock reports about the Status of the planned CCM Pilot Study on the Realization of the (awaited) Kilogram
Special issue of *Metrologia*

“Realization, maintenance and dissemination of the new kilogram”

Guest editors:
Horst Bettin
Stephan Schlamminger
Special issue of *Metrologia*

Contents

- P. Richard: Foundation for the redefinition of the kilogram
- G. Mana: A system of units based on fundamental constants of physics
- I. Robinson: The watt balance: a technique for implementing the new SI definition of the mass unit
- K. Fujii: Realization of the kilogram by the XRCD method
- Zhang Zhonghua: A new generation joule balance with electromagnet at the NIM
- K. Marti: (Surface science for mass artefacts)
- S. Davidson: Air-vacuum transfer; establishing traceability to the new kilogram
Contents

• S. Guelatti-Khélifa: Precise determination of the ratio $h/m$: a way to link Avogadro project to watt balance
• L. Nielsen: Dissemination, mass scale and CMCs after the redefinition of the kilogram
• E. de Mirandés: The BIPM ensemble of reference mass standards
• R. Davis: Pilot Study for an on-going BIPM Key Comparison
• M. Stock: Redefinition of the kilogram: ensuring continuity between the definitions based on the International Prototype of the Kilogram and on the Planck constant
Special issue of *Metrologia*

Missing:

Paper about additional methods, e.g. volt balance

Proposed: Gordon Shaw (NIST)

Time schedule

- Feb. 2015: Abstract or content list, title, co-authors
- Early 2016: Submission
Walter Bich reviews the Situation with the CCM Conditions
Status of Planck Constant Determination

Results of

- NRC: \(1.8 \times 10^{-8}\) rel. unc.
- IAC: \(2.0 \times 10^{-8}\) rel. unc.
- NIST-3: \(5.6 \times 10^{-8}\) rel. unc.

Birge ratio: 1.45

- NRC: \(1.8 \times 10^{-8}\) rel. unc.
- NMIJ: \(3 \times 10^{-8}\) rel. unc.
- PTB: \(3 \times 10^{-8}\) rel. unc.

Birge ratio: \(<1\), but NMIJ and PTB are correlated (about 20%)
CCM WGR-kg: Membership

New members

- NPL
- KRISS
- Personal member: Leonid Vitushkin (VNIIM)
Next meeting of the CCM WGR-kg
Friday 8 July 2016 in Ottawa, Canada,
satellite meeting of the CPEM 2016
Thank you very much for your attention!

Questions?

Comments?