

| measure |
| innovate | perform |

16th

PROGRAMME

CONGRÈS INTERNATIONAL DE **MÉTROLOGIE**
INTERNATIONAL CONGRESS OF
METROLOGY

| 7 | 8 | 9 | 10 | OCTOBER | 2013 |
| | | | | PARIS | FRANCE |



COLLÈGE FRANÇAIS DE
MÉTROLOGIE

www.metrologie2013.com | info@cfmetrologie.com



16^e

CONGRÈS INTERNATIONAL DE MÉTROLOGIE INTERNATIONAL CONGRESS OF METROLOGY



COLLÈGE FRANÇAIS DE
METROLOGIE



PARTNERS



ORGANISERS



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Bernard Larquier

CHAIRMAN OF THE CONGRESS



The Congress is 30 years old: it is mature, based on a long experience but still looking for new topics.

Its aims are multiple:

- Explore the evolution of measurement techniques and their implications for Industry, R&D and society,
- The added value of measurement as a tool for quality of products and processes,
- The participation in the development of innovative technologies.

Its content is large:

- 180 presentations in oral or poster sessions,
- 6 round-tables focused on industrial challenges,
- An exhibition showcasing innovations and solutions,
- Technical site visits exploring industrial best practice.

The news for 2013 are:

- A special introduction about trades in measurement field,
- 2 workshops dealing with European research programmes.



Pierre Claudel

CHAIRMAN OF THE COLLEGE FRANÇAIS DE MÉTROLOGIE



One public or different audiences for the Congress?

More than 1,000 participants are coming from 50 countries:

- Users of measurement technology in industry, research and academia
- Manufacturers of measurement equipment and instrumentation
- Quality managers and decision makers
- Academics and researchers.

A simultaneous translation is provided for all talks.

This event is therefore the unique opportunity for communication and exchanges between all members of the same family!



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Claudine THOMAS - BIPM
Michael VANDENHENDE - NOVARTIS (Switzerland)
José VEAU - EDF (France)

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Mr MEDINA - CEM (Spain)
Mr PARK - KRISS (Korea)
Mr PECCHIOLI - Cofrac (France)
Mr PÉNIN - Norma System (France)
Mr PIQUEMAL - Club Nano (France)
Mrs SALVETAT - Ifremer (France)
Mrs THOMAS - BIPM
Mr TWERENBOLD - METAS (Switzerland)
Mr WUNDERLI - METAS (Switzerland)
Mr ZVIZDIC - FSB (Croatia)

METROLOGY 2013 and *enova* PARIS, same place, same dates, same objectives: **to encourage meetings.**



8-9-10 OCT 2013 - Paris expo Porte de Versailles - Hall 7.2

www.enova-event.com



9:00	11:05	11:35	12:50	14:00	15:00	17:00	17:35	18:30
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MONDAY 7				WELCOME		CAREERS IN METROLOGY <small>p. 8</small>		OPENING		DRINK
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TUESDAY 8	S1	SI, what's new ?	p. 9		S4	Optical radiation	p. 9		POSTER	<ul style="list-style-type: none"> • Flow • Health • Statistics • Mechanical quantities • Food processing 	TABLE RONDE / ROUND TABLE S7 Dosimetry and Radiotherapy <small>p. 13</small>	COCKTAIL		
	S2	Industrial flow measurement	p. 10		S5	Force and Pressure	p. 10						TABLE RONDE / ROUND TABLE S8 Advanced coordinate metrology <small>p. 13</small>	
	TABLE RONDE / ROUND TABLE	Medical biology: mastering your analysis		p. 11		S6	Mathematical tools	p. 11						TABLE RONDE / ROUND TABLE Measurement and traceability in food processing <small>p. 14</small>
	TABLE RONDE / ROUND TABLE			p. 12		Workshop TReND		p. 12						
										LNE visit Electrical, thermal and optical measurement				

WEDNESDAY 9	S10	Risk management in medicine	p. 18		S13 METROLOGY AT THE HEART OF INNOVATION				POSTER	<ul style="list-style-type: none"> • Environment • Chemistry • Energy • Dimensional • Training 	TABLE RONDE / ROUND TABLE S14 Energy challenges <small>p. 20</small>	GALA		
	S11	Surface texture and Form	p. 18										TABLE RONDE / ROUND TABLE S15 Environmental awareness <small>p. 21</small>	
	TABLE RONDE / ROUND TABLE	Measurement fuelling low carbon technologies		p. 19										TABLE RONDE / ROUND TABLE The metrological requirements specific to high-tech fields <small>p. 21</small>
	TABLE RONDE / ROUND TABLE	Workshop HiTeMS		p. 19										
										CEA visit ZOE atomic pile, radioactivity measurement, radiobiology and environmental toxicology				

THURSDAY 10	S17	Electrical metrology	p. 25		POSTER	<ul style="list-style-type: none"> • Temperature • Electricity • Time / Frequency • Management • Optics and Soft metrology 			TABLE RONDE / ROUND TABLE S21 Soft metrology <small>p. 27</small>	CLOSING SESSION	DRINK	
	S18	Achieving traceability	p. 25									TABLE RONDE / ROUND TABLE S22 Temperature: some like it hot <small>p. 27</small>
	TABLE RONDE / ROUND TABLE	Metrology challenges for nanotechnologies		p. 26								
										PEUGEOT visit 3D measure, surface form, engine and mechanical test		



CAREERS IN METROLOGY

15:00 ▶ **Industrial competitiveness** has become a crucial issue. Reducing cost, improving performance, reducing the risk and guaranteeing the quality of products are part of the obligations of any company or organisation.

The measurement trades, technician or engineer, are at the heart of this action. Indeed, no risk management without performing measures. No operational excellence without the most perfect possible knowledge of real needs and skills of **manufacturing and measurement processes**.

Examples and testimonies will illustrate the contribution of measurement in improving the competitiveness and its strategic positioning in the dynamics of companies:

- How to make a career in the fields of measurement?
- Has the sector interesting opportunities?

17:00 ▶ • Is it more varied and innovative than a career in production or design? ...

SI SI, WHAT'S NEW?

Chairman: Claudine THOMAS - BIPM

9:00 ▶ A method for measuring the Planck constant: the watt balance
Mr THOMAS - LNE / France

9:20 ▶ A CMOS based electron pump for quantum metrology of the new SI ampere
Mr JEHL - CEA / France

9:40 ▶ The set of reference mass standards of the BIPM
Mrs DE MIRANDES, Mr IDREES, Mrs BARAT, Mr PICARD - BIPM

10:00 ▶ Recent progress on the BIPM watt balance
Mrs FANG, Mr KISS, Mr ROBERTSSON, Mrs DE MIRANDES, Mr SOLVE, Mr PICARD, Mr STOCK - BIPM

10:20 ▶ The new METAS watt balance experiment
Mr BAUMANN - METAS / Switzerland

10:40 ▶ Introducing Joint Research Programme « quantum ampere » for the realisation of the new SI ampere
Mr SCHERER - PTB / Germany

11:05  11:35

CONGRESS OPENING

17:00 > 18:30

Congress opening speeches
Mr LARQUIER - BEA Métrologie, Chairmain of Metrology 2013
et Mr CLAUDEL - CETIAT, Chairman of the Collège Français de Métrologie

Congress opening by the representative of the Ministry in charge of the Industry

High metrology: an ideal training for advanced industry
Mr QUINN, Honorary Director of the BIPM

DRINK

S4 OPTICAL RADIATION

Chairman: Pierre FERDINAND - CEA / France

11:35 ▶ SI physiological units
Mr PELLEGRINO, Mrs GODINHO - IPQ, Mr OLIVEIRA - ITN, Mrs FILIPE - IPQ / Portugal

12:00 ▶ New primary standards of optical power operating at room temperature
Mr DONSBERG, Mr SILDOJA, Mr MANOCHERI, Mr MERIMAA, Mr IKONEN - MIKES, Mr PETROFF - Fitecom / Finland

12:25 ▶ Traceability for surface spectral solar ultraviolet radiation
Mr DUBARD, Mr VALIN, Mrs OBATON - LNE / France

12:50  13:45

S2 INDUSTRIAL FLOW MEASUREMENT

Chairman: Isabelle CARE - CETIAT / France • David BENAMOU - CT2M / France

- 9:00 Numerical analysis of the discharge coefficient with disturbers for flow metering accuracy
Mr LARIBI, Mr AIT AMRANE - University of Khemis-Miliana, Mr YOUCEFI - University of Oran / Algeria
- 9:25 Measurement of air flow induct by velocity measurements
Mrs CARE - CETIAT, Mr BONTHOUX, Mr FONTAINE - INRS / France
- 9:50 Evaluation of vortex flowmeters by Exera
Mr DAVID, Mrs CARE - CETIAT, Mr VEAU - EDF / France
- 10:15 CFD and metrology in flow metering: RCS flow measurement with elbow taps and its uncertainty
Mr DENEUX, Mr ARENAS - EDF / France
- 10:40 Estimation of the uncertainty in the conveyance of a dam valves
Mr BLANQUART, Mrs BORNE, Mrs GRIMALDI, Mr FAURE - CNR / France

11:05  11:35

S5 FORCE AND PRESSURE

Chairman: Mouna MAKHLOUF - LCAE / Tunisia

- 11:35 Metrological characterisation of a new standard in gauge pressure in the range 1.5 to 50 MPa
Mr RABAULT - LNE / France
- 12:00 Recent progress in high pressure metrology in Europe
Mr SABUGA - PTB / Germany, Mr PRAZAK - CMI / Czech Republic, Mr RABAULT - LNE / France
- 12:25 Dynamic force calibration by impact excitation
Mr FENG - National Institute of Metrology / China

12:50  13:45

MEDICAL BIOLOGY: MASTERING YOUR ANALYSIS

- 9:00 In France, the evolution of the regulations requires the medical laboratories to be accredited for all its activities of analysis before 2016. This approach requires a **control of the methods of analysis**, the implementation of a **management of the test and measure equipments**, an **estimation of the uncertainties associated with the testing results**. Moreover, it will be interesting to open the discussion beyond French borders and to examine the requirements that meet the medical laboratories in other countries.

Debates about key questions:

- What can be the contribution of metrology in this approach?
- Which methods used in other areas of testing apply or are adaptable?
- Should we consider new approaches and methodologies?
- How to qualify thermocyclers and centrifuges?

Animation: Mr CLAUDEL - CETIAT / France

With: Mr AVELLAN - Anlys / France, Mr MacDONALD - PTB / Germany, Mrs MEHAY - Cofrac / France

Mr PEYRET - AES Chemunex / France, Mrs VASLIN - REIMANN - LNE / France

11:00

11:05  11:35

S6 MATHEMATICAL TOOLS

Chairman: Marc HIMBERT - LCM LNE-CNAM / France

- 11:35 Novel mathematical and statistical approaches to uncertainty evaluation: introducing a new EMRP research project
Mr BAR, Mr ELSTER - PTB / Germany, Mrs MATTHEWS - NPL / UK, Mr PENDRILL - SP / Sweden, Mr WRIGHT - NPL / UK
- 11:55 Uncertainty evaluation by means of joint possibility distributions
Mr FERRERO, Mrs SALICONE, Mr PRIOLI - University of Milano / Italy
- 12:15 Specification and acceptance limits in uncertainty in a shop floor measurement process, in PSA Peugeot Citroën powertrain plants: an industrial witnessing
Mr HUREL - PSA Peugeot Citroën / France
- 12:35 Evaluation of measurement uncertainty for time-dependant quantities
Mr EICHSTADT, Mrs ARENDACKA, Mr LINK, Mr ELSTER - PTB / Germany

12:55  13:45

TUESDAY 8 OCTOBER 2013

RELIABLE CHARACTERISATION METHODOLOGIES FOR ADVANCED MATERIALS

11:35 > 12:50

The micro- and nanoelectronic world is experiencing steady changes in tackling the new challenges in terms of miniaturization, power consumption, power density and processing speed.

New types of inorganic materials are being used in semiconductor industry. There is now a critical need for metrology to provide traceable and quantitative chemical composition measurements of new materials in complex spatial arrangements with buried interfaces and with nm depth resolution.

This workshop will address topics related to the European research project TReND (TRaceable characterisation of Nanostructured Devices) aiming at both the accurate measurement and reliable characterisation of material and device properties at the nanoscale level to support the competitiveness of the European semiconductor and photovoltaics industry. No single technique can provide the traceability required for all kind of materials, therefore the TReND project will include accurate comparisons between a set of different techniques.

TOPICS:

- Traceable chemical and dimensional depth characterization of inorganic nanolayers and buried interfaces,
- Chemical speciation and phase identification of physical location of surfaces, buried nanolayers and interfaces,
- Improved elemental and species depth profiling based on X-ray analytical methods,
- Metrology for 3D nanoscale chemical imaging of inorganic electronic and organic photovoltaic devices,
- Quantitative measurements of electrical properties of the surface and subsurface of organic thin films.

Animation by: Mr BECKHOFF - PTB / Germany and Mrs LEPY - CEA-LNHB / France

With the participation of the following institutes: CMI / Czech Republic, BAM / Germany, LETI / France, IMEC / Belgium, NPL / UK, MFA / Hungary, HZB / Germany



TUESDAY 8 OCTOBER 2013



S7 DOSIMETRY AND RADIOTHERAPY

Chairman: Jean CHAUDAUDRA - ip / France • Damian TWERENBOLD - METAS / Switzerland

- 15:30 Dosimetry standards in medical radiation dosimetry: needs and challenges
Mr MEGHZIFENE - IAEA / Austria
- 15:55 Calibration of dosimeters following standard NF EN ISO 8041
Mrs BARTOLI, Mr AVERLANT, Mr CELLARD - LNE / France
- 16:20 Some thoughts on the extension of the international reference system to β emitters.
Mr RATEL - BIPM
- 16:45 Metrological issues in molecular radiotherapy
Mr D'ARIENZO - ENEA-INMRI / Italy
- 17:10 European project: metrology for radiotherapy using complex radiation fields
Mr BORDY - CEA / France

S8 ADVANCED COORDINATE METROLOGY

Chairman: Rudolf THALMANN - METAS / Switzerland • Robin HART - NPL / UK

- 15:30 Verification of laser tracker angular encoder errors
Mr NASR, Mr FORBES, Mr LEWIS, Mr HUGHES - NPL / UK
- 15:50 Terrestrial Laser Scanner equipment calibration
Mrs PAREJA, Mr DE VICENTE Y OLIVA, Mr GARCIA PABLOS - University of Madrid / Spain
- 16:10 Modeling and evaluation of measurement uncertainty using CMM on flexible mechanical parts
Mr RAYNAUD - INSA, Mr WOLFF - IUT of Lyon, Mr TRAN - INSA / France
- 16:30 3D metrology process control with high-speed helix computed tomography
Mr LUBBEHUSEN - GE Sensing & Inspection Technologies / Germany
- 16:50 Least squares best-fit geometric elements taking into account uncertainty
Mr SMITH, Mr FORBES - NPL / UK
- 17:10 Dynamic referencing in 3D optical metrology for higher accuracy in shop floor conditions
Mr MONY, Mr BROWN, Mr VIALA, Mr LARUE - Creaform / France



MEASUREMENT AND TRACEABILITY IN FOOD PROCESSING

15:30 Measures make it possible to assess product fit for consumption: any measurement error can have dramatic consequences for consumers, as well as for the production companies involved, or even for the whole food processing chain. Other quality measurements also help determine the price of a product. Metrology is widely used in the food processing industry, but its importance remains largely ignored outside of this sector.

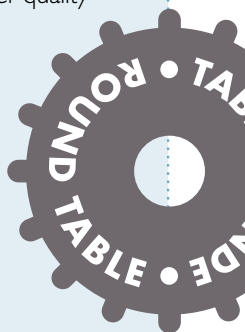
Debates about key questions:

- What about measurement and its implementation in the manufacturing process?
- How to measure and control temperature in a baking oven, how to make a packaging meet a dual requirement, ...?
- Which are the tools of metrology to meet these requirements?

Animation: Mrs SAUVAGEOT - LNE / France

With: Mr CLAUDEL - CETIAT / France, Mr GILMORE - NPL / United Kingdom, Mrs MAUFRAND - Groupe DELPEYRAT / France

17:30 Mrs MAZOYER - ANIA / France, Mr TROSSAT - ACTILAIT / France



POSTER - 13:45 to 15:15

FLOW

- Measurement of ventilation flow rate at terminal device
Mrs CARE - CETIAT / France
- New electromagnetic flowmeters for liquid metal
Mr VELT, Mr MIKHAILOVA - SRC Niiteplopribor / Russia
- Improving liquid flow measurements for drug delivery application
Mr DAVID - CETIAT / France, Mr LUCAS, Mrs MIRZAE - VSL / The Netherlands, Mr GERSL - CMI / Czech Republic, Mr MELVAD - DTI / Denmark, Mr BISSIG - METAS / Switzerland, Mrs BATISTA - IPQ / Portugal, Mr AKSELLI - Tubitak / Turkey
- Calibration and use of syringe pumps
Mrs BATISTA, Mr ALMEIDA, Mrs FILIPE - IPQ, Mr COSTA - Hospital Garcia de Orta / Portugal
- Representativity of flow rate measurements for pressure differential devices
Mr VEAU - EDF / France
- The INRIM water flowrate primary standard revamping
Mr MARINARI, Mr SPAZZINI - INRIM / Italy
- Standard for high viscosity and multiphase liquid flow measurement
Mr WU, Mr LUO - National Metrology Center / Singapore

HEALTH

- Conformity assessment of a high performance liquid chromatography calibration
Mrs VARGAS HOYOS, Mr GONZALEZ HORTA - CMI / Cuba
- Calibration laboratory for low level dosimetry
Mr BERCEA, Mrs CELAREL, Mr CENUSA - NIPNE / Romania
- Design, construction and characterisation of an irradiator to perform calibration of the ambient dose equivalent
Mr OLIVEIRA - IST, Mr CARVALHO - University of Lisbon, Mr CARDOSO, Mr SANTOS - IST / Portugal
- How to adapt metrology for a medical biology laboratory?
Mr ROSO - CT2M / France
- Construction of a large section graphite calorimeter for measurements in small fields used in radiotherapy
Mr DUFRENEIX, Mr BORDY, Mrs DAURES, Mr DELAUNAY, Mr OSTROWSKY - CEA / France
- Metrological approach for the quantification of metalloproteins
Mrs SWART, Mrs ZAKEL - PTB / Germany, Mrs FISICARO - LNE / France, Mrs GOENAGA-INFANTE - LGC / UK
- Traceability of the biochemical measurements results: cases studies on the metrological and practical aspects
Mrs DUTA - National Institute of Metrology / Romania

POSTER - 13:45 to 15:15

HEALTH

- Application of TDCR-Geant4 modeling in the primary measure of activity
Mr THIAM - CEA / France
- Biologically weighted quantities in radiotherapy: an European joint research project
Mr RABUS - PTB / Germany & all
- Development of a new in-water-phantom graphite calorimeter for the measurement of absorbed dose to water in medium energy x-ray beams
Mr PINTO, Mrs PIMPINELLA, Mr GUERRA - ENEA-INMRI / Italy, Mrs ASTEFANOAEI - University of Iasi / Romania, Mr LORETI, Mr QUINI, Mrs TONI - ENEA-INMRI / Italy
- Metrology for dosimetry at IFIN-HH Mr BERCEA, Mrs CELAREL, Mr CENUSA - NIPNE / Romania
- Traceable pH and ISE measurements in clinical chemistry Mr BASTKOWSKI - PTB / Germany
- Evaluation of the beta spectral shapes Mr MOUGEOT - CEA / France

STATISTICS

- New mathematical and statistical approaches to uncertainty evaluation in the context of regression and inverse problems
Mr FISCHER - LNE / France
- Pitfalls in uncertainty estimation: few measurements, non-gaussian distributions
Mrs PETRY - SMD / Belgium
- Covariance in calibration process
Mr DUBOIS - Delta Mu / France
- Direct and inverse calibration curves of measuring instruments: selection and fitting
Mr GRANOVSKIY, Mrs SIRAYA - CSRI Elektropribor / Russia
- Uncertainties estimation of portable measuring arm by Monte Carlo method
Mrs ROMDHANI, Mr LUILLION, Mr HENNEBELLE, Mr FONTAINE - University of Bourgogne / France
- Analysis of a national low dc resistance inter-laboratories comparison
Mr GALLIANA, Mr GASPAROTTO, Mr CAPRA - INRIM / Italy
- Uncertainty associated with measurement of mineral micropollutants in natural and waste waters: differences observed between analytical methods during proficiency testing schemes
Mr DE KUYSSCHE - IUT of Lille, Mr CHARPENTIER - AGLAE, Mr PENHOAT, Mr COURTADE - IUT of Lille, Mr GUARINI - AGLAE / France
- Regpoly: a software for estimating the calibration function and obtaining measurement result based on an indication
Mrs YARDIN - LNE / France

POSTER - 13:45 to 15:15

MECHANICAL QUANTITIES

- Conceptual design of multi-capacity load cell
Mr OSMAN, Mr HASAN, Mr EL-HAKEEM - NIS, Mr KOUTA, Mr ATTIA - University of Cairo / Egypt
- Characterisation of flexure pivots for the French watt balance experiment
Mr PINOT - LNE / France
- Metrological behavior of the load cells work under initial load
Mr ABDELHAKHEEM - NIS / Egypt
- Implementation of bidimensional wall correction using pressure signature at the TA-3 wind tunnel
Mr FERNANDO, Mr DE MORAES, Mrs LUISA, Mr COSTA REIS, Mr MATSUO, Mr CHISAKI - IAE / Brazil
- Use of pooled standard deviation of paired samples in calculating measurement uncertainty by the Monte Carlo method
Mr BECKERT, Mr DOMENEGHETTI, Mr BOND - University of Santa Catarina / Brazil
- Extension of dissemination of mass unit below 1 mg in Romania
Mrs VALCU - National Institute of Metrology / Romania

FOOD PROCESSING

- Feasibility study for the development of a honey reference material
Mrs ZAPPA - ENEA, Mrs DEPERO, Mrs BORGESSE - University of Brescia, Mrs GATTI, Mrs GIORDANO, Mrs ZOANI - ENEA / Italy
- Estimation of uncertainty to the homogeneity study in the certification of a candidate certified reference material in fish matrix
Mr ULRICH, Mr DE S. SARKIS - IPEN / Brazil
- Accreditation with flexible scope of a GC-MS analytical method for the determination of pesticides residues in fruits and vegetables
Mrs NOCENTINI, Mrs FOCARDI, Mrs FORTINI, Mr VONCI, Mrs BIANCALANI - IZSLT / Italy
- Metrological compatibility of alcohol contents measurements
Mr FURTADO, Mrs MADEIRA, Mr PELLEGRINO, Mrs DIAS, Mrs SPOHR, Mrs FILIPE - IPQ / Portugal
- ComptIAA energy project: measurement for energy management in food industries
Mr CLAUDEL - CETIAT / France

SI 0 RISK MANAGEMENT IN MEDICINE

Chairman: Hans KOCH - PTB / Germany • Jean CHAUDAUDRA - ip / France

- 9:00 ▶ Metrology for patients care
Mr CRISTIAN, Mrs STUMPF, Mr MORO - Biocordis / France
- 9:25 ▶ Assessing the risk of minimally invasive surgery: a metrological approach
Mrs NAU, Mr POLLMANN, Mr SCHMITT - University of Aachen / Germany
- 9:50 ▶ Production of a certified reference material for glucose, creatinine and total cholesterol and organisation of a commutability study coupled to a multicentric evaluation of field methods trueness
Mr DELATOUR, Mrs HEUILLET, Mrs LALERE, Mrs VASLIN-REIMANN - LNE / France
- 10:15 ▶ International implementation of ICEB accredited courses in cleanroom metrology
Mrs ALLOUL-MARMOR, Mrs VANDRIESSCHE - Aspec / France
- 10:40 ▶ Metrology for safety MRI
Mr ITTERRMANN - PTB / Germany

11:05 ☕ 11:35

SI 1 SURFACE TEXTURE AND FORM

Chairman: Thierry COOREVITS - Arts et Métiers Paris Tech / France

- 9:00 ▶ Inspection of the cooling towers at EDF: uncertainty of the 3D-shape measurement
Mr MOREAU, Mr BAILLY - EDF / France, Mr GRUSSENMEYER - INSA / France, Mr BORLIN - University of Umea / Sweden, Mr CHAMBRIARD, Mr BOUDON - EDF / France
- 9:20 ▶ Roughness and contamination characterisations of worn surfaces
Mr SILVESTRI, Mrs AZOUIGUI - LCM LNE-CNAM / France, Mr GEE - NPL / UK
- 9:40 ▶ Imperfect drillings measurements on production lines by industrial vision
Mr MAIRESSE, Mr SLIWA, Mr VOISIN - University of Bourgogne / France
- 10:00 ▶ Effect of form error in datum features on evaluated geometries
Mr FORBES, Mr WILSON - NPL, Mr HANSEN, Mr ORCHARD - Rolls-Royce / UK
- 10:20 ▶ Micro roughness measurement in industrial environment. Case of mechanical parts
Mr LEROY - PSA Peugeot Citroën / France
- 10:40 ▶ Development of a new apparatus for cylindrical form measurement with nanometric-level accuracy
Mr VISSIERE - Geomina / France

11:05 ☕ 11:35

MEASUREMENT FUELLING LOW CARBON TECHNOLOGIES

- 9:00 ▶ Countries within the European Union have set themselves ambitious targets to reduce carbon emissions whilst at the same time maintaining a secure energy supply. Low carbon technologies are seen as the panacea moving towards a greener economy with an enormous market potential.

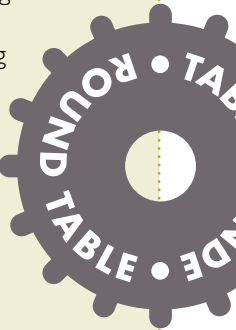
Debates about key questions:

- Whether regulation is required to drive standards and development?
- How measurement can accelerate the development in absence of regulation?
- How the measurement industry can support the implementation of the European Energy Strategy under horizon 2020?

Animation: Mrs BURSTON - NPL / UK

- 11:00 ▶ With the participation of: Axpo Group, BIPM, EDF, European Commission, LNE, Peugeot Citroën Automobiles, Solar Century

11:05 ☕ 11:35



HIGH TEMPERATURE METROLOGY FOR INDUSTRIAL APPLICATIONS

9:00 > 11:00

The measurement of temperatures above 1000 °C is both difficult and yet vital for the success of a wide range of industrial processes: aerospace/space (1300 to 3000 °C), nuclear fuel production and essential nuclear safety testing (1800 °C to 2500 °C), refractory metals production (2500+ °C), silicon carbide, carbon/carbon composites and iron, steel, glass and ceramics manufacture.

Due to growing environmental concerns (emissions/"zero waste") and legislation and in the face of ex-EU competition these industries require improved process efficiency. One of the simplest ways of achieving this is by improved high temperature measurement.

The HiTeMS project (High temperature metrology for industrial applications) started in 2011 and brings together 15 Europeans partners, to develop a suite of methods and techniques for improving the measurement of high temperatures. Problems associated with non-contact thermometry such as window transmission, emissivity and reflected radiation and contact thermometry such as sensor drift and in-situ drift mitigation will be addressed.

Animation by: Mr MACHIN - NPL / UK, Mr SADLI - LCM LNE-CNAM / France

With the participation of the following institutes: NPL, LCM LNE-CNAM, UME

11:05 ☕ 11:35

S13 METROLOGY AT THE HEART OF INNOVATION

Chairman: Marc HIMBERT - LCM LNE-CNAM / France

11:35 > 12:50

New challenges for metrology in chemistry and biology

Martin MILTON - BIPM

R&D in metrology: 2020 prospects

Kamal HOSSAIN - EURAMET

Measurement in work flow
A surprising industrial testimony

12:50  13:45



S14 ENERGY CHALLENGES

Chairman: Maguelonne CHAMBON - LNE / France



15:30 Energy: societal stakes and metrology developments at LNE
Mr FILTZ - LNE / France

15:55 Metrology infrastructure to support the realisation of smart electrical grids
Mr RIETVELD - VSL / The Netherlands

16:20 Low cost power and flow rates measurements in manufacturing plants
Mrs GRAU - EDF / France

16:45 Development of a facility for thermal diffusivity measurements at very high temperature
Mrs FLEURENCE, Mr HAY, Mr DAVEE, Mr HAMEURY, Mr LACIPIERE - LNE / France

17:10 European project: metrology for energy harvesting
Mr FUNCK - PTB / Germany



S15 ENVIRONMENTAL AWARENESS

Chairman: Annarita BALDAN - VSL / The Netherlands • Bernd GUETTLER - PTB / Germany

15:30 European project: traceable measurements for monitoring critical pollutants under the European Water Framework Directive 2000/60/EC
Mrs CABILLIC - LNE / France

15:55 European project: metrology for chemical pollutants in air
Mrs BALDAN - VSL / The Netherlands

16:20 Metrological needs for monitoring aquatic environments: from metrological traceability demonstration to decision making process
Mrs LARDY-FONTAN, Mrs GUIGUES, Mrs LALERE, Mrs VASLIN-REIMANN - LNE / France

16:45 A dissolved oxygen calibration bench
Mrs SALVETAT, Mrs LE BIHAN, Mr COMPERE - Ifremer / France

17:10 Measuring soot particles from automotive exhaust emissions
Mr ANDRES - METAS / Switzerland, Mrs GEHRKENS-JORDAN, Mr THEDENS - PTB / Germany

THE METROLOGICAL REQUIREMENTS SPECIFIC TO HIGH-TECH FIELDS

15:30 The new technological developments of products and industrial processes require higher levels of measurement, and stricter standards in product design and manufacture. At the same time, cost constraints often resulted in limiting metrology applications in companies. Wider use of metrology led to greater effectiveness, **moving it from limited product manufacturing control activities to larger measurement process control in design.**

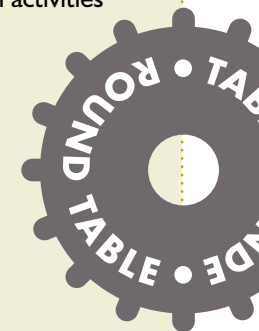
Short presentation and debates about key questions:

- How do metrological requirements meet such needs for technical and cost performance?
- How to define what is 'just necessary'?
- How the current frames of reference used need to be adjusted?
- What new requirements are to be taken into account?

Animation: Mr DAUBENFELD - Peugeot Citroën Automobiles / France

With: Mr BOSVELD - Philips Healthcare / The Netherlands, Mr JENDLY - Symetis / Switzerland,

17:30 Mr LEREBOURS - Safran / France, Mr MARCHIONE Eurocopter / France, Mr CORDUANT - Renault / France



POSTER - 13:45 to 15:15

ENERGY

- Cost-benefit analysis of renewable energy systems under uncertainties
Mr MATHIOULAKIS, Mr PANARAS, Mr BELESSIOTIS - NCSR Demokritos / Greece
- Track condition estimation method uncertainty in vehicle efficiency measurement system
Mr VALJAOTS, Mr LAANEOTS, Mr SELL - University of Tallinn / Estonia
- Building energy efficiency: one metrological support example to vocational education and training
Mr FILTZ - LNE, Mr NICOLAS, Mrs OSMONT, Mr MARQUIE - Lycée Louis Vicat, Mrs VALAURS, Mrs VILLENEUVE - GRETA, Mr COMMENT, Mr PALAPRAT - NEOTIM / France
- Materials metrology for energy and photonics
Mr FILTZ, Mr HAY, Mr DUBARD - LNE / France



POSTER - 13:45 to 15:15

ENVIRONMENT / CHEMISTRY

- The influence of temperature and CO₂ in exhaled breath
Mrs ANGHEL, Mr IACOBESCU - National Institute of Metrology / Romania
- Calibration gases for existing air quality directive pollutants at limits values.
Mrs MACE - LNE / France
- Metrological study of typical Brazilian diesel
Mr FONSECA, Mr BATISTA, Mrs SILVA, Mrs PISSURNO, Mr SOARES, Mrs JESUS, Mr SILVA, Mr DARODA, Mr CUNHA - INMETRO / Brazil
- Control of measurement, analysis and testing processes
Mrs DE LIMA FIORAVANTE - INMETRO / Brazil
- Toward a better traceability of the electrochemical measurements
Mrs CHAMPION - LNE / France
- The effect of salinity level on conductivity sensors calibration
Mrs LE BIHAN, Mrs SALVETAT, Mr COMPERE - Ifremer / France
- Metrological traceability in chemistry: an overview of two INRIM activities
Mrs ORRU, Mrs ROLLE - INRIM / Italy
- Development of gases mole fraction and concentration transference procedures with Fourier spectroscopy
Mr KONOPELKO, Mr BELOBORODOV, Mr RUMIANTSEV, Mr SELUKOV - Mendeleev Institute for Metrology / Russia
- Total reflection X-ray fluorescence spectroscopy for environmental and biological analysis
Mrs BILO, Mrs DEPERO, Mrs BONTEMPI, Mrs BORGESSE - University of Brescia, Mr CINOSI, Mr SERALESSANDRI, Mr SIVIERO - GNR / Italy
- Volatil organic compounds exposure measurement in industrial environment
Mr COUDERT - C&C IngeScience / France
- Two variants of Winkler titration for dissolved oxygen measurements
Mrs SALVETAT, Mrs LE BIHAN, Mr COMPERE - Ifremer / France, Mrs HELM, Mr JALUKSE, Mr LEITO - University of Tartu / Estonia

TRAINING

- 2013, year of the first graduates in metrology in Algeria
Mrs KHANAFI-BENGHALEM - University of Setif / Algeria
- « Instrumentations-measurement-quality » training for careers in the field of high technologies
Mrs RAZET - LCM LNE-CNAM / France

POSTER - 13:45 to 15:15

DIMENSIONAL

- Evaluation of geometrical characteristics and capacity of cylindrical tanks by least square method Mr PRONENKO, Mr SAMOYLENKO - Ukrmetrteststandard / Ukraine
- Comparison of nanoparticles diameter measurements by AFM and SEM Mrs DELVALLEE, Mr FELTIN, Mr DUCOURTIEUX, Mrs TRABELSI - LNE / France
- Development of an atomic force microscope for dimensional nanometrology applications Mr BOUKELLAL, Mr DUCOURTIEUX, Mr POYET - LNE / France
- Interlaboratory comparisons with the calibration of geodetic instruments Mrs GUCEVIC, Mrs DELCEV, Mr OGRIZOVIC - University of Belgrade / Serbia
- Performance studies in micropipettes calibration Mr ALMEIDA, Mrs BATISTA, Mrs FILIPE - IPQ / Portugal
- National comparison in the verification of fuel dispensers Mrs ALMEIDA, Mr ALMEIDA, Mrs BATISTA, Mrs FILIPE, Mr REIS - IPQ / Portugal
- Study the characteristic of the pneumatic measuring system such as Etamic combined with an injection sensor Mr BOUAZIZ - ENP / Algeria
- Air temperature measurements based on the speed of sound to compensate long distance interferometric measurements Mr PISANI, Mrs ASTRUA, Mr ZUCCO - INRIM / Italy
- Associated calibration and uncertainties of large capacity milk cooling tanks Mr HENNEBELLE - University of Bourgogne, Mr COOREVITS - Arts et Métiers Paris Tech / France
- New on site method for flatness calibration of planes Mr RISTONEN, Mr ANDERSSON - University of Tempere / Finland
- Laser standards with the reading range of lengths between 1 and 10³ m in the atmospheric boundary layer Mr KRAVCHENKO - Institut of Metrology / Ukraine
- Uncertainty associated with coordinate measurement in comparator mode Mr FORBES - NPL, Mr MENGOT, Mr JONAS - Renishaw / UK
- How to choose the appropriate means of measuring in dimensional field? Mr PLUMART - Somega-A+ Métrologie / France
- Calibration of laser trackers Mr PIRES - Trescal / France
- Non destructive contactless precision measurement of flatness by interferometry moiré Mr MEGUELLATI - University of Setif / Algeria

S17 ELECTRICAL METROLOGY

Chairman: Isabel GODINHO - IPQ / Portugal • Luc ERARD - LNE / France

- 9:00 ▶ Automated impedance metrology extending the quantum toolbox
Mr PALAFOX - PTB / Germany, & all
- 9:25 ▶ Development of cryogenic current comparators for low-current metrology
Mr RENGEZ, Mr SERON, Mr DEVOILLE, Mr PIQUEMAL - LNE / France
- 9:50 ▶ Scattering parameter metrology: toward an improved traceability of vector network analyser measurements in France
Mrs VINCENT - LNE / France
- 10:15 ▶ Inductive voltage divider calibration with sampling method
Mr CORMINBOEUF - METAS / Switzerland
- 10:40 ▶ Wide frequency range quadrature bridge-comparator
Mr SURDU, Mr LAMEKO, Mr SURDU, Mr KURSIN - Ukrmetrteststandard / Ukraine

11:05  11:35

S18 ACHIEVING TRACEABILITY

Chairman: Georgia HARRIS - NIST / USA • Nieves MEDINA - CEM / Spain

- 9:00 ▶ Impact assessment of the metrology research
Mr ERARD - LNE / France
- 9:25 ▶ Traceability: implementing ILAC P10 and ILAC P14. One accreditation body's perspective
Mr KNAKE, Mrs WRIGHT - AZLA / USA
- 9:50 ▶ A new certified reference material by CETAMA: its certification approach
Mrs RIGAUX, Mr RIVIER, Mrs ROUDIL, Mr ADNET, Mrs EYSSERIC, Mr TUFFERY, Mr RUAS - CEA / France
- 10:15 ▶ Improving the product verification process in advanced manufacturing supply chains
Mr JONES, Mr COOPER - NPL / UK
- 10:40 ▶ Outsourcing of metrology
Mr REALI, Mr VASTY - A+ Métrologie / France

11:05  11:35

METROLOGY CHALLENGES FOR NANOTECHNOLOGIES

9:00 For a decade, nanotechnologies have provided a growing number of potential applications in the key sectors of industry, in health services and environment-related fields. The development of nanomaterials raises issues as regards their use and possible risks to health, environment, and safety. It requires a nanometrology capable of taking up the many metrological challenges nanotechnologies raise. This new science of measurement needs a greater multidisciplinary approach than traditional metrology and the emergence of new concepts. It includes the measurement of dimensional quantities and of other physical or chemical quantities as well.

Short presentation and debates about key questions:

- What are the main issues facing industry in this field?
- A review of the major R&D efforts being carried out currently,
- What are the future developments required to meet the needs of industries?

Animation: Mr FELTIN - Club nanoMétrologie / France

With: Mr FOUCHER - CEA-LETI / France, Mrs ROURE - Ministère en charge de l'Industrie / France, Mr CHAMBONNET - 3S Photonics / France, Mrs NOLLEAU - Meberis Pharma / France, Mr GARNAES - DFM / Denmark, Mr DAI GAOLIANG - PTB / Germany

11:00

11:05  11:35

S20 NANOTECHNOLOGY

Chairman: François PIQUEMAL - LNE / France

11:35 Nanoscale transport measurement with multiple probe scanning tunneling microscopy
Mr GRANDIDIER - CNRS / France

12:00 Two years experience of the nanometrology Club
Mr PIQUEMAL - LNE / France & all.

12:25 Characterisation of epitaxial and CVD graphene with double metal-graphene contacts for gas sensing
Mr NOVIKOV, Mr LEBEDEVA - University of Aalto, Mr WALDEN - Finnish Meteorological Institute, Mr HAMALAINEN, Mr IISAKKA, Mr SATRAPINSKI - MIKES / Finland

12:50  13:45



S21 SOFT METROLOGY

Chairman: Alain GUERDAT - Rolex / Switzerland

13:45 Discrete ordinal and interval scaling and psychometrics
Mr PENDRILL - SP / Sweden

14:10 Measurement of multiparametric quantities at perception of sensory information by living creatures
Mr TAYMANOV, Mrs SAPOZHNIKOVA - Mendeleev Institute for Metrology / Russia

14:35 Objectifying user attention caused by visually perceived product components
Mr KOHLER, Mr SCHMITT, Mr FALK - University of Aachen / Germany

15:00 Correlation between haptical perceived quality characteristics and measured technical parameters for leather surfaces
Mrs NEUMANN, Mr FALK, Mr SCHMITT - University of Aachen / Germany

15:25 Metrology for solid state lighting
Mr NONNE, Mr RENOUX, Mrs ROSSI - LNE / France

S22 TEMPERATURE: SOME LIKE IT HOT

Chairman: Dolores DEL CAMPO - CEM / Spain • Vito FERNICOLA - INRIM / Italy

13:45 Progress report for European project « High temperature metrology for industrial applications »
Mr MACHIN, Mr PEARCE - NPL / UK, Mr VUELBAN - VSL / The Netherlands, Mr STRNAD - CMI / Czech republic, Mr EDLER, Mr ANHALT - PTB / Germany, Mr SADLI - LCM LNE-CNAM / France

14:05 European project: ongoing development at LNE for the thermal conductivity measurement
Mr HAY, Mrs CAPPELLA, Mr DAVEE - LNE / France

14:25 Self-validation techniques for high-temperature thermocouples
Mr FAILLEAU, Mr DEUZE, Mr SADLI, Mr MOKDAD, Mr BOURSON, Mr BRIAUDEAU - LCM LNE-CNAM / France

14:45 A new ultrasonic device for non-intrusive measurement of temperature in pipes at hot operating conditions (up to 450 °C)
Mr KIELCZYNSKI, Mr AIKENS - Research and Productivity Council / Canada

15:05 Construction and in-situ characterisation of high-temperature fixed point cells devoted to industrial applications
Mr SADLI, Mr BOURSON - LCM LNE-CNAM / France, Mr LOWE - NPL / UK

15:25 Toward new high temperature reference materials for calorimetry and thermal analysis
Mr RAZOUK, Mr HAY, Mr HIMBERT - LCM LNE-CNAM / France

RISK MANAGEMENT AND PRODUCT CONFORMITY

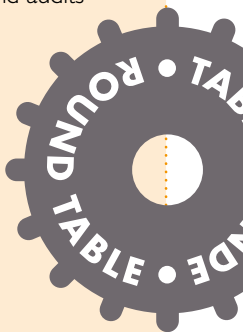
13:45 The assessment of product conformity is intended to guarantee that the products meet both legal requirements and technical standards applicable, as set by regulation authorities. The assessment of conformity covers the processes, tests and audits conducted in the production plants. It contributes to consumer health and safety protection as well as environmental protection. It facilitates trade, while protecting the interests of the parties.

Debates about key questions:

- What is the role of metrology in such business activities?
- How to determine whether the measurement results are within the limits set by the regulation, or by the technical standards applicable to the products
- How to manage the production process to evaluate the conformity and the uncertainties involved in such results, especially near the acceptance levels?
- Which standards used in the assessment of conformity: ISO/CEI 17020 and 17025, the new 2012 version.

Animation: Mr LARQUIER - BEA Métrologie / France

With: Mr GERVAISE - SGS Multilab / France, Mr GORJUP - LNE / France, Mr MORELLEC - GE HEALTHCARE / France
Mr PIERSON - ANSES / France



CLOSING SESSION

15:50 > 16:10



Synthesis, highlights of the Congress
and prospects for metrology.
Best oral and poster papers prizegiving.

Mr FILTZ - LNE, Chairman of the Scientific and Technical Committee of the Congress / France

DRINK

POSTER - 11:15 to 12:45

TEMPERATURE

- Correction for window transmission in radiation thermometry using high temperature fixed points
Mr LOWE, Mr MACHIN - NPL / UK
- Characterisation by spectroscopy of the temperature profile in a shock tube
Mr BONNET, Mr BOUVET, Mr LUC - CEA, Mr HERVE - University of Nanterre / France
- Comparative study between the experimental temperature and the calculated one of couple steel-tungsten carbide animated by a rotation movement
Mrs KHANAFI-BENGHALEM - University of Setif / Algeria
- A European multi-institute project for providing improved and easier traceability to the kelvin
Mrs DEL CAMPO - CEM / Spain & all
- Thermal characterization of vortex multi swirling jet in confined mode with or without obstacle
Mr BRAIKIA - University of Chlef / Algeria
- Thermostatic chambers control in laboratories: the beginning of difficulties?
Mr BLANQUART, Mr CRETINON / France
- Improving references and dissemination in the field of high-temperatures at LNE-CNAM
Mr SADLI - LCM LNE-CNAM / France & all
- Reducing uncertainty in practical temperature calibration based on proposed changes to the mise en pratique for the realisation of the kelvin
Mr LOWE - NPL, Mr WILLMOTT, Mr BROUGHTON - Land Instruments International / UK
- Developpment of a humid air generator based on a dilution principle
Mr GEORGIN, Mr BONDOUX, Mr BERNARD, Mr SALEM - CETIAT / France
- Probabilistic approach for uncertainty propagation through a thermal time constant model in case of natural and forced convection
Mr PIERRAT - LJ Consulting & LJK-LAB, Mr GEORGIN - CETIAT / France

ELECTRICITY

- Electromagnetic characterisation of materials for industrial applications up to 110 GHz
Mr NDIAYE - LNE / France
- Measurement of rail road electrical energy
Mr AGAZAR, Mr POLETAEFF, Mr FORTUNE, Mrs BLANC, Mr FEUILLATRE - LNE / France

POSTER - 11:15 to 12:45

ELECTRICITY

- 1 Ω -10 k Ω high accuracy standard setup for calibration of multifunction electrical instruments
Mr CAPRA, Mr GALLIANA, Mr LANZILLOTTI, Mr SERAZIO - INRIM / Italy
- Grid-based computational algorithm for accurate AC conductivity measurements
Mr POKATILOV, Mr PARKER, Mr KUBARSEPP - University of Tallin and Metroserf, Mr MARTENS - University of Tallin, Mr KOLYSHKIN - University of Riga / Estonia
- Automatic bench for current transformer calibration
Mr BELIERES, Mr AGAZAR - LNE / France
- Traceability of S-parameter measurement at intermediate frequencies (100 kHz – 100 MHz).
Mr ZIADE, Mr POLETAEFF, Mr LITWIN, Mrs VINCENT-DROUAR, Mr ALLAL - LNE / France
- Improvement of the accuracy of the logometric impedance meters in wide frequency range
Mr SURDU, Mr LAMEKO, Mr PANICH - Ukrmetrteststandard / Ukraine
- Development of a reference Phasor Measurement Unit for the grid monitoring
Mr NDILIMABAKA, Mrs BLANC - LNE / France
- Conception of a platform for magnetic compass calibration
Mr LE MENN - SHOM / France
- An interlaboratory comparison programme on high frequency electromagnetic field measurements in a controllable environment performed in Greece
Mr KARABETSOS - Greek Atomic Energy Commission / Greece
- Calibration system developed for harmonic measurements with DFT techniques
Mr PINTO, Mr STEMMER, Mrs FOIATTO - University of Rio Grande do Sul / Brazil
- Development of an Arduino shield for measurement and characterisation of resistive sensors
Mr DONATO, Mr ALOISIO, Mr NERI - University of Messina, Mrs LATINO - CNR, Mr CAPRA, Mr GALLIANA - INRIM / Italy
- Institutional system of the federal electricity commission
Mrs MONTOYA, Mrs SANTAELLA - Comision Federal de Electricidad / Mexico

TIME / FREQUENCY

- Time as unique base quantity
Mr DRAGAN - GDF DATA BANKS / Romania
- Compact atomic clock prototype based on coherent population trapping
Mr DANET, Mr YUN, Mrs KOZLOVA, Mr GUERANDEL, Mr DE CLERCQ - LNE-SYRTE / France
- Time and frequency measurement standards of Ukraine
Mr NEYZHMAKOV, Mr ROMANKO, Mr PROKOPOV - Institute of Metrology / Ukraine

POSTER - 11:15 to 12:45

MANAGEMENT

- Internationally accepted IT security standards and legal metrology
Mr THIEL, Mr HARTMANN, Mr GROTTKER, Mr RICHTER - PTB / Germany
- Installation of a reference material production laboratory
Mrs BOTHOREL - Manumasure / France
- Club of accredited laboratories: sharing experience, crossed audits and improvement of the quality of measurements
Mr BOUILLON - CT2M / France
- Centre for intercomparisons
Mrs HAJRADINOVIC, Mrs JONASSON - SP / Sweden
- Methods validation: NF T90-210 or NF V03-110?
Mr GEYNET - CT2M / France

OPTICS AND SOFT METROLOGY

- A new approach to bandwidth correction in spectrometer measurements using the Richardson-Lucy method
Mr EICHSTADT, Mr SCHMAHLING, Mr WUBBELER, Mr KRUGER, Mr ELSTER - PTB / Germany
- Strain fields measurement of non rigid solid by scanning laser coupled with a camera
Mr RAHEL, Mr WANG, Mr ROY, Mr FONTAINE - University of Bourgogne / France
- Hyperspectral imaging: a tool for biological measurements
Mr PISANI, Mr ZUCCO, Mrs CARICATO, Mrs EGIDI - INRIM / Italy
- A high resolution set up devoted to the measurement of the bidirectional reflectance distribution function around the specular peak at LNE-CNAM
Mrs OUARETS - LCM LNE-CNAM / France
- Characterisation of the cryogenic radiometer at new laser wavelengths
Mrs COUTIN, Mr ROUGIE - LCM LNE-CNAM / France
- Traceable radiometry for remote measurement of climate parameters
Mr ETIENNE, Mr DUBARD - LNE / France
- News from the IPQ's primary photometry laboratory
Mr PIRES, Mr NUNES, Mrs LAUNDOS, Mr PELLEGRINO, Mrs FILIPE - IPQ / Portugal
- Assurance of metrological traceability of results obtained by the use of computerised instruments
Mrs SAPOZHNIKOVA, Mr TAYMANOV - Mendeleyev Institute for Metrology / Russia



Get the better of your metrology

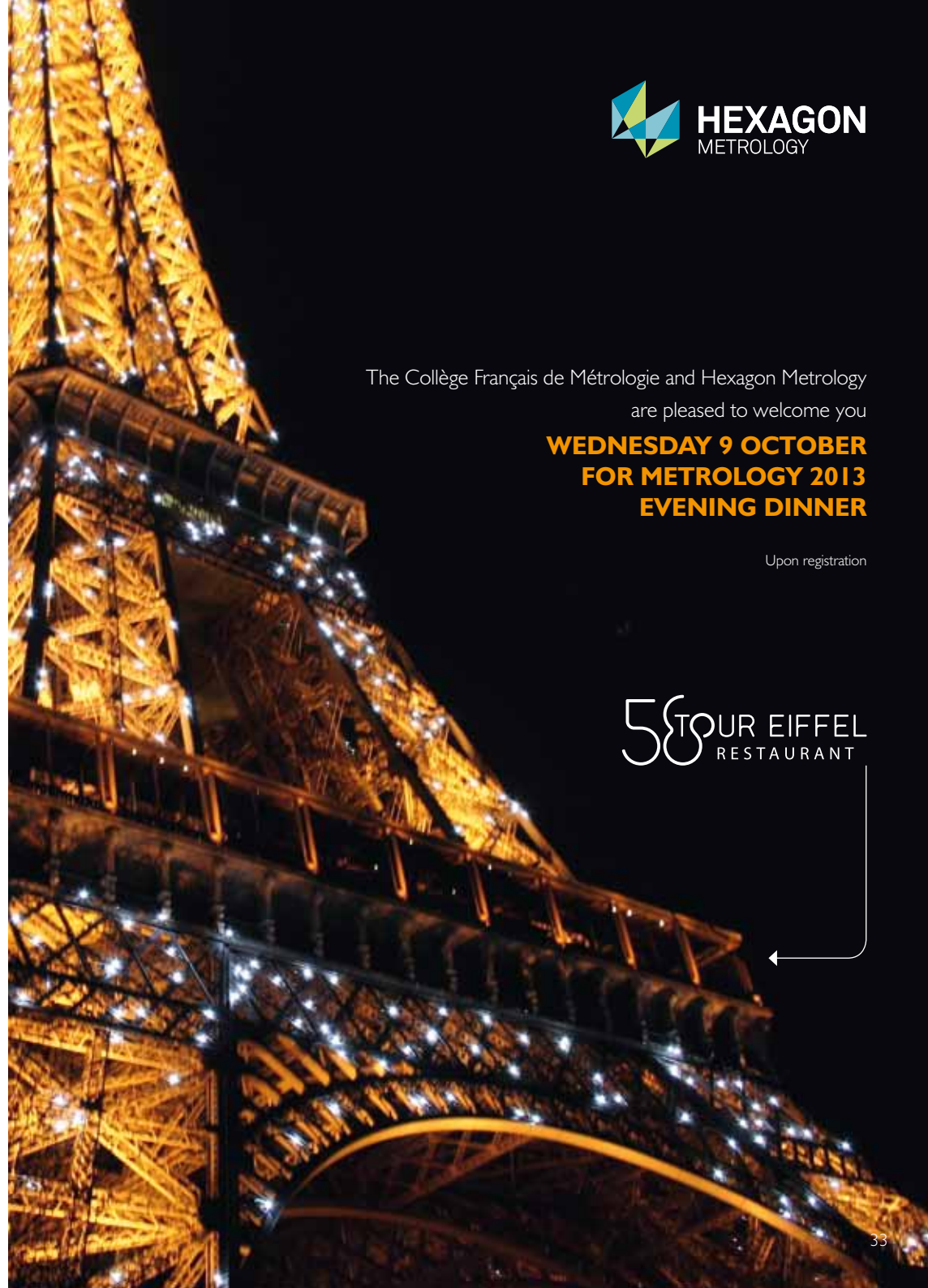


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**WEDNESDAY 9 OCTOBER
FOR METROLOGY 2013
EVENING DINNER**

Upon registration

50 TOUR EIFFEL RESTAURANT

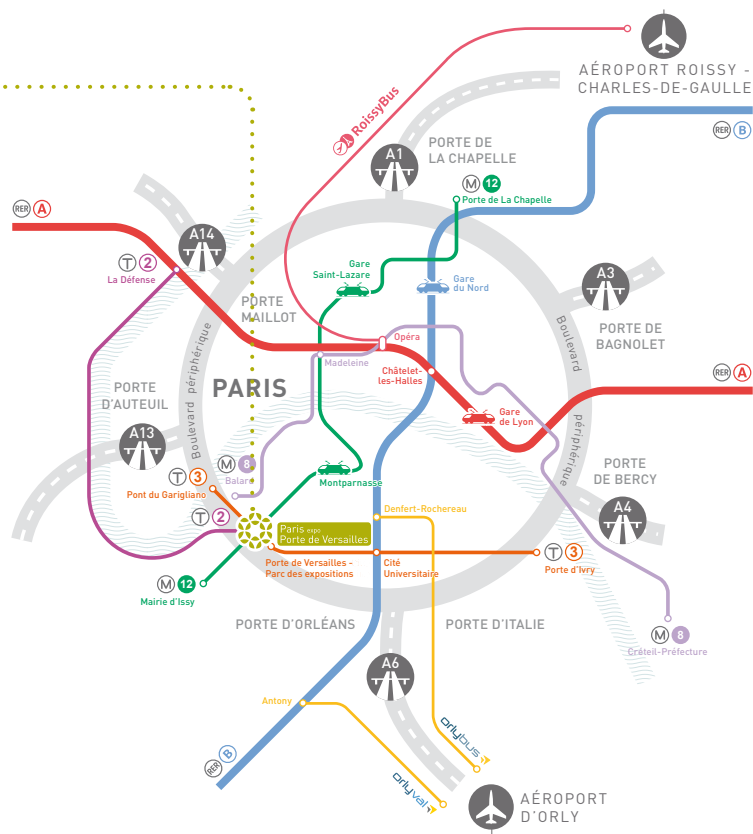




▶ LOCATION OF THE CONGRESS

PARIS EXPO PORTE DE VERSAILLES - Pavillon 7.2

1 place de la Porte de Versailles - 75015 PARIS - France - www.viparis.com



▶ LANGUAGES SEMINAR

All presentations will be held in **French** or **English** and will be simultaneously translated.

▶ HOTELS

Information on www.metrologie2013.com, link "**How to get there**".

▶ FEES

Congress fees include:

- participation in the conferences with simultaneous translation (French, English),
- seminar proceedings,
- access to the exhibition,
- catalogue of the exhibition,
- coffee breaks, cocktails and lunches on October 8, 9 and 10,
- one technical visit.

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Payment by CB (Mastercard, Visa, Gold, American Express) or by cash will exceptionally be accepted at the desk.

▶ CANCELLATIONS

Cancellations must be sent to the General Secretary before September 20, 2013. The seminar fee payment will then be returned by bank transfer after the congress with a deduction of 120€ for administration costs. Cancellations received after September 20, 2013 will not be refunded.

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REGISTRATION FORM



| 7 | 8 | 9 | 10 |
OCTOBER 2013

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TUESDAY 8 OCTOBER

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WEDNESDAY 9 OCTOBER

10 11 TR TRend 13 14 15 TR

THURSDAY 10 OCTOBER

17 18 TR 20 21 22 TR

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Limited places, registrations allocated in order of booking

LNE Tuesday 8, afternoon

CEA Wednesday 9, afternoon

PEUGEOT Thursday 6, morning

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