Update from the BIPM Director

16th October 2020
Dr Martin Milton
BIPM Director
Members and Associates

- 62 Member States* and
- 40 Associates of the CGPM

*States Parties to the Metre Convention; the term "Member States" is its synonym and used for easy reference.
Members and Associates

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- 40 Associates of the CGPM
  (States and Economies)

*The official term is “States Parties to the Metre Convention”; the term “Member States” is its synonym and used for easy reference.

262 Institutes
- 102 National Metrology Institutes
  - 61 Member States
  - 41 Associates
- 4 International organizations
  (ESA, IAEA, JRC, WMO)
- plus 156 Designated Institutes

1,613 comparisons
1039 KCs, 574 SCs
25,242 CMCs
Peer-reviewed declarations
“Metrology in the fight against Covid-19”

- In April, the CIPM President invited NMIs to share examples of how their work is supporting the fight against the pandemic.

- The responses received from the NMIs are listed on the BIPM website: https://www.bipm.org/en/worldwide-metrology/covid-19-metrology.html

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www.bipm.org
All meetings held on-line

All meetings have been held on-line since March, using Zoom and Cisco Webex platforms.

Total - 100 meetings for Working Groups for a total of 2175 participations.
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‘Ensuring the reliability of measurements in response to the COVID-19 pandemic’ (200 participants)

www.bipm.org
How reliable is Covid-19 testing?

**SARS-COV-2**

**Monoclonal Antibody quantification**

Coordinating labs: NIM, NRC, BIPM

**Surface Spike glycoprotein**

**SARS-CoV-2**

**RNA copy number quantification**

Coordinators: LGC, NIM, NIBSC, NIST

Measurand 1:
Copy number concentration
Nucleocapsid (N) gene partial sequence

Measurand 2:
Copy number concentration
Envelope (E) gene full sequence
How to compare clocks to better than $1 \times 10^{-16}$?

Frequency standards in TAI

www.bipm.org
How to compare clocks to better than $1 \times 10^{-16}$?

**Frequency standards in TAI**

**Time transfer for TAI**

**IPPP**: GNSS precise point positioning with integer ambiguities

$1 \times 10^{-16}$ in ~7 days; **Light, low cost, worldwide coverage**

**TWSDR**: Improved Two-way time transfer

$1 \times 10^{-16}$ in ~10 days; Significant equipment, visibility limits

**VLBI**: Very long baseline interferometry

$1 \times 10^{-16}$ in ~several days; Heavy equipment, visibility limits

**Optical fibres**: $1 \times 10^{-18}$ in hours; Large infrastructure needed!

Pizzocaro et al. *Nat Phys* 2020 - authors from NICT-INRIM-INAF-BIPM
The BIPM Kibble balance

Very significant progress in 2019-2020

- New interferometer, firmly mounted on magnetic circuit
- Improved electrical grounding
- Optimized measurement sequence
- Revised control software
- Improved data processing

Standard uncertainty for calibration of 1 kg mass standards now 0.049 mg
World Metrology Day 2020

“Measurements for global trade”

- Partner RMO is AFRIMETS
- Posters in 20 languages
- Events in 23 countries

http://www.worldmetrologyday.org/links.html

World Metrology Day 2021 theme will be ‘Measurement in health’
Partner RMO is GULFMET, Partner NMI is SASO
On-line Capacity-Building webinars

New on-line courses

“KCDB 2.0” – On-line short course  
Typically 9 hours over 3 days

“KCDB 2.0” – On-line technical exchange  
Typically 90 minutes in two different time zones

Six webinars involving >300 NMI staff since May 2020
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New e-learning to be launched in 2021

• Five course models being prepared
• Collaboration with OIML to use their specialized e-learning web software
New **Digital Transformation** projects

- The CIPM have a long-term aim to establish a framework for documents and data that are “FAIR”.

- “Conventional calibration certificates could soon become history”

- Digital Calibration Certificates (DCC) will be widely used.
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Machine readable access to the KCDB
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First xml version of the SI Brochure

www.bipm.org
New **Digital Transformation** projects

Both projects will be beta-tested with user groups in November

Machine readable access to the KCDB

First xml version of the SI Brochure
Outcomes of the 2016 to 2019 Work Programme

- 560 Participation in comparisons coordinated by the BIPM
- 492 Calibrations certificates and Study notes issued by the BIPM
- 51 Participation in Laboratory-based CBKT (25 placements at the BIPM)
- 427 Participation in Workshop-based CBKT activities of the BIPM
- 80/59 Participation in the TIME comparisons (Circular T/ UTCr)
- 58 WP Secondees assisted to deliver the Work Programme projects
BIPM Actions during confinement

- We have sustained all key activities
  - eg Circular-T, World Metrology Day, launch of KCDB2.0
- We have brought forward some activities in the WP
  - eg automation of data handling in SIR, on-line technical exchange/capacity building
- We are working to understand how we can best NMIs them as the “new normal” emerges.
  - eg the NMI “COVID action” repository, the CCQM COVID pilot studies
- We are developing new ways to support the CCs on-line
  - eg 50 Webex video meetings for CCQM and new schedules/webinars for the CCTF.
- We are now back to 100% operational efficiency whilst incorporating necessary health protection measures.
Thank you

Annual Review 2019/2020
Visit their website for more information:
https://www.thelastartifactfilm.com/
Charles-Édouard Guillaume (1861-1938)

- He was born into a watchmaking family in Fleurier, Switzerland.
- He dedicated more than half a century to metrology through his work at the BIPM.
- In 1915, he became Director of the BIPM, until his retirement in 1936.
- He was awarded the Nobel Prize in Physics in 1920 "in recognition of the service he has rendered to precision measurements in Physics by his discovery of anomalies in nickel steel alloys".