IMEKO TC12

NEWSLETTER

IMEKO Technical Committee 12

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Dear Colleagues,

the thermal metrology community is fully and deeply involved in a multitude of activities. Joint research projects are running and providing important results both in primary thermometry and in disseminating the unit and new techniques. The new definition of the kelvin is almost a "done" fact and the last minute adjustments of the Boltzmann constant value are on their way to reach the "less than 1 part per million" goal. On this subject the recent IMEKO World Congress saw the presentation of Joachim Fisher at one of its plenary sessions: details are in the next article.

The new field of environmental metrology is well established and the results delivered by large projects demonstrate the effective impact achieved in disseminating traceability and best practice to the climatology and meteorology communities. New task group are born within the BIPM CCT and the EURAMET, tasked to establish and extend the collaboration with the community of stakeholders. Thermal metrologists are now sitting in relevant commissions of the WMO as expert members. Events, project meetings, round tables and workshops are constantly held, covering a variety of topics of wide interest.

Such a highly motivated community is now ready to prepare for one of the (if not "the"!) most important event: **Tempmeko 2016.**

This newsletter brings you news from our community together with the most important information on the location, registration and submissions for Tempmeko. As usual, I will be glad to receive contributions and highlights on thermal metrology, hygrometry and thermophysical properties, to be included in the future issues of this newsletter.

Andrea Merlone

The new definition of the kelvin at the IMEKO World Congress.

Joachim Fischer, from PTB and member of TC12, gave a lecture on the new definition of the kelvin, as invited speaker at a plenary session of the IMEKO World Congress in Prague.

Joachim Fischer *(PTB) at the IMEKO World Congress in Prague (31st August 2015).*

In his lecture Joachim highlighted the last advances in the experiments involved in the determination of the Boltzmann constant, together with the consequences of its adoption in the future definition of the temperature unit. Here we report the talk abstract.

"The General Conference on Weights and Measures agreed in principle at its 24th meeting in October 2011 on new definitions for four of the seven base units of the International System of Units (SI). Kilogram, ampere, kelvin, and mole will be defined in terms of fixed numerical values of the

Planck constant, elementary charge, Boltzmann constant, and Avogadro constant, respectively. A refined value of the Boltzmann constant suitable for defining the kelvin is presently determined by fundamentally different primary methods like acoustic gas thermometry, dielectric constant gas thermometry, noise thermometry, and the Doppler broadening technique. Details of the measurements, progress to date, and further perspectives will be reported. Necessary conditions to be met before proceeding with changing the definition are given. The consequences of the new definition of the kelvin on temperature measurement will be outlined. After the new definition has been adopted as well the present method, the International Temperature Scale of 1990, ITS-90 and primary thermometers can be both used to realize the temperature unit. Both methods to realize the kelvin will be reviewed in this presentation."

Metrology for the Arctic, Metrology in the Arctic.

"*Climate change comes first and comes faster in the Arctic*", says Kim Holmen, head of the Norwegian Polar Institute. Hundreds of projects are active in Ny Ålesund, the scientific community operating in the world northernmost inhabited village. Multitudes of experiments, sites, sensors, and measurements are involved to record an impressive amount of data. Accurate measurements are fundamental to quickly capture trends and traceability is the key concept to guarantee comparability in space and time. In the arctic environment, instruments are subject to challenging conditions and extreme measurement ranges.

The Climate Change Tower in Ny Ålesund 79° N. Dismantling sensors for the calibration.

Quantities of influence have a stronger effect on the measurement results and the usual calibration procedures rarely take them into account. Metrology plays then a key role to address the data quality needs and the specific demand for dedicated calibration procedures and evaluation of measurement uncertainty. Temperature of the air, sea water, ice, permafrost soil, together with humidity and soil moisture are all essential climate variables constantly monitored in the Arctic. The metrology community is now being engaged in new collaborations. The first "Arctic Metrology" campaign was performed as an activity of the MeteoMet project, in the summer of 2013 and involved the transport of a special chamber to Ny Ålesund and the stay there of three metrologists to calibrate the sensors used by the GRUAN station for the pre launch ground check of radiosondes.

Discussing the calibration procedure with staff of the Alfred Wegener Institute inside the Arctic Observatory.

During the permanence of the staff and the equipment in the Arctic base, researchers of other stations were interested in following the work and on the calibration. This set the starting point for the proposal of possible further metrological activities in Ny Ålesund. The idea was then discussed during the first "Arctic Metrology Workshop" on 26 April 2015, where participants from different countries and different fields met to bring their experience and possible contribution in forming a proposal for addressing challenging metrology needs for Arctic Research. The idea was then presented at the Ny Ålesund seminar in Tromsö on September 2015, and was positively welcomed. The creation of a laboratory for environmental metrology is now included as one of the tasks in the Atmospheric flagship roadmap. On 16-19 October the Arctic Circle Assembly (www.arcticcircle.org) will host a breakout session organised by EURAMET and endorsed by BIPM, where scientists will have the

opportunity to bring to the attention of a wide audience how metrology can benefit the Arctic research. The definition of first steps toward a common metrology infrastructure to be established in the Svalbard will also be proposed, in preparation for calls for a funded joint research project. With contributions in better evaluating measurement uncertainties, on effects of quantities of influence, with dedicated calibration procedures, new techniques to operate sensors in extreme conditions, and novel instruments, thermal metrology can surely bring its experience and valuable contribution to the studies on such an unique and significant part of our planet.

Andrea Merlone

Tempmeko 2016

The XIII International Symposium on Temperature and Thermal Measurements in Industry and Science will be held in Zakopane, Poland between 26 June and 1 July 2016. The Symposium is one of the most important event organized every three years under the auspices of IMEKO Technical Committee 12. A constantly growing number of participants (we expect more than 300 persons next year) presenting high quality scientific papers has made this conference one of the most prestigious scientific meetings in the field of the temperature metrology.

Wł. Trzebiatowski Institute of Low Temperature and Structure Research of the Polish Academy of Sciences, Designated Institute, is organizer of the Symposium. Patrons Symposium, among others, there are the Ministry of Science and Higher Education, Ministry of Economy and the Polish Centre for Accreditation. Anna Szmyrka-Grzebyk, head of the Temperature Standard Laboratory at the Institute, is a chair of the National Organizing Committee.

Two persons – Graham Machin and Richard Rusby – from the National Physical Laboratory, UK are chairs of the International Program Committee. 54 members of the IPC represent global and regional metrological organizations –

BIPM, EURAMET, SIM etc. The World Meteorological Organization WMO is represented too.

Main topics of the TEMPMEKO 2016 are the same as in the past:
Fundamental aspects and standards
Temperature methods and sensors
Humidity and moisture
Thermophysical Quantities and Standard Reference Materials
Traceability and dissemination
Applications of temperature, humidity, moisture and other thermal measurements
Meteorology and climate.

The most important dates:

1 June 2015	**Call for papers**
31 October 2015	**Abstracts deadline**
31 January 2016	Abstracts acceptance
1 March 2016	Early fee payment end
30 April 2016	Manuscript due
31 May 2016	Program finalization

The Symposium venue will be at Hotel Belvedere in Zakopane. The hotel offers suitable conference rooms, places for posters presentation and booths for exhibitors, as well good restaurants, accommodation and spa. A list of recommended hotels in Zakopane with reduced prices for the Symposium participants is given on the website. All participants are requested to make hotel reservations on their own as soon as possible.

The TEMPMEKO 2016 website

www.tempmeko2016.pl

has been ready since 1st June 2015. **Call for papers** and **Registration** are opened.

Cordially invite you to Zakopane

Anna Szmyrka-Grzeby
Aleksandra Kowal
Organising Committee, Tempmeko '16

Message from IPC Chair Persons

As IPC co-chairs we are aiming to assemble an exciting programme for the conference next June, and we are anticipating that there will be significant contributions on

·the forthcoming kelvin redefinition, particularly new results reported for T-T90 and T-T2000,

·advances in new primary thermometry techniques

·research in sensor development, fixed points (e.g. new types, impurity and thermal effects), etc

·progress in radiation thermometry, including the standardisation and application of thermal imaging·in humidity, moisture in materials and water in non-air gases at various pressures and temperatures

·and other topics (see the web-site for guidance).

We aim to raise the profile of industrial applications of thermometry and to have sessions focussing on advances in fields as diverse as meteorology, medicine and the measurement of thermal quantities.

We look forward to receiving your abstracts by the end of October!

Graham Machin
Richard Rusby
Co-IPC chairs, Tempmeko '16

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