CCM Report to the 25th CCU meeting
September 2021

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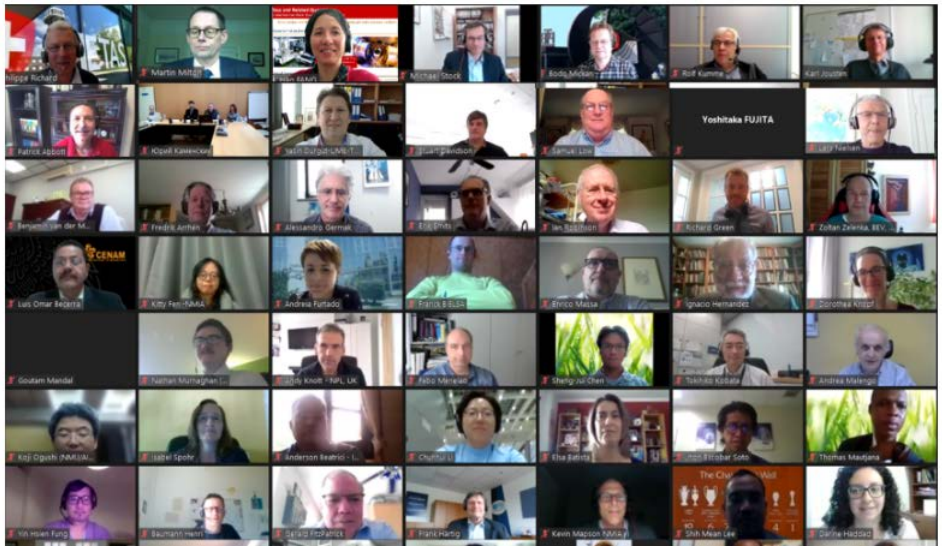
CCM

The CCM

Consultative Committee for Mass and Related Quantities

25 members and 4 observers, 8 Working Groups

Mass, force, torque, pressure, vacuum, density, viscosity, hardness, fluid flow and gravimetry



last meeting (18th meeting)
20 to 21 May 2021
86 participants

next meeting (19th meeting)
25 to 26 May 2023

Redefinition of the kilogram

CCM Recommendation G1 (2017)

- An internationally coordinated dissemination from the NMIs with realization experiments and the BIPM
- Dissemination based on the so-called “Consensus Value” as a common basis to ensure the continuity, temporal stability and equivalence of the mass unit
- Until dispersion in values between realization experiments becomes compatible with their individual uncertainties

Dissemination phases

Phase	Time scale	Description	Source of traceability	Uncertainty of BIPM mass calibrations	Role of realization experiments	Dissemination of mass from NMIs with realization experiments
0	Until 20 May 19[1]	Traceability to the IPK	$m_{\mathrm{IPK}} \equiv 1$ kg $u_{m_{\mathrm{IPK}}} \equiv 0$	$u_{\mathrm{stab}}(t)$	Measurement of h	Dissemination from national prototype traceable to IPK
1	20 May 19 - date 1[2]	Traceability to the Planck constant via the IPK, with additional uncertainty from the (new) definition	$m_{\mathrm{IPK}} = 1$ kg $u_{m_{\mathrm{IPK}}} = 10\ \mu$g	$\approx \sqrt{u^2_{m_{\mathrm{IPK}}} + u^2_{\mathrm{stab}}(t)}$	Contribute to Key Comparison (KC), improve and resolve discrepancies	Dissemination from national prototype traceable to IPK, with 10 µg added uncertainty
2	date 1 – date 2[3]	Traceability to the Planck constant, dissemination from a consensus value[4] (CV)	Consensus value (CV)	$\approx \sqrt{u^2_{\mathrm{CV}} + u^2_{\mathrm{stab}}(t)}$	contribute to CV (via KC), improve experiments and resolve discrepancies	Dissemination from consensus value with uncertainty $\approx \sqrt{u^2_{\mathrm{CV}} + u^2_{\mathrm{stab,NMI}}(t)}$
3	from date 2	Traceability to the Planck constant, dissemination by individual realizations	Fixed value of h $u(h) \equiv 0$	(Uncertainty of BIPM realization experiment)	Realization of the unit of mass, Participation in KCs to demonstrate equivalence	Dissemination from validated realization experiments with the uncertainty of the experiment. The terms of the CIPM MRA are applicable.

Table 1: The four phases necessary for the reliable transition from the IPK to independent NMI realizations of the unit of mass

1 20 May 2019 = implementation date of revised SI.

2 date 1 = CCM approval of the consensus value resulting from the first KC of realization experiments after the implementation of the revised SI, expected Q1 2020.

3 date 2 = CCM decision that dissemination from consensus value no longer necessary, because dispersion of calibration results from validated primary realization experiments is compatible with their individual uncertainties.

4 CV (Consensus value). The consensus value (CV) will be managed by a CCM task group to ensure stability and continuity, taking all new realizations and comparisons into account and advising the CCM should it become clear that a consensus value is no longer required.

Important information related to the kilogram (I)

- The final report of the first Comparison of kilogram realizations CCM.M-K8.2019 is published.
- The first Consensus Value for the dissemination of the kilogram was calculated by the CCM Task Group CCM-TGPfD-kg in December 2020.
- The dissemination of the kilogram entered in Phase 2 on 1st February 2021.
- The update of the CMCs of 31 NMIs to account for the uncertainty in the Consensus Value was completed on 2 June 2021.

Important information related to the kilogram (II)

- Major documents
  - final report of CCM.M-K8.2019
  - Calculation of the Consensus Value for the Kilogram 2020
  - Report on the Calculation of the CCM Consensus Value for the Kilogram 2020
- Next KC of kilogram realizations
  - September to December 2021: measurement of travelling standards at NMIs
  - January – March 2022: comparison measurement at BIPM
  - June 2022: Draft A report
  - September 2022: Final Report

Thank you!

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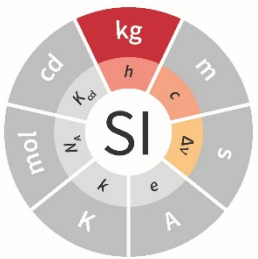

Bureau International des Poids et Mesures