

The BIPM key comparison database Newsletter – No 16 – December 2011

Dear Reader,

Welcome to the 16th KCDB Newsletter.

In this issue we highlight some updates related to the CIPM MRA, the Joint Committee of the Regional Metrology Organizations and the BIPM (JCRB), the content of the KCDB, and various events and news concerning the BIPM, especially in the field of international affairs. We also mention the main achievements of the BIPM's scientific work.

*We wish you a pleasant time surfing the KCDB Newsletter No 16,
The BIPM KCDB Office*

To improve future editions of the KCDB Newsletter, please send your feedback to BIPM.KCDB@bipm.org so that we may address your specific interests and concerns.

The complete series of *KCDB Newsletters* is available [here](#).

NEW: 'Reports on the KCDB' page now available on the BIPM website

This new page gives access to a presentation on the KCDB, and to the biannual reports that the KCDB Office prepares. Readers are encouraged to consult this page for details concerning publication of key and supplementary comparisons and approved sets of Calibration and Measurement Capabilities (CMCs). Click [here](#)

PDF version of the KCDB Newsletter No 16: click [here](#)

The success story of the KCDB Newsletter No 16:

"Study on economic impact of equivalence of measurement standards"

by Dr Takashi Usuda, AIST/NMIJ, Japan, Visiting Scientist, Director's Office, BIPM, from September 2010 to December 2011.

➔ **States Parties to the Metre Convention and Associates of the CGPM**

Since the publication of the *KCDB Newsletter No 15*, Montenegro became an Associate of the CGPM on 1 August 2011. This brings the current number of States Parties to the Metre Convention to 55, and of Associates of the CGPM to 34.

Over the same period, the BIPM registered some further signatures of the CIPM MRA:

- Mr Zijad Dzemic signed the CIPM MRA on 15 June 2011 on behalf of the Institute of Metrology of Bosnia and Herzegovina IMBIH. Bosnia and Herzegovina became an Associate of the CGPM on 24 May 2011.
- Mr Shaheen Raja signed the CIPM MRA on 6 July 2011 on behalf of the National Physical and Standards Laboratory NPSL (Pakistan). The Islamic Republic of Pakistan became a State Party to the Metre Convention in 1973.
- Ms Vanja Asanovic signed the CIPM MRA on 19 October 2011 on behalf of the Bureau of Metrology BMM (Montenegro).

Signature of the CIPM MRA on behalf of the BMM, Montenegro, on 19 October 2011 at the BIPM, Sèvres, France

The following were present for the signing of the CIPM MRA
Her Excellency Ms Irene Radovic - the Ambassador of Montenegro
Ms Dragana Kandic - Third secretary
Prof. Vanja Asanovic - Director, Montenegro Bureau of Metrology
Dr Goran Vukoslavovic - Deputy Director, Montenegro Bureau of Metrology
Prof. Michael Kühne - Director of the BIPM
Mr Andy Henson - BIPM International Liaison Officer



*From left to right:
 Ms Radovic, Ms Asanovic and Prof. Kühne*



*From left to right:
 Ms Asanovic, Mr Henson, Ms Radovic and Ms Kandic*

Photos: Taken by Mr Vukoslavovic, Courtesy Ms Asanovic

As of 15 November 2011, the CIPM MRA has been signed by the representatives of 87 institutes – from 50 States Parties to the Metre Convention, 34 Associates of the CGPM, and 3 international organizations – and covers a further 138 institutes designated by the signatory bodies as holders of specific national standards.

* **Full list of Participants in the CIPM MRA**

* **Full list of Member States and Associates**

(Information taken from the BIPM website)

→ Feedback from the 27th meeting of the JCRB

The **27th meeting of the JCRB** was hosted by EURAMET and Bundesamt für Eich- und Vermessungswesen (BEV) in Vienna, Austria, on 14 and 15 September 2011, and was attended by some 30 people.



*The AFRIMETS delegation at the 27th meeting of the JCRB
Mr Mourad Ben Hassine, Chairman of AFRIMETS on the right, accompanied by
Mr Dennis Moturi, from KEBS, Kenya, on the left, and Dr Mohammed Berrada,
Vice-Chair of AFRIMETS until July 2011 and Member of the Executive Committee of AFRIMETS*

Rules for Modifying Existing CMCs

It was noted that rules specified in document CIPM MRA-D-04 for modifying existing CMCs were frequently not observed in the preparation of CMC files submitted for review, resulting in a loss of time and an increased chance for errors at the publication stage. Regional Metrology Organization (RMO) representatives were thus requested to remind the chairs of their technical committees and working groups of the importance of following instructions for modifying existing CMCs established by the JCRB in the guidance documents. (Action 27/1)

Status of the CMCs of institutes whose designation has been withdrawn

The JCRB decided that CMCs declared by RMTCL of Latvia, whose designation in the area of ionizing radiation was withdrawn by the NMI of Latvia, would be permanently deleted from the KCDB. Furthermore, it was resolved that, henceforth, all CMCs of those institutes removed from [Appendix A](#) would be automatically deleted from the KCDB without the need for a separate decision from the JCRB. (Action 27/2 and Resolution 27/1)

Designated Institutes

The JCRB discussed the situation of an increasing number of designated institutes (DIs) that are not seen to be sufficiently participating in the activities of the CIPM MRA and about whom little information is thus known, leading to questions concerning the appropriateness of their designation. As a result of the discussion, the following measures were agreed:

- Noting the absence of designation area information for a large number of DIs listed in [Appendix A](#), it was decided that the BIPM International Liaison Officer and the Executive Secretary of the JCRB would be charged with obtaining this information from the appropriate designating authorities and reporting on the progress of this work at the next JCRB meeting. (Action 27/3)
- The BIPM is charged with drafting a document detailing the expectations from DIs for active engagement in the activities of the CIPM MRA, such as quality system reviews by RMOs, measurement comparisons and declaration of CMCs. In drafting this document, BIPM will make use of the suggestions contained in a document presented at the meeting by EURAMET on the subject. (Action 27/4)

PTB Guide 6

The BIPM International Liaison Officer presented a guide to the CIPM MRA (PTB Guide 6) prepared by an employee of PTB previously seconded to the BIPM. PTB intends to use the guide in its international technical cooperation programmes as a teaching instrument. The JCRB decided that the possibility of adopting this guide as a BIPM document should be explored. (Action 27/5)

Next Meetings

The 28th meeting of the JCRB will be held at the BIPM on 3-4 April 2012. The following meeting will be hosted by SIM on 25-26 September 2012.

(Report by Mr Ahmet Ömer Altan, JCRB Executive Secretary, BIPM)

* [CIPM MRA documents](#) (Document CIPM MRA-D-05: [updated version dated November 2011](#))

→ BIPM international affairs

BIPM, OIML, ILAC and ISO joint declaration on metrological traceability

The [BIPM](#), the International Organization of Legal Metrology ([OIML](#)), the International Laboratory Accreditation Cooperation ([ILAC](#)) and the International Organization for Standardization ([ISO](#)) have issued a joint declaration on metrological traceability, which was signed on 9 November 2011. This quadripartite declaration document from the four internationally recognized bodies responsible for metrology, accreditation and standardization world-wide, addresses a very wide audience for whom traceability is important.



* **More information and the text of the declaration on the BIPM website:** click [here](#)

Creation of a Joint WMO/BIPM Joint Liaison Group

World Meteorological Organization ([WMO](#)) and BIPM establish a Joint Liaison Group to facilitate the implementation of the recommendations from the 2010 WMO-BIPM Workshop on “Measurement Challenges for Global Observation Systems for Climate Change Monitoring: Traceability, Stability and Uncertainty”

In the Spring of 2010 the WMO and the BIPM held a high-profile three day joint workshop in Geneva, Switzerland, entitled the [“WMO-BIPM workshop on Measurement Challenges for Global Observation Systems for Climate Change Monitoring: Traceability, Stability and Uncertainty”](#).

The workshop brought together 170 participants from relevant communities to debate and review the status of applied meteorology, with respect to metrological traceability, in eight specific themed areas. The goal was to identify key measurement issues in climate science, Earth observation and numerical weather prediction models where there is a requirement to develop or improve the underpinning metrology. The workshop also explored the ways in which the metrology and Earth observation communities can work together to reduce uncertainties and thus ensure the accuracy and comparability of climate science measurements both now and in the future. The workshop was convened to strengthen the links between the communities and identify activities that will act as examples for the future development of measurement science in the field of Earth observation. The workshop report covers eight major topic areas encompassing some 56 sub-themes and grouped the large number of recommendations made during the workshop into four distinct areas:

- **The coordination of metrological services for the meteorological community,**
- **The development and implementation of guidelines and operating procedures,**
- **Research and development,** and
- **Knowledge transfer activities between the metrology and meteorology communities.**

In July 2011 the WMO and the BIPM established a Secretariat level Joint Liaison Group (JLG) between the two organizations in order to follow up and facilitate the recommendations. Some of the recommendations from the workshop are already being addressed by the two communities. In other cases the WMO are refining their analysis needs so that they are able to articulate more specifically the metrological support required from the metrology community. The JLG is already active in facilitating better communication between the meteorology and metrology world, for example brokering the participation of the Australian NMI (NMIA) in the November 2011 Metrology Workshop for WMO members (specifically, for their instrument calibration specialists) in the South West Pacific.

(Report by Mr Andy Henson, International Liaison Officer, BIPM)

24th meeting of the CGPM

The 24th meeting of the General Conference on Weights and Measures ([CGPM](#)) was held from 17 to 21 October 2011 in Paris.

Following this major event, which was preceded by a meeting of the CIPM, the BIPM published a special issue of the [BIPM Bulletin](#) in November 2011 entitled [News from the session II of the 100th meeting of the CIPM and the 24th meeting of the CGPM](#). Reader are invited to download the Bulletin for further information; we focus here on the Resolutions adopted at the 24th meeting of the CGPM, especially on the approval of possible changes to the International System of Units, the SI.

* [Full list of the BIPM Bulletins](#)

* **Resolutions of the 24th meeting of the CGPM**

1. [On the possible future revision of the International System of Units, the SI](#)
2. [On the importance of international collaboration so as to place measurements to monitor climate change on an SI traceable basis](#)
3. [Dotation of the BIPM for the years 2013 to 2015](#)
4. [On the status of Associate State of the General Conference](#)
5. [On the acceptance of Economies as Associate of the General Conference](#)
6. [On financial arrears of States Parties to the Metre Convention](#)
7. [On rescheduling agreements between the International Committee for Weights and Measures and defaulting States Parties to the Metre Convention for the payment of their financial arrears](#)
8. [On the revision of the *mise en pratique* of the metre and the development of new optical frequency standards](#)
9. [On the adoption of a common terrestrial reference system](#)
10. [On the role, mission, objectives, long-term strategy and governance of the BIPM](#)

The New SI

**Approval of possible changes to the International System of Units, the SI,
including redefinition of the kilogram**

On Friday 21 October 2011, the CGPM took a major step towards the revision of the International System of Units, the SI, including redefinition of the kilogram, by unanimously adopting

Resolution 1 “On the possible future revision of the International System of Units, the SI”

and thereby outlining the proposed New SI as well as the steps required for the final completion of this project. The text of **Resolution 1** is that of Draft Resolution A, which had been publicly available for some months on the BIPM “New SI” website, with only minor changes proposed by delegates during the meeting of the CGPM. One of these changes invites the CIPM to continue its work to make the language of the New SI as understandable as possible for general users, while maintaining scientific rigour and clarity and without altering the basic content and structure of the New SI as described in Resolution 1.

Final approval of the New SI with a date for its implementation will be made by the CGPM after its prerequisite conditions have been met, this will not be before 2014.

This historic decision represents the culmination of many years of work, particularly by the Consultative Committee for Units (CCU) and its President, Professor Ian Mills.



*Prof. Ian Mills, President of the CCU,
presenting possible changes to the SI, at the
24th meeting of the CGPM*

17 October 2011

* **New SI website**

* **Draft Chapter 2 of the 9th SI Brochure**

* **Frequently Asked Questions on the New SI**

(Information taken from the BIPM website)

Related paper:

* **SI Units - Proposed change to the definition of the kilogram: Consequences for legal metrology**, a paper by Dr Richard Davis, Consultant at the BIPM, *OIML Bulletin*, **LII**, 4, October 2011, pp 5-10

(Courtesy OIML)

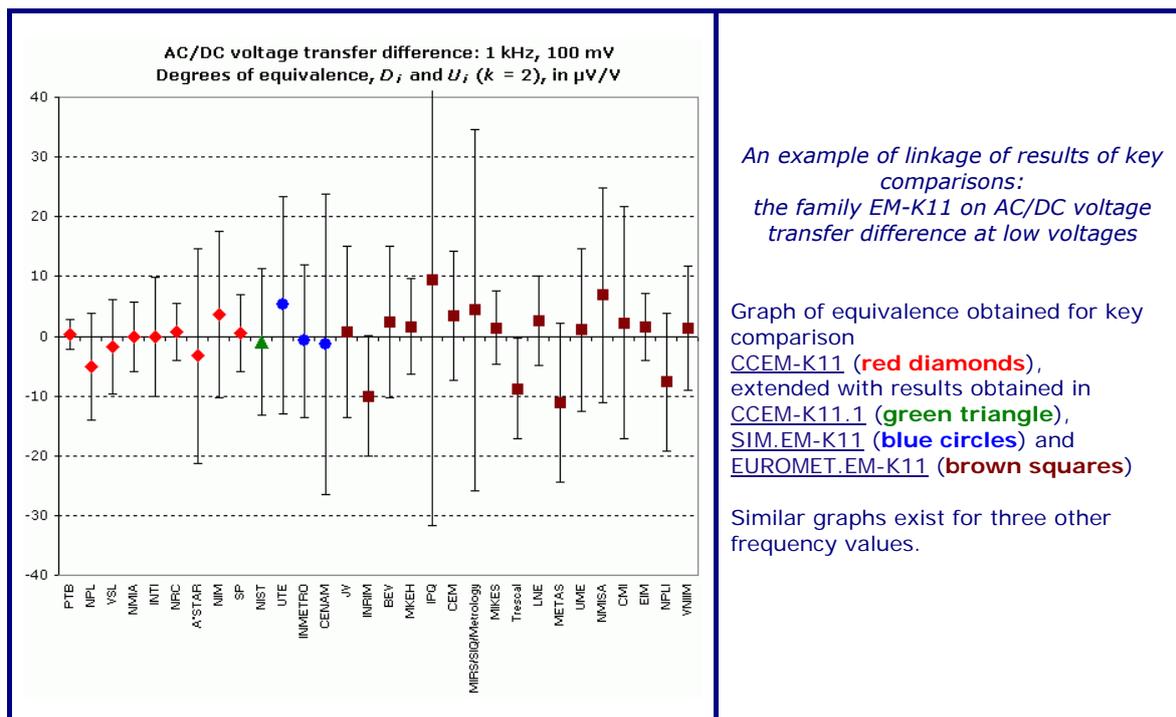
➔ News from the KCDB

Key and supplementary comparisons

The [key and supplementary comparisons](#) database now contains 772 key comparisons (84 from the BIPM, 383 from the CCs, 2 from AFRIMETS, 108 from APMP, 32 from COOMET, 121 from EURAMET, and 42 from SIM) and 286 supplementary comparisons, which gives a total in excess of 1000. On average, about 40 new key comparisons and 27 new supplementary comparisons are registered each year.

Updated graphs illustrating the participation in [key](#) and [supplementary](#) comparisons were made available on the [Statistics page of the KCDB](#) on 24 November 2011.

The Final Reports of 65 % of the comparisons registered are currently posted in the KCDB. Tables of individual laboratory results, degrees of equivalence and graphs of equivalence are published in the KCDB for key comparisons only. The KCDB currently holds a total of more than 1720 graphs of equivalence.



Results of RMO and bilateral key comparisons are usually linked to those of the corresponding CIPM key comparisons. We now have one example of **a family of eight key comparisons linked together**: [M.M-K1](#) (one kg stainless steel standards), including 82 degrees of equivalence relative to the [CCM.M-K1](#) key comparison reference value. These results span a period of more than 10 years and a new central CIPM key comparison, [CCM.M-K4](#), will soon be launched with the BIPM acting as the pilot laboratory, thus restarting the whole exercise.

A number of similar examples of six or seven key comparisons linked together can be found in the KCDB.

Note that the final reports of key and supplementary comparisons posted in the KCDB are also generally published in the [Metrologia Technical Supplement](#).

* [Latest KC results published](#)

Calibration and Measurement Capabilities (CMCs)

At the beginning of December 2011, exactly **24247 CMCs had been published in the KCDB**.

The **very first sets of CMCs** declared by [Paraguay](#) (23 CMCs in Mass Standards) and [Ecuador](#) (20 CMCs also in Mass Standards) were published on 31 January 2011 and 16 September 2011, respectively. Paraguay and Ecuador signed the CIPM MRA on 27 October 2009 and 15 April 2001, respectively, illustrating just how long and difficult the effort may be to complete the whole CIPM MRA process.

There were also some movements related to **temporary removal and re-instatement of CMCs**, and the total number of “greyed-out” CMCs decreased from a “local maximum” of 472 CMCs greyed-out in April 2010, to 184 on 22 November 2011. This decrease results from two actions:

- At its 26th meeting in March 2011, the JCRB decided upon a procedure to deal with CMCs that had been greyed-out for more than five years (see the [KCDB Newsletter No 15](#), dated June 2011), namely deleting them in a definitive way or allowing them a one-year period of grace for a decision about re-instatement or definitive deletion. This resulted in some rationalization of the several hundred CMCs concerned.
- At its 27th meeting in September 2011, the JCRB resolved that “the CMCs of those institutes removed from Appendix A will automatically be deleted from the KCDB” (see above). It followed that the 143 CMCs in ionizing radiation from Latvia, declared by RMTc, which ceased to be a designated institute on 10 March 2010, were definitively deleted on 16 September 2011.

In addition, the KCDB Office dealt with numerous corrections, namely editorial changes, deletion of services that are no longer available, and changes in laboratory names and acronyms.

Up-to-date details on the number of CMCs currently published in the KCDB, per country and per metrology area, are available from the [Statistics page of the KCDB](#). In addition, a record of the history of CMC publications (including greying-out and re-instatement following QS approval) is kept in the form of an EXCEL file, which is made available in real-time from the restricted-access part of the JCRB CMC website.

* [Latest CMCs published](#)

Modification of the KCDB website

The KCDB web system was modified on 31 August 2011. The modifications concerned the [KCDB website on CMCs in Chemistry](#). The acronym “QM” and the expression “Amount of substance” are generally not familiar to the industrial community, and have been suppressed and replaced by the word “Chemistry”.

The CMCs covering Physics and Chemistry are also clearly separated, and some new functionality is offered to the users in order to facilitate access to information in this area.

The BIPM free-text search engine is now inserted in the pages of CMCs in Chemistry and makes it possible for a direct search of services linked to a given CRM.



The screenshot shows the old KCDB Chemistry CMCs Home Page. At the top, there is a BIPM logo and navigation links: Home, Key and supplementary comparisons, and Calibration and Measurement Capabilities - CMCs. Below this is a breadcrumb trail: Home > CMCs Search > QM search form. The main heading is "CMCs - Search form" with the KCDB logo. The page is titled "Calibration and Measurement Capabilities Amount of Substance (not including pH and electrolytic conductivity)". There are links for "pH and electrolytic conductivity", "QM Instructions", and "List of categories". A section for "Direct access to full lists of CMCs by country and by category as .PDF files" includes dropdown menus for "Country" and "Category", and a "Display .PDF file" button. A "Keyword search" section has a text input for "Analyte or component keyword search", a "Match exactly" radio button (set to "No"), and a "Category" dropdown set to "All". A "Search" button is at the bottom of this section. On the left side, there are several sidebar sections: "Metrology area" with a list of categories (AUV, EM, L, M, PR, QM, RI, I, TE); "Traceability to the SI through the BIPM" with a link to "BIPM calibration and measurement services"; "Related links" with links to "KCDB Statistics", "KCDB FAQs", "CIPM MRA", "JCRB", "Find my NMI", and "Metrologia"; and "Contact us" with a link to "BIPM_KCDB@bipm.org".

The old Chemistry CMCs Home Page (no longer available)

BIPM
Bureau International des Poids et Mesures

Home Key and supplementary comparisons Calibration and Measurement Capabilities - CMCs

Home > CMCs Search > QM search form

CMCs - Search form KCDB

Calibration and Measurement Capabilities
Chemistry (not including pH and electrolytic conductivity)

→ [pH and electrolytic conductivity](#) → [Instructions](#) → [List of categories](#)

Direct access to full lists of CMCs by country and by category as .PDF files

Country: Category: → [Display .PDF file](#)

Free search For instance type SRM 2612 to access services linked to the CRM identified as SRM 2612.

Type a Chemical or CRM identifier: → [Search](#)

Keyword search

Analyte or component keyword search: Match exactly: Yes No

Category: → [Search](#)

Physics

- [Acoustics, Ultrasound, Vibration](#)
- [Electricity and Magnetism](#)
- [Length](#)
- [Mass and related quantities](#)
- [Photometry and Radiometry](#)
- [Ionizing Radiation](#)
- [Thermometry](#)
- [Time and Frequency](#)

Chemistry

- [Chemistry](#)

Traceability to the SI through the BIPM

- [BIPM calibration and measurement services](#)

Related links

- [KCDB Statistics](#)
- [KCDB FAQs](#)
- [CIPM MRA](#)
- [JCRB](#)
- [Find my NMI](#)
- [Metrologia](#)

Contact us

- BIPM.KCDB@bipm.org

The new Chemistry CMCs Home Page (available on-line)

Visits to the KCDB website

The average number of monthly visits to the KCDB website remained constant at around 7200 during 2010. The average number of pages consulted during each visit increased significantly, compared to 2009, as has the average duration of each visit.

The log-on statistics recorded for the period January – October 2011 indicate a slight increase of the average number of monthly visits, to 7800, and a constant average number of about 100 000 KCDB web pages opened each month.

We believe that the KCDB website continues to attract our key customers: National Metrology Institutes, regulators, accreditors, commercial and industrial companies.

As already observed, all pages are visited equally, including the “What’s new?” page, the [Statistics](#) page, and the [Newsletters](#). PDF files of comparison reports and CMC lists are regularly downloaded.

Visitors to the KCDB website come from all over the world. The KCDB website is reached by 31 % of visitors from links proposed in other websites (especially NMI websites), a percentage slightly higher than in 2010. Internet search engines (Google, Yahoo, etc.) lead about 9 % of visitors to the KCDB website, the remaining 60 % reach our web page via personal bookmarking, directly typing the URL address or by using links given in e-mails.

(KCDB Report by Dr Claudine Thomas, BIPM KCDB Coordinator)

→ Some BIPM scientific highlights

Amandine Proia's doctoral thesis on "Contribution to the absolute calibration of a GNSS reception chain"



Amandine Proia successfully defended her doctoral thesis "**Contribution to the absolute calibration of a GNSS reception chain**" on Thursday, 10 November 2011 in Toulouse, France.

Her work, funded by the [CNES](#) and the BIPM, focused on the development and optimization of a method of absolute calibration in order to independently determine the electrical delay of each element in a GNSS reception chain (time receiver, antenna and antenna cable) with an overall uncertainty of less than one nanosecond.

The absolute calibration method can also be used to characterize the performance and the environmental sensitivity of each component of the acquisition system.

The presentation took place during a one-day seminar organized by the CNES on "GNSS simulator at the service of reception chains", of which it was the highlight.

The jury, comprising N. Capitaine (Observatoire de Paris), F. Vernotte (Observatoire de Besançon), A. Bauch (PTB), P. Defraigne (Royal Observatory of Belgium), C. Bourga (THALES TAS-F), P. Tuckey (Observatoire de Paris), G. Petit (BIPM) and G. Cibié (CNES), awarded her the **title of Doctor of the Paris Observatory, specializing in Astronomy and Astrophysics, with high honors**.

It should also be mentioned that Amandine received a "Student Award" at the conference "2011 IEEE-IFCS and EFTF" held early May 2011 in San Francisco.

(Report by Dr Gérard Petit, BIPM Time Department)

Graphene: Definitive results of the graphene comparison now published!

Preliminary results were reported in the [KCDB Newsletter No 14](#) dated December 2010.

Reference

Janssen T.J.B.M.¹, Fletcher N.E.², Goebel R.², Williams J.M.¹, Tzalenchuk A.¹, Yakimova R.³, Kubatkin S.⁴, Lara-Avila S.⁴ and Falko V.I.⁵, [Graphene, universality of the quantum Hall effect and redefinition of the SI system](#), *New J. Phys.* 13 093026, 2011

¹ National Physical Laboratory (United Kingdom), ² Bureau International des Poids et Mesures, ³ Linköping University (Sweden), ⁴ Chalmers University of Technology (Sweden), ⁵ Lancaster University (United Kingdom)

Abstract

The Système International d'Unités (SI) is about to undergo its biggest change in half a century by redefining the units for mass and current in terms of the fundamental constants h and e , respectively. This change crucially relies on the exactness of the relationships that link these constants to measurable quantities. Here we report the first direct comparison of the integer quantum Hall effect (QHE) in epitaxial graphene with that in GaAs/AlGaAs heterostructures. We find no difference in the quantized resistance value within the relative standard uncertainty of our measurement of 8.6×10^{-11} , this being the most stringent test of the universality of the QHE in terms of material independence.

This paper was also chosen by *Nature* as one of their "Research Highlights" (selections from the scientific literature) in their issue of 29 September 2011: [Nature, 477, page 512](#).

[Access to the NPL video describing the work](#)

(Report by Dr Michael Stock, Director of the BIPM Electricity Department)

The future of Coordinated Universal Time (UTC)

The future of Coordinated Universal Time (UTC)

Coordinated Universal Time (**UTC**) was defined by the International Telecommunication Union (**ITU-R**) in 1972 and has been maintained since 1988 by the BIPM. UTC is the common time reference for coordination of broadcast time and frequency services world-wide, and it constitutes the basis of legal time in almost all countries.

UTC is calculated at the BIPM on the basis of the contribution of some 400 atomic clocks held in about 70 institutes distributed world-wide. The contributing laboratories maintain local approximations to UTC denominated UTC(k).

At its 14th meeting in 1971, the General Conference on Weights and Measures (CGPM) recommended International Atomic Time (**TAI**) as the fundamental basis of the world's time scale with the atomic definition of the second adopted at the 13th meeting of the CGPM in 1967 as its unit. It was still necessary to have access to accurate time related to the rotation of the Earth for applications such as celestial navigation. For this purpose, **UTC** was defined as the atomic time scale derived from TAI and synchronized to the non-uniform time defined by the rotation of the Earth (**UT1**) by the application of **leap seconds** whenever necessary to keep the two scales within a difference of at most 0.9 seconds.

Forty years after its creation, UTC with leap seconds constitutes a serious problem for users of precise timing and synchronization. Furthermore, access to UT1 can be obtained today with more precision than the present definition of UTC with the predictions provided by the International Earth Rotation and Reference Systems Service.

The use of different continuous atomic time scales in satellite navigation systems such as GPS time and in the future the European Galileo time and the Chinese BeiDou time, stemmed from the great difficulty of using an atomic time scale that includes occasional but not accurately predictable one-second steps. This unnecessarily complicates their internal time keeping operations, and endangers their inter-operability and even reliability.

Difficulties are foreseen in ensuring the security and reliability of the increasing range of timing systems at all levels of accuracy if they have to operate in the presence of one-second step changes. The problem of ensuring completely unambiguous time and date information at the instant of the step change is not easy to solve. A broad range of infrastructural systems, such as communications, power grids, air traffic control and synchronization of financial operations all depend critically on precise and reliable timing. The public is becoming more and more demanding as regards the safety and reliability of these systems.

For these reasons the ITU is considering a proposal to abolish the leap seconds in UTC. **A recommendation with a new definition of UTC, without leap seconds, will be submitted for approval to the ITU Member States at the Radio-Communication Assembly that will meet in Geneva, Switzerland, in January 2012.** If the recommendation is accepted, UTC will continue to be securely linked to the rotation of the Earth since the values for the difference [$UT1 - UTC$] will continue to be available at the level of microseconds from the International Earth Rotation and Reference Systems Service (**IERS**).

PRESS RELEASE: UTC for the 21st Century : The BIPM issued a press release following the Royal Society Discussion Meeting on UTC for the 21st Century, which was held at the Kavli Royal Society International Centre, UK, on 3-4 November 2011. The meeting was organized by Dr Terry Quinn and Dr Felicitas Arias.

(Report by Dr Felicitas Arias, Director of the BIPM Time Department)

→ 50 years of ionizing radiation metrology at the BIPM

Compliments to the staff of the Ionizing Radiation Department on the occasion of the 50th anniversary of the opening of this activity at the BIPM!



The staff of the BIPM Ionizing Radiation Department

From left to right: Guy Ratel, Susanne Picard, Cecilia Kessler, David Burns, Penelope Allisy-Roberts, Manuel Nonis, Philippe Roger, Sammy Courte and Carine Michotte

The work of the BIPM Ionizing Radiation (IR) Department was first mentioned in the *Procès-verbaux des séances du Comité international des poids et mesures - 50e session (octobre 1961)* under the paragraph "Section des radiations ionisantes (Examen du 3e Rapport du Comité Consultatif. Premiers travaux au Bureau International; laboratoires, personnel, matériel)".

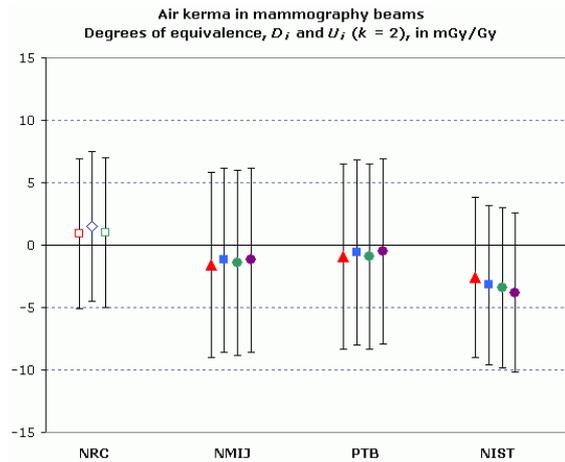
Following strong international representation and unanimous support from the CIPM, the 11th meeting of the CGPM in 1960 allocated an extraordinary dotation and approved the construction of the laboratory building, now shared with the Chemistry Department, and an extensive work programme.

Consequently, **2011 marked the first 50 years of dosimetry and radionuclide activity metrology at the BIPM**. The scene has been set by the Consultative Committee for Ionizing Radiation for the next 50 years in addressing the metrological challenges arising from the increasing use of accelerator technology, for example to produce radionuclides and to treat cancer.

The IR Department operates the **International Reference System** for the measurement of gamma-emitting radionuclides (SIR) and consequently runs 63 ongoing comparisons to cover the gamma-emitting radionuclides in common use. By means of a transfer instrument developed at the BIPM for use at distant NMIs, the system also includes short-lived radionuclides such as ^{99m}Tc (used globally in diagnostic nuclear medicine (nearly 30 million patients per year), and an extension to include pure beta emitters is close to completion.



The ionizing radiation building at the BIPM



First results [BIPM.RI\(1\)-K7](#) published on 17 November 2011 for seven radiation qualities

Open red square: W/Mo 23 kV, Open blue diamond: W/Mo 30 kV,
Open green square: W/Mo 50 kV

Red triangle: Mo/Mo 25 kV, Blue square: Mo/Mo 28 kV
Green circle: Mo/Mo 30 kV, Purple circle: Mo/Mo 35 kV

In the field of metrology for ionizing radiation **dosimetry**, the BIPM maintains the primary standards and reference facilities for **low energy x-rays**, including **mammography beams** (for which comparisons started in 2009 – see results above), for **medium-energy x-rays**, for **⁶⁰Co radiation beams** and more recently has produced a **travelling primary standard** to enable NMIs to verify their **dosimetry in high-energy x-ray beams from accelerators** in the new **BIPM.RI(1)-K6 comparison series**. A significant number of NMIs have installed, or are planning to install, accelerators for metrology to ensure the best dissemination of SI traceable dosimetry to their cancer clinics that treat over 7 million patients per year. This development is currently supported by the travelling standard but unfortunately, the BIPM programme cannot cope with more than one or two such off-site comparisons per year.

The BIPM ongoing comparisons in dosimetry and radionuclide activity are used by the NMIs to support, directly or indirectly, most of their [3909 Calibration and Measurement Capabilities](#) in these fields.

(Report by Dr Penelope Allisy-Roberts, Director of the BIPM Ionizing Radiation Department)

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→ Advance notice



CPEM 2012

The Conference on Precision Electromagnetic Measurements, more popularly referred to as CPEM, is devoted to topics related to electromagnetic measurements at the highest accuracy levels. These cover the frequency spectrum from dc through the optical region. A major focus of this conference is quantum devices that relate electrical standards to fundamental constants and the international system of units.

CPEM attracts a highly specialized international participation. The principal types of organizations that participate at CPEM are the national standards laboratories; industrial organizations that manufacture the highest accuracy electrical standards and measurement instruments; industrial and government standards laboratories that interact extensively with national laboratories; and universities that conduct research on precision measurements, standards and related fundamental constants. Attendance at CPEM is considered a must for the researchers and metrologists who are responsible for electrical standards.

[CPEM'12 website](#)

- * [Calendar of meetings held at the BIPM](#)
- * [Other conferences, workshops and general assemblies](#)