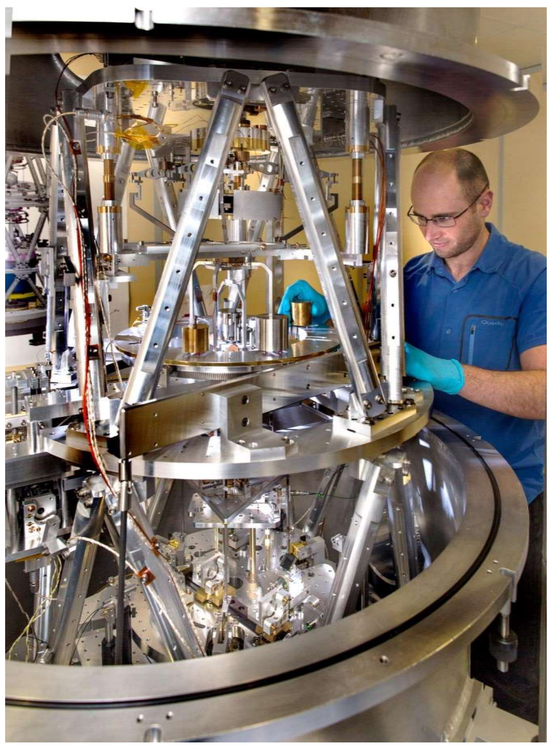
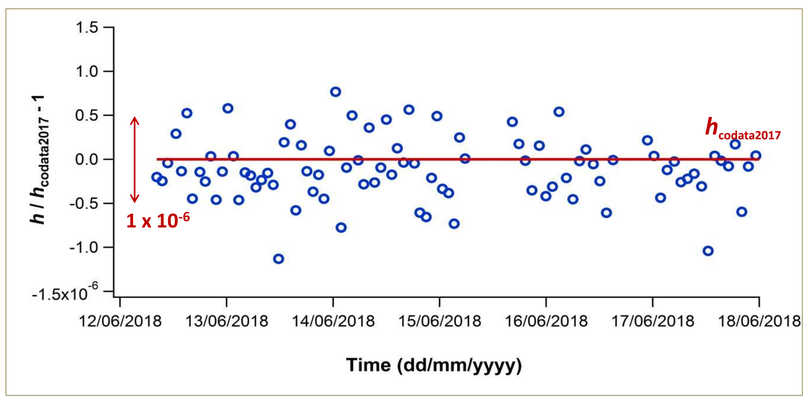
Mass metrology at the BIPM

The BIPM Kibble/watt balance to realize the new definition of the kilogram on a long-term, cost-shared basis

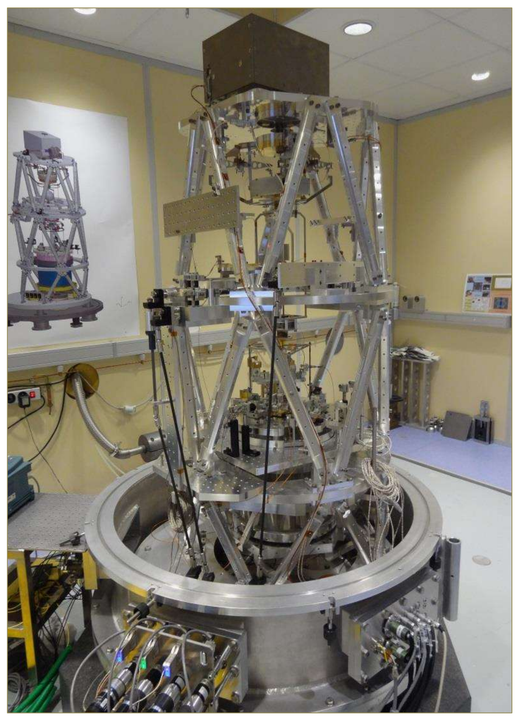


Preparing the Kibble balance for a series of measurements

- Since mid-2018 operating at the level of a few parts in 10^7, with further improvements planned
- Target uncertainty ≈ 2 parts in 10^8, allowing calibration of a 1 kg mass to within 20 µg
- Can operate in three different measurement schemes to investigate systematic errors



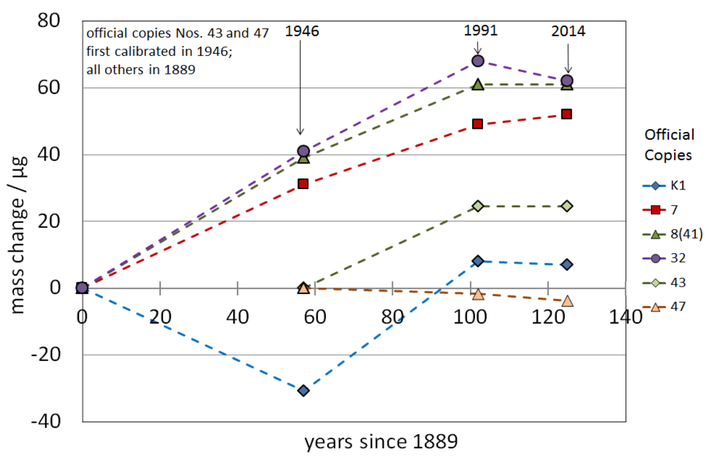
Series of Planck constant determinations with the BIPM Kibble balance during 6 days



Kibble balance without vacuum chamber

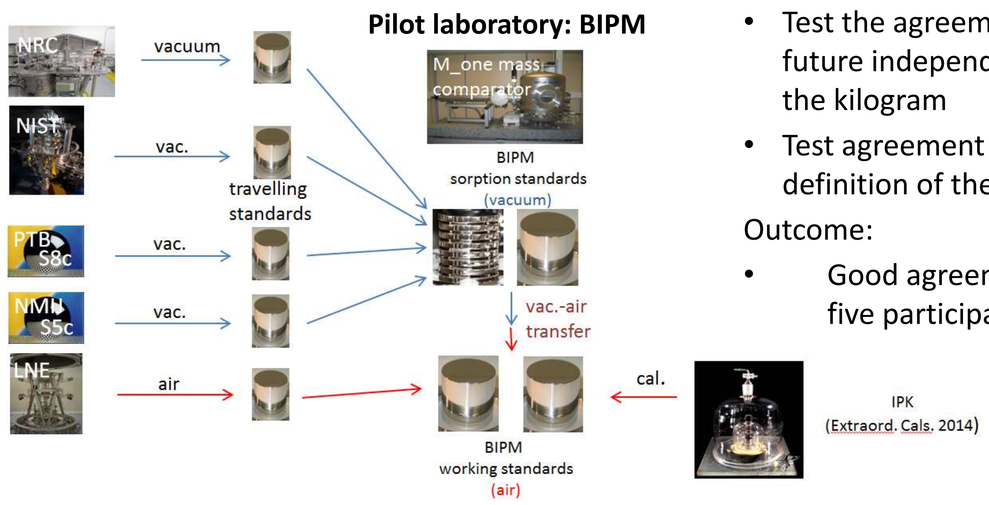
Kibble balance with vacuum chamber closed

Extraordinary Calibrations using the IPK



Ensuring continuity between present and revised kilogram

The CCM pilot comparison of future realizations of the kilogram

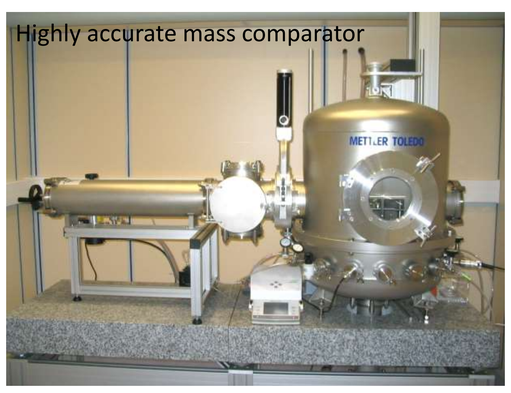


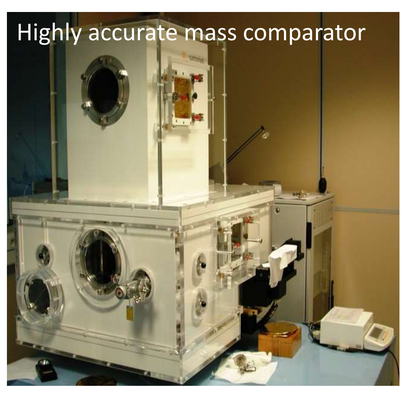
- Test the agreement between future independent realizations of the kilogram
- Test agreement with previous definition of the kilogram

Outcome:

- Good agreement between five participants and with IPK

Mass calibrations for NMIs, in air and under vacuum





Typical calibration uncertainty : 5 micrograms

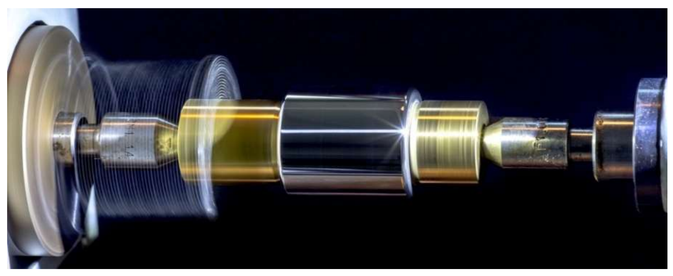
The BIPM ensemble of reference mass standards

Providing a stable mass reference for

- comparisons between independent realizations of the kilogram made at NMIs
- Internationally coordinated mass dissemination during transition phase
- calibrations for NMIs without realization experiments

Provision of Pt-Ir 1 kg national prototypes for Member States

The BIPM has provided the majority of the Member States with one or more 1 kg Pt-Ir prototypes and continues to do so. Up to now, more than 110 prototypes have been fabricated for 42 Member States and the BIPM.



1 kg Pt-Ir prototype at the final polishing stage in the BIPM workshop

1 kg Pt-Ir prototype in its travel container

1 kg stack of 8 Pt-Ir disks fabricated at the BIPM