

Towards the replacement of the last artifact

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Bureau
International des
Poids et
Mesures



Mass and Related Quantities



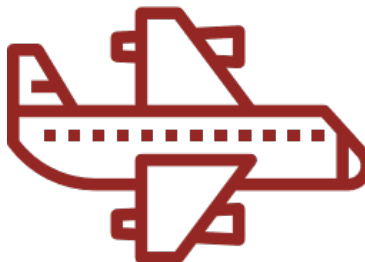
Health



Energy



Fair trade



Safety



The last artifact



The kilogram is the unit of mass; it is equal to the mass of the international prototype of the kilogram (IPK)

- Unique
- Only 1 kg
- Stability cannot be checked
- Possible damage and contamination

Time for change has come

About the need for a change

... Alone among the three fundamental quantities of mechanics, [the unit of] mass will still rely on an artefact standard: the [IPK] made of an alloy of platinum and iridium, conserved at the Pavillon de Breteuil. Without even mentioning one of the cataclysmic disasters now haunting our world, and which would vaporize the IPK,

it must be said that its invariability is something of a miracle.

In practice, it is only used rarely for fear of altering it. This is a weakness of the Metric System to which metrologists must sooner or later provide a remedy.

Report of CIPM President, Mr A. Danjon, to the meeting of the 11th CGPM, 1960, p. 25.

The main activities of the CCM

CCM: Consultative Committee for Mass and Related Quantities



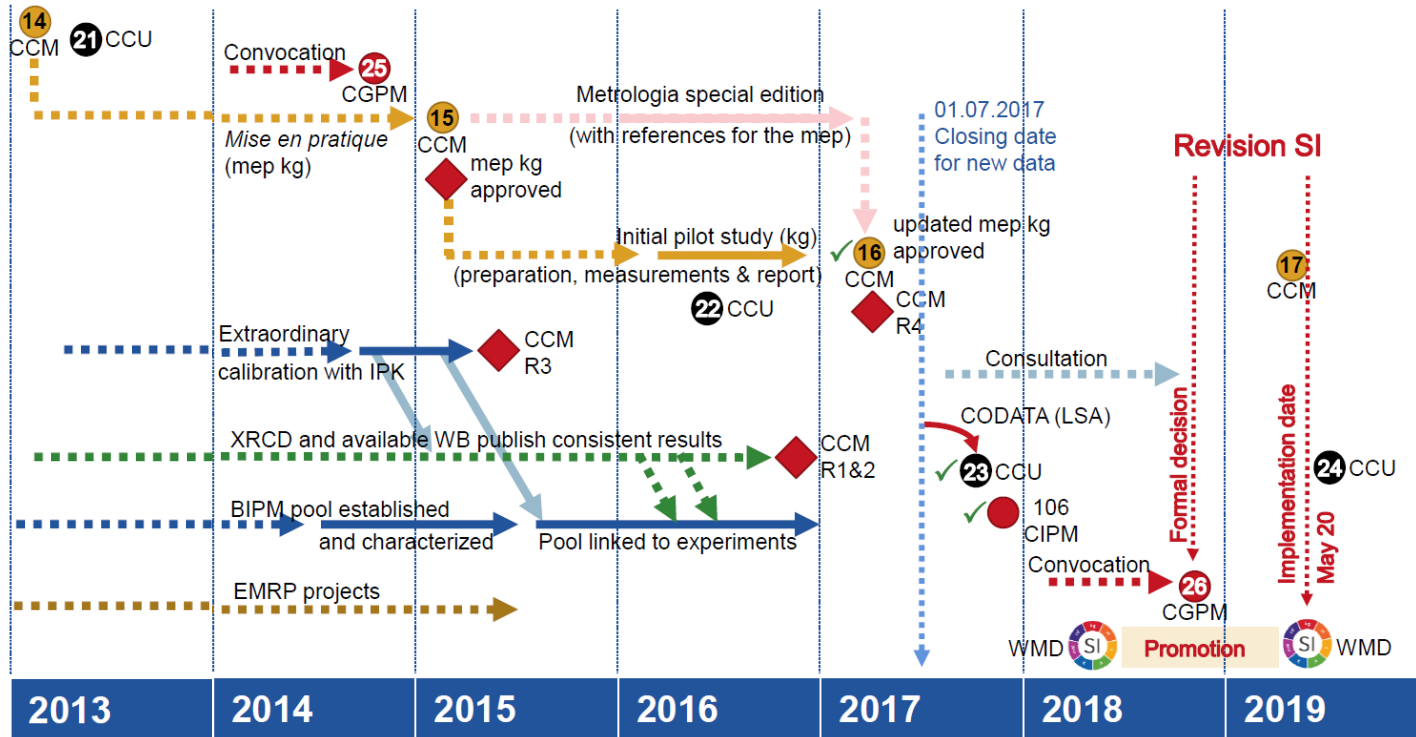
CCM

- Roadmap
- Conditions
- Recommendations
- Mise en pratique
- Strategy
- CIPM MRA review

23 members, 6 observers and many experts

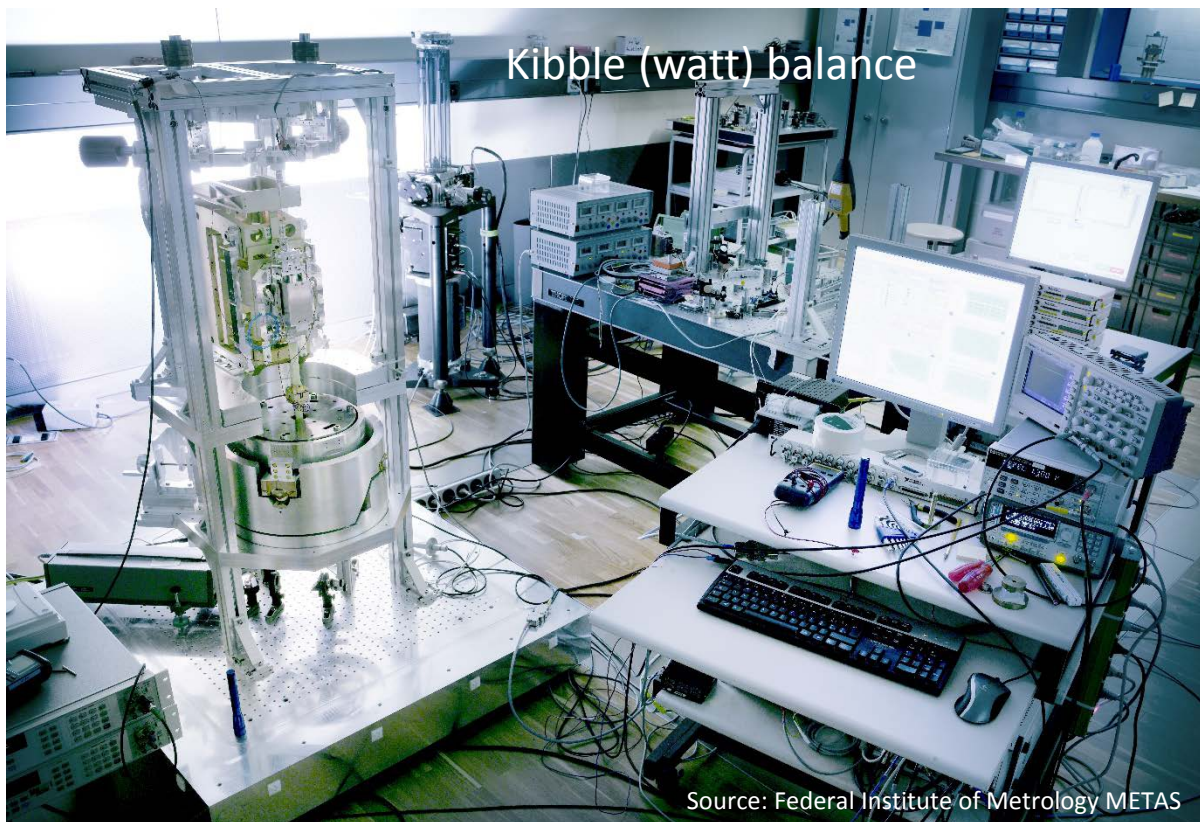
Mass, force, torque, pressure, vacuum, density, viscosity, hardness, fluid flow and gravimetry

Progressing towards the state-of-the-art



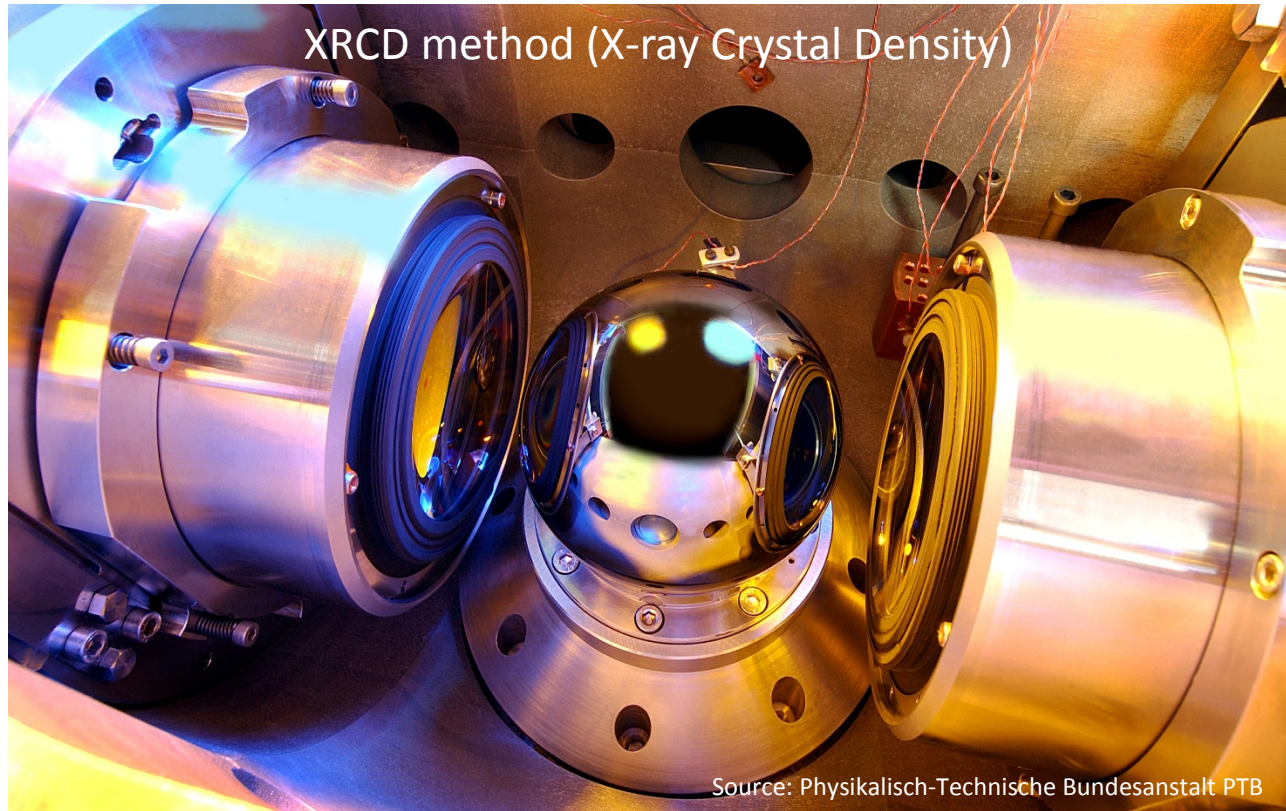
◆ Conditions from CCM Recommendation G1 (2013)

Experimental determination of h



The Planck constant
 $h = 6.626\,070\,15 \times 10^{-34} \text{ J s}$

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CCM quality check for the redefined kilogram

 Consistency

 Uncertainty

 Traceability

 Validation

Facilitate open dialogue with stakeholders

CCM actions during the last years:

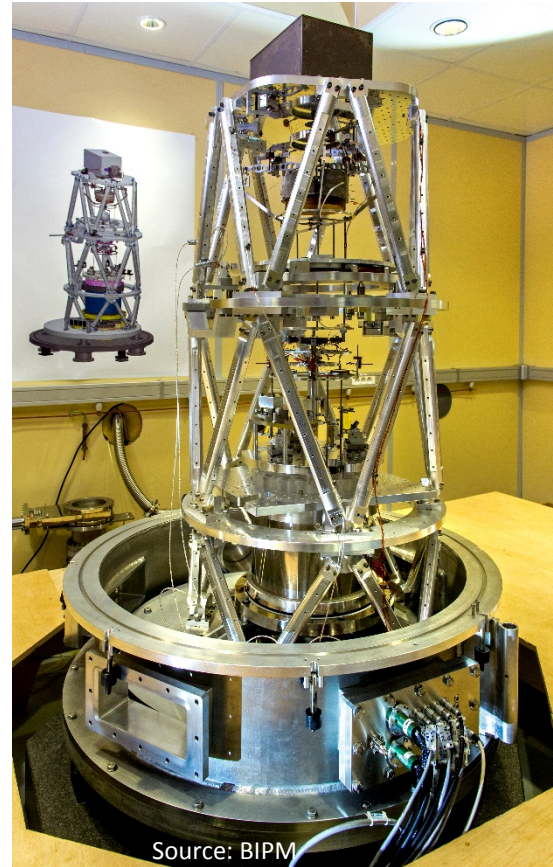
- ◆ Active consultation and communication about the changes to come (meetings, website, newsletter CCM *e-News*)
- ◆ Invited talks and keynote at conferences and in the regions
- ◆ Publication of a Metrologia focus issue on *Realization, Maintenance and Dissemination of the Kilogram*
- ◆ Information for users about the proposed revision of the SI (BIPM website)



Important work at the BIPM

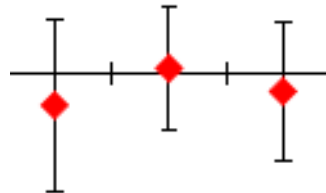
- ◆ The CCM thanks the BIPM for the strong support of the CCM activities and especially those related to the redefinition of the kilogram
- ◆ The CCM supports the BIPM Work Programme 2020-2023
- ◆ The CCM congratulates the BIPM for the excellent results obtained recently with the BIPM Kibble (watt) balance

The BIPM Kibble (watt) balance is the balance of the member states

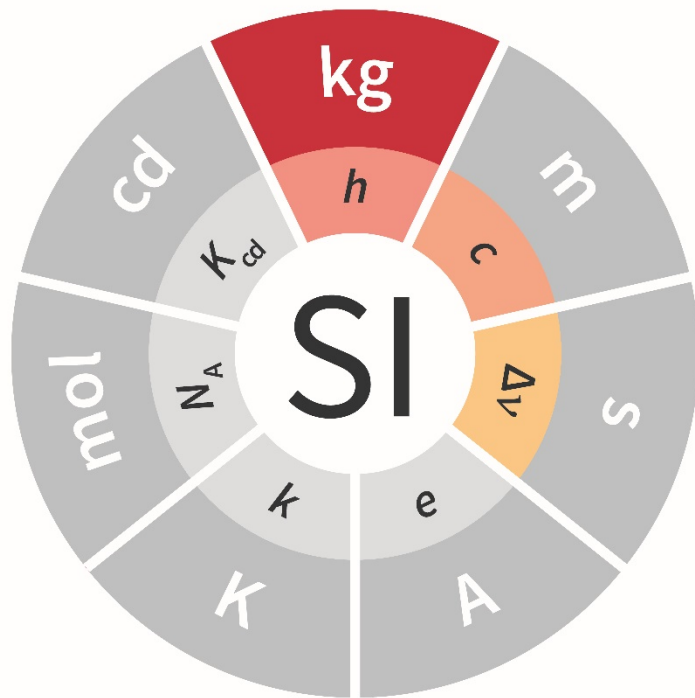


Global comparability of measurements

- ◆ The CIPM MRA improved the global comparability of measurements in the numerous fields of the CCM
- ◆ CCM established guidance documents for supporting the key comparisons and the CMC submission and review
- ◆ The CCM worked with all the regions in the context of the CIPM MRA
- ◆ A calibration campaign with the IPK was performed at the BIPM prior to the redefinition
- ◆ The first comparison of the future realization experiments is being organized



Outlook



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