Report from the BIPM Director

“Plans for the 150th anniversary of the signature of the Metre Convention”

Dr Martin MILTON
20th October 2023
Members and Associates (May 2023)

- **64 Member States** and
- **36 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.

251 Institutes participating in the CIPM MRA
- 97 National Metrology Institutes + 3 Ministries
  - 64 Member States
  - 36 Associates
- 4 International organizations
  (ESA, IAEA, JRC, WMO)
- plus 150 Designated Institutes

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Laboratory highlights - Chemistry

New comparison services and reference data for chemical standards

Carbon dioxide (CO$_2$) in air standards: On-demand comparisons

- BIPM reference facility validated (CCQM-P225)
- New on-demand comparison service for NMIIs (2024)
- Supports global and national initiatives to verify GHG emissions

Organic Standards

- 8th qNMR internal standard document available (for Benzoic acid)
- Ensemble for purity assignment of all small organic materials
- Supports CRM development at NMIs
Highlights - Traceability for Laboratory Medicine

JCTLM database

- Lists NMIs services for laboratory diagnostics and supports regulatory requirement for traceability.
- New version of database released (October 2022) and Application Programming Interface released (April 2023).

Funding found for new web interface to be developed in 2024

- 70 000 € raised in 2023 from nine NMIs - KRISS, HSA, NIST, NIM, NMIA, LGC, PTB, IFCC, ICSH
Laboratory highlights – Ionising radiation

Renewed standard

- New primary standard for medium-energy x-rays tested and validated.

Expanded services

- Establishment of the KCRV and comparisons in $^{137}$Cs beam by the BIPM using the facility at the IAEA (Seibersdorf, Austria)
- Validation of the extension of the SIR and definition of 11 radionuclides to open the ESIR K5 comparison in 2024.
- Metrological scheme established for the RMO copies of the SIRTI to increase the number of short-lived radionuclides comparisons.

Support CCRI & member states

- 10 bilateral comparisons, 17 comparison reports, 40 calibrations
- 5 webinars, 3 workshops, 14 CCRI& WG/TG meetings
- Creation of the CCRI Digital Transformation TG (chaired by IR Dept)
Highlights - increasing participation by optical clocks in UTC

The new computational mode takes account of 483 correlations. A step towards a new optical definition for the second.

Primary and Secondary frequency standards reported to Circular-T. (Heavy dots indicate evaluations carried out within the month of computation)

- Optical
  - Rb fountain
- Cs fountain
- Cs beam

As shown at the CGPM in 2022

https://webtai.bipm.org/database/show_psfs.html
Highlights - increasing participation by optical clocks in UTC

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As shown at the CGPM in 2022.

[Graph showing participation of optical clocks in UTC with primary and secondary frequency standards reported to Circular-T.]

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Laboratory highlights – Physical metrology

Completion of the second key comparison of kilogram realizations

Realization of the kg using the Kibble balance and XRCD methods

BIPM Kibble balance participated with an uncertainty of 41 µg

Roadmap addressing the lack of agreement under development by CCM

Calculation of the second consensus value – basis for the dissemination of the kg since 1 March 2023

New e-learning courses on e-learning.bipm.org
  • Realization of the kilogram (53 users)
  • Dissemination of the kilogram (73 users)
Laboratory highlights – Physical metrology

Upgrading on-site comparisons of quantum standards for voltage and resistance

Improved 1 Ω standard resistors for comparison of quantum Hall resistance standards (BIPM.EM-K12)

(Present limitation: low-frequency dependence of 1 Ω resistors: dc value not well defined)

Collaboration with PTB and NMJ on development and characterization of new resistors

3 mHz, frequency of BIPM measurement
Laboratory highlights – Physical metrology
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New comparison scheme for AC voltage with voltage quantum standard BIPM.EM-K10

Successful pilot study at KRISS 08/2023

At 62.5 Hz: \( U(\text{KRISS}) - U(\text{BIPM}) = 5 \text{ nV} \)
Laboratory highlights – Physical metrology

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Recent survey of NMI requirements

- 24 more NMIs interested in on-site comparison of JVSs (dc and/or ac)
- 15 more NMIs interested in on-site comparison of QHR standards

At 62.5 Hz: $U_{\text{(KRISS)}} - U_{\text{(BIPM)}} = 5$ nV

3 mHz, frequency of BIPM measurement

No defined dc value

Current reversal cycle time (s)

KRISS 2023
Communication and liaison with International Organizations
Promoting metrology to external communities

➢ 203 prerecorded presentations/posters
➢ 1078 participants

Report Published in June 2023
➢ 81 technical issues identified
➢ 126 recommendations to address these
➢ CIPM STG-CENV coordinating

BIPM/NMIs contribution to Session on Standard needs for an Operational Global Network

➢ Opens opportunity to progress workshop theme on ‘Metrology as an integral component of operational systems to estimate greenhouse gas emissions based on accurate measurements and analyses’
➢ Requirements identified for NMI Greenhouse Gas Standards for newly developing monitoring networks
Communication and liaison with International Organizations
Promoting metrology to external communities

Climate Change
BIPM an official observer to UNFCCC at COP28 in November 2023
Fact-finding mission, maybe opportunity to participate in side events!

Digitalization
Joint Statement of Intent on the SI Digital Framework

Promoting metrology for solving global challenges in line with the CIPM strategy!
Communication and liaison with International Organizations
Promoting metrology to external communities

World Metrology Day – 20th May 2023
- The theme related to the food production system
- Poster designed by the Instituto Nacional de Tecnología Industrial (INTI), Argentina (in association with SIM)
  - Translations into 62 local poster versions
  - Events listed in 66 countries

UNESCO recognition of World Metrology Day
- On 13 October 2022 the UNESCO Executive Board took a key step towards recognizing World Metrology Day as a UNESCO event.
- Proposal formally presented by Kazakhstan and supported by the BIPM and OIML.
- Written support from 43 UNESCO Member States.
- We strongly expect formal recognition in 2024 at the UNESCO General Conference.
Examples of non-members participating in World Metrology Day 2023

Bahrain

Takjikistan

Nigeria

Haiti
Liaison with the International Telecommunications Union

Steps taken with ITU towards continuous UTC.

In 2020 an MoU was signed between ITU-R and BIPM –

- ITU-R Director and delegates participated to the CGPM 2022
- BIPM collaborated with ITU-R to organize a special session at the 2nd ITU Inter-regional workshop on Definition of time scale and dissemination of time signals via radiocommunication systems (Res. 655 (WRC-15)) in Nov 2022
- BIPM collaborated with ITU-R to produce a special issue of ITU News on The future of Coordinated Universal Time (April 2023)
- BIPM hosted a meeting of the ITU-R WP7A dealing with time signals and frequency standard emissions, in June 2023
- Networking continues with national and regional ITU delegations to explain Res 4 (CGPM 2022) and the upcoming discussion and the ITU World Radio Conference in Nov 2023

Liaison with IERS

- Need of robust services disseminating UT1-UTC
Capacity Building and Knowledge Transfer
Collaboration with all six RMOs

**CBKT participation by RMO**

Data from Nov 2016 to Nov 2022.

**Thanks for support from:**
- METAS, Switzerland
- NIM, China
- NIST, USA
- NMISA, South Africa
- NPL, United Kingdom
- PTB, Germany
- SCL, Hong Kong, China
- TÜBITAK UME, Türkiye
- IEEE, USA

Plus
- All the RMOs
BIPM/RMO forum - supporting the RMO Secretariats

Day 1: Participation in BIPM activities
Day 2: Gaining familiarity with the BIPM website, KCDB, CBKT and communication tools
Day 3: Emerging interactions

21 Participants from 6 RMOs
RMO Secretariats and those who assist the RMO in various interactions with the BIPM.

27 to 29 September 2023

RMO Toolbox indexing:
- Membership
- CIPM MRA
- Communications
- CBKT
- Digital Transformation
A “training platform” operated by the BIPM, able to host BIPM and RMO e-learning material

• **950 users** in the platform

• **5 RMOs** have joined the initiative: APMP, COOMET, EURAMET, GULFMET, SIM

• **19 courses** from BIPM and participating RMOs are available today

• **Self-registration** system

• **Accessible around the clock and on any device**
Joint BIPM/OIML publication D-01

joint knowledge transfer initiative - National Metrology Systems

Brochure – in 3 languages

“National metrology systems - Developing the institutional and legislative framework” (OIML D 1:2020)
Dr Anna CYPIONKA  
Director

Ms Rahima GULIYEVA 
Institutional liaison and membership  
Principal Liaison Officer

Dr Janet R. MILES 
Head of digital transformation  
Principal Liaison Officer

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Dr Janet R. MILES 
Head of digital transformation  
Principal Liaison Officer

Communications

Dr Dana VLAD  
Head of Communications  
Principal Communications Officer

Mr Robert SITTON  
Publications  
Senior Communications Officer

Ms Céline PLANCHE  
Web and translation  
Senior Communications Officer

International liaison and Communication Department

CIPM MRA and CBKT

Mr Chingis KUANBAYEV  
Head of CBKT and CIPM MRA support  
Principal Liaison Officer

Dr Stephanie MANIGUET  
KCDB coordination  
(and JCTLM for Chemistry)  
Senior Liaison Officer

Mr Ibrahim AHMED  
JCRB Executive Secretary  
Secondee (KEBS)

Mr Kangyoung SUNG  
Strategy Development and Capacity Building  
Secondee (KRISS)
Meetings and local outreach

Meetings 2023 (to date)

• 70 on-line meetings
• 37 hybrid meetings
• 5204 participations
• 8512 person-days

Heritage Days

BIPM opened on 16 and 17 September for the « Journées européennes du patrimoine ». **423 visitors** have discovered the Pavillon de Breteuil over the week-end in one of the five slots offered for the guided visits.

Since 2020, **around 1500 visitors** have visited the BIPM on this occasion.
Revenue versus expense (“budget basis”)

Revenue – increase - (due to small increase in contributions and sale of prototypes)
Expense – increase - (due to CGPM, Associate subs write off, electricity)
Expenditure .... staff

Salary costs stable in real terms (and only 1.9% above 2013 level). Secondments re-building since pandemic.
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Young metrologists’ 2050+ vision

Where do “young metrologists” think metrology will be in 2050+?

- To complement the CIPM Strategy 2030+ with visionary ideas in collaboration with young metrologists from the RMOs
  - RMO Coordinators nominated
  - Online questionnaire launched
  - Six RMO virtual workshops are planned (end of 2023-June 2024)
  - Consolidation workshop (in-person) with RMO Coordinators at BIPM HQ

Online questionnaire

Young metrologists’ 2050+ vision
RMO coordinators

AFRIMETS
Alphonsus KIPKEMBOI (Kenya)

AFRIMETS
Pritesh JIVAN (South Africa)

APMP
Oijai ONGRAI (Thailand)

APMP
Yin Hsien FUNG (New Zealand)

COOMET
Nikita ZVIAGIN (Russian Federation)

COOMET
Gulaikhan SUYEUBAYEVA (Kazakhstan)

EURAMET
Peter PAVLASEK (Slovakia)

GULFMET
Rayan ALYOUSEFI (Saudi Arabia)

GULFMET
Moza Khalfan ALMEMARI (UAE)

SIM
Rodrigo COSTA-FELIX (Brazil)

SIM
Fernando José Andrés MONGE (Costa Rica)
“thank you”