A celebration of 150 years of the Metre Convention

20-22 May 2025

Agenda

WORLD METROLOGY DAY SYMPOSIUM
150 YEARS OF THE METRE CONVENTION: SCIENCE, INNOVATION & GLOBAL IMPACT

Tuesday 20 May 2025, 10:00 to 17:15 (CEST/Paris time)
UNESCO Headquarters, Room I, Paris, France

Every year, World Metrology Day is celebrated in around 50 countries by national metrology institutes, legal metrology entities, regional metrology organizations, and other stakeholders who rely on accurate measurements to underpin business, global trade, and sustainable development. It commemorates the anniversary of the signing of the Metre Convention (Paris, 1875) and the creation of the International Bureau of Weights and Measures (BIPM).

Recognizing the significance of metrology, the 42nd Session of the UNESCO General Conference (42 C/Resolution 21) proclaimed 20 May of every year as World Metrology Day. In 2024, World Metrology Day was observed for the first time as an international day designated by UNESCO.

20 May 2025 will mark the **150th anniversary** of the Metre Convention—an especially notable World Metrology Day. To celebrate, an event hosted at UNESCO Headquarters will bring together Permanent Delegations to UNESCO, representatives of the BIPM's Member States and Associates, international organizations, scientists, students, and the general public, highlighting 150 years of metrology and the unique international collaboration under the Metre Convention.

Objectives

1. Celebrate 150 years of the Metre Convention and its impact on science and innovation.
2. Highlight the importance of accurate measurement for global trade, sustainable development, and scientific collaboration.
3. Explore emerging challenges and future directions in metrology and its role in addressing the Sustainable Development Goals (SDGs).
4. Foster multilateral dialogue among policymakers, scientists, and international organizations on capacity building and innovation in metrology.

Tuesday 20 May 2025
UNESCO Headquarters, Paris

Registration opens - 08:30
First session - 10:00 - 11:15

Opening Session

10:00 - 10:05 **Opening**

Video, 150 years of the Metre Convention

Welcome by the Master of Ceremonies

- **Ms Georja Calvin-Smith**, Journalist, France

10:05 - 10:30 **High-Level Opening Remarks**

- **Ms Lidia Brito**, Assistant Director-General for Natural Sciences, UNESCO **TBC**
- **H.E. Mr Askar Abdrakhmanov**, Ambassador, Permanent Delegate of the Republic of Kazakhstan to UNESCO
- **Dr Wynand Louw**, President, International Committee for Weights and Measures (CIPM), South Africa
- **Dr Bobjoseph Mathew**, President, International Committee for Legal Metrology (CIML), Switzerland

10:30 - 11:15

Keynote Address

The SI - a tool for all mankind

Prof. William D. Phillips, Nobel Prize laureate 1997
National Institute of Standards and Technology (NIST), USA

Tuesday 20 May 2025
UNESCO Headquarters, Paris

Second session - 11:15 - 12:45

Panel Discussion
Navigating the Future of Metrology: Addressing the challenges of Scientific and Technical Multilateralism

Video, introducing the session

Opening remarks by Moderator

- **Dr Maguelonne Chambon**, Director R&D, Laboratoire national de métrologie et d'essais (LNE), France

Panel Discussion

- **Mr Shaofeng Hu**, Director, Division of Science Policy and Basic Sciences, Natural Sciences Sector, UNESCO
- **Prof. Alessandro de Angelis**, Scientific Attaché at the Permanent Delegation of Italy to the International Organisations in Paris
- **Prof. Mustafa Çetintaş**, Director, TÜBITAK Ulusal Metroloji Enstitüsü (TÜBİTAK UME), Türkiye
- **Dr Sharonmae Smith-Walker**, CEO, CARICOM Regional Organisation for Standards and Quality (CROSQ), Jamaica
- **Dr Victoria Coleman**, CIPM member and National Measurement Institute, Australia (NMIA), Australia

12:45 - 14:30 **Lunch**

Tuesday 20 May 2025
UNESCO Headquarters, Paris

Third session - 14:30 - 15:45

150 years of international use of the Metric System

Video, introducing the session

Opening remarks by Moderator

- **Dr Fabienne Casoli**, President, Observatoire de Paris-PSL, France

Keynote address

From the Metric System to the Metre Convention

Prof. Ken Alder, Professor of History and author of "The Measure of All Things"

Northwestern University, USA

Speech "The historic contribution of China to measurement science"

- **Dr Yuning Duan**, Former CIPM member, National Institute of Metrology (NIM), China

Speech "150 years in fifteen photographs"

- **Dr Martin Milton**, Director of the BIPM

Tuesday 20 May 2025
UNESCO Headquarters, Paris

Fourth session - 15:45 - 17:15

Panel Discussion
Future challenges for global metrology

Video, introducing the session

Opening remarks by Moderator

- **Ms Georja Calvin-Smith**, Journalist, France

Scene setting address "Expanding the horizon of metrology to chemistry, biology and beyond"

- **Prof. Willie E. May**, Vice President, Research and Economic Development & Professor of Chemistry, Morgan State University, USA

Scene setting address "Metrology as a driver for the industrial revolution"

- **Dr Nathalie von Siemens**, Member of the Advisory Board, Physikalisch-Technische Bundesanstalt (PTB), Germany

Panel Discussion

including **Prof. May** and **Dr von Siemens** with:

- **Dr Pascale Defraigne**, Time and Frequency Service, Royal Observatory of Belgium
- **Prof. Venu Gopal Achanta**, CIPM member and National Physical Laboratory of India (NPLI), India
- **Dr Henry Rotich**, Kenya Bureau of Standards (KEBS), Kenya

17:00 - 17:10
Closing Note

- **Dr Takashi Usuda**, CIPM Secretary and National Metrology Institute of Japan, AIST (NMIJ/AIST), Japan

17:10 - 17:15
Closing Remarks

- **Mr Shaofeng Hu**, Director, Division of Science Policy and Basic Sciences, Natural Sciences Sector, UNESCO

Wednesday 21 May 2025
Palais des Congrès, Versailles

Registration opens - 08:00
Session 1 - 09:00 - 10:45

Metrology in the quantum era

The revision of the SI in 2019 and the progress of quantum technologies are enabling the development and implementation of quantum standards for an ever-increasing range of metrological applications. Quantum metrology relies on quantum effects to enhance precision and resolution in measurement beyond what would be possible with classical physics. Quantum metrology also provides the means to create inherent quantum standards – that do not require calibration – and that can be direct realizations of the units of the SI, based on fundamental constants. Such standards may allow access to primary realizations to users outside the National Metrology Institutes.

Convenor: Dr Michael Stock, BIPM

09:10
Ms Barbara Goldstein, National Institute of Standards and Technology (NIST), USA
The interplay between quantum, metrology and technology

09:35
Prof. Lixing You, Shanghai Institute of Microsystem and Information Technology, China
Superconducting photon detector: from quantum information processing to metrology

10:00
Panel discussion

Moderator: **Prof. Jan-Theodoor Janssen**, CIPM member and National Physical Laboratory (NPL), UK

Panelists: **Ms Goldstein** and **Prof. You**

Dr Jifeng Qu, CIPM member and National Institute of Metrology (NIM), China

Dr Nicolas Spethmann, Physikalisch-Technische Bundesanstalt (PTB), Germany

10:45 - 11:15 **Coffee**

Session 2 - 11:15 - 13:00

Metrology for climate science

Accurate measurement is the basis for scientific knowledge on climate science, its impacts and future risks. This session is devoted to the application of metrology to global climate and environment challenges. It will focus on initiatives taken since the BIPM-WMO Workshop on "Metrology for Climate Action" developed a consensus on recommendations to increase the impact of metrology and metrology institutions on climate data.

Convenor: Dr Robert Wielgosz, BIPM

11:20
Dr Oksana Tarasova, WMO - World Meteorological Organization (WMO)
Development of a Global GHG Monitoring System

11:45
Mr Mahesh Kumar Sha, Royal Belgian Institute for Space Aeronomy (BIRA-ISAB), Belgium
Fiducial Reference Measurement for GHG

12:10
Panel discussion

Moderator: **Dr Dolores del Campo Maldonado**, CIPM member and Centro Español de Metrología (CEM), Spain

Panelists: **Dr Tarasova** and **Mr Sha**

Dr Leonard Rivier, Integrated Carbon Observation System (ICOS)

Dr Sangil Lee, Korea Research Institute of Standards and Science (KRISS), Republic of Korea

13:00 - 14:15 **Lunch**

Wednesday 21 May 2025
Palais des Congrès, Versailles

Session 3 - 14:15 - 16:00

The FAIR digital revolution

In its long-term strategy, the CIPM has highlighted "digital transformation" as one of the key challenges for the coming decades. Indeed, the world is becoming increasingly digital with the emergence of Industry 5.0 based on the *Internet of Things* involving the rapid exchange of data from machine to machine. This is creating a growing need for interoperability and traceability of measurement data, in line with the FAIR principles. This traceability will be based on the SI digital framework and will be disseminated to all applications via NMI data services.

Convenor: Dr Vincent Gressier, BIPM

14:20
Dr Barend Mons, Leiden University, the Netherlands
Stop Data Sharing…

14:45
Dr Mark Allen, Strasbourg Astronomical Data Center (CDS), France
FAIR digital data in astrophysics

15:10
Panel discussion

Moderator: **Prof. Cornelia Denz**, CIPM member and Physikalisch-Technische Bundesanstalt (PTB), Germany

Panelists: **Dr Mons** and **Dr Allen**

Dr Peter Thompson, National Physical Laboratory (NPL), UK

Prof. Venu Gopal Achanta, CIPM member and National Physical Laboratory of India (NPLI), India

16:00 - 16:30 **Tea**

Wednesday 21 May 2025
Palais des Congrès, Versailles

Poster preview session

16:30 to 17:45

Convenor: Dr Edgar Flores Jardines, BIPM

More than 350 posters were submitted following an open invitation to show the state-of-the-art in nine areas of metrology that were highlighted in the CIPM Strategy 2030+.

In this session, the authors of nine outstanding posters selected by a panel of CIPM members will give two-minute presentations of their papers. An additional tenth poster has been selected from the contributions to the "Young Metrologists' Vision 2050+", a foresight exercise that brought together young metrologists from around the world.

All of the posters are on display on the anniversary website and the outstanding papers will be displayed at the Palais de Congrès.

Introduction by Mr Hans Arne Frøystein, CIPM member and Justervesenet (JV), Norway

The 'light fingerprint' of rubidium for precise atomic clocks
Ms Dorothy Mringie, State Department of Trade, Kenya

Isotopic measurements for energy transition to low-carbon fuels
Dr Kai Fuu Ming, National Metrology Centre, Agency for Science, Technology and Research (NMC, A*STAR), Singapore

Standardisation of measurements of neurodegenerative disease biomarkers: the neurobiostand project
Dr Chiara Giangrande, Laboratoire national de métrologie et d'essais (LNE), France

Transforming food and water safety with innovative nanoscale plastic reference materials
Dr Adrian Pegoraro, National Research Council of Canada (NRC), Canada

Collaborative metrology efforts for sustainable energy solutions in the Asia-Pacific
Dr Oijai Ongrai, National Institute of Metrology Thailand (NIMT), Thailand

Enabling the recycling of technology critical elements from e-waste through metrology
Dr Sarah Hill, LGC Limited, UK

On the path to quality assurance of trustworthy AI in medicine: the metric-framework for systematically assessing medical training and test data
Dr Daniel Schwabe, Physikalisch-Technische Bundesanstalt (PTB), Germany

Towards an easier realisation of the ohm with the quantum anomalous Hall effect
Dr Martina Marzano, Istituto Nazionale di Ricerca Metrologica (INRIM), Italy

Building the next generation of metrologists: opportunities to improve SI education and scientific literacy at 150 years and beyond
Ms Elizabeth Benham, National Institute of Standards and Technology (NIST), USA

Perceptual Metrology: A Future Frontier in Human Well-Being
Mr Cristhian Alfredo Paredes Cardona, Instituto Nacional de Metrología (INM), Colombia

Wednesday 21 May 2025
Palais des Congrès, Versailles

Reception

17:45

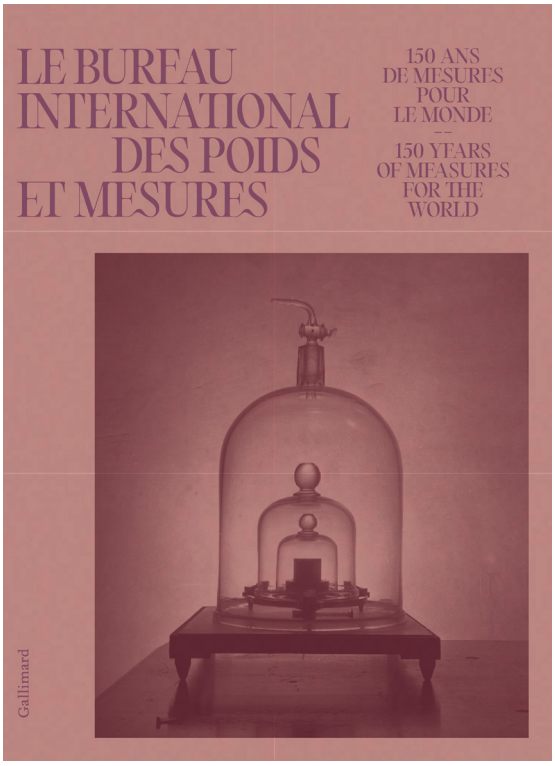
Happy Birthday to the BIPM!

Join us in the Palais des Congrès for a reception to celebrate the 150th anniversary of the signing of the Metre Convention.

Book launch

« Le Bureau International des Poids et Mesures: 150 ans de mesures pour le monde / 150 years of measures for the world »

This new book, written to celebrate the anniversary, will be launched at the reception.



Thursday 22 May 2025
Palais des Congrès, Versailles

Session 4 - 09:00 - 10:45

New science and the definition of the second

The field of time metrology has always advanced rapidly based on the outcomes of leading-edge research into the performance of atomic clocks. Since 1967, the definition of the SI second has relied on quantum physics and is based on the caesium atom resonance frequency in the microwave domain. The capabilities of optical clocks have now surpassed the current performance of caesium, leading to debates initiated by the CCTF on a new definition based on optical frequency standards. Researchers are also exploring clocks based on nuclear transitions. This session will feature some of the latest advances made in the precision of optical clocks and the techniques for their comparison that offer the possibility for a new definition for the second.

Convenor: Dr Patrizia Tavella, BIPM

09:05
Prof. Hidetoshi Katori, University of Tokyo, Japan
Optical lattice clocks: From curiosity-driven science to future applications

09:30
Dr Marina Gertsvolf, National Research Council of Canada (NRC), Canada
The CCTF roadmap to the redefinition of the second

10:00
Panel discussion

Moderator: **Dr Noël Dimarcq**, CIPM member and Université Côte d'Azur, Observatoire Côte d'Azur, France

Panelists: **Prof. Katori** and **Dr Gertsvolf**

Prof. William D. Phillips, National Institute of Standards and Technology (NIST), USA

10:45 - 11:15 **Coffee**

Thursday 22 May 2025
Palais des Congrès, Versailles

Session 5 - 11:15 - 13:00

Future revolutions - measuring for the life sciences

The final two sessions will showcase several exceptional opportunities for new metrology and new applications for metrology. These are based on the outcomes of leading-edge research and will present many challenges to the way we think about metrology in the future.

This session will showcase exceptional opportunities for new metrology and new applications in the field of life science. The focus will be on two areas: the application of chemical metrology for biomarker analysis in personalized medicine and the role of metrology in enabling new techniques for diagnosis and therapy in radiotherapy. Medical researchers will present their work and highlight the future role of metrology in advancing technology in life science.

Convenor: Dr Anna Cypionka, BIPM

11:20
Dr Renee Ruhaak, Leiden University Medical Center, the Netherlands
Personalized medicine - for improved patient care

11:45
Dr Claude Bailat, Lausanne University Hospital and University of Lausanne, Switzerland
Bringing radiometrology traceability to hospitals

12:15
Panel discussion

Moderator: **Ms Georgette Macdonald**, CIPM member and National Research Council of Canada (NRC), Canada

Panelists: **Dr Ruhaak** and **Dr Bailat**
Prof. Willie E. May, Morgan State University, USA
Ms Zakithi Msimang, International Atomic Energy Agency (IAEA)

13:00 - 14:15 **Lunch**

Thursday 22 May 2025
Palais des Congrès, Versailles

Session 6 - 14:15 - 16:00

Future revolutions - metrology in space

The last session will focus on another exciting field of application of metrology: space research. In cutting-edge research projects metrologists collaborate with space scientists to realize reliable measurement space thereby making important contributions to the outcome of space missions. At the same time, metrology uses technology developed for space mission to create new opportunities for metrology, namely in the realization of UTC.

Convenor: Dr Martin Milton, BIPM

14:20
Dr Luca Stringhetti, SKA Observatory
Precision at Cosmic Scales: future Metrology through the Square Kilometre Array telescope

14:45
Ms Cheryl Gramling, NASA Headquarters, USA
The Moon and beyond: measurements to navigate the solar system

Questions from the floor
Moderator: **Dr James Olthoff**, CIPM member and formerly National Institue of Standards and Technology (NIST), USA

Farewell video

Closing remarks

16:00 **Close of the conference**