

PARIS | FRANCE

3 | 4 | 5 | 6 **OCTOBER** 2011

PROGRAMME

**15** | CONGRÈS INTERNATIONAL  
DE MÉTROLOGIE

INTERNATIONAL CONGRESS OF  
**METROLOGY**

Innovation | Exchanges | Technical Visits

**ADDED VALUE**  
THROUGH **BETTER MEASUREMENT**

Held jointly with



[www.metrologie2011.com](http://www.metrologie2011.com)



# 15<sup>e</sup> CONGRÈS INTERNATIONAL DE MÉTROLOGIE

## INTERNATIONAL CONGRESS OF METROLOGY

Exhibition | Exchanges | Technical Visits

is organised by the Collège Français de Métrologie with the support of:



Press partners:





# 15 | INTERNATIONAL | CONGRESS | OF METROLOGY |

9:00

11:05

11:35

12:50

MONDAY 3

TUESDAY 4

**S1** Liquid flow measurement



**S4** Gas flow measurement

**S2** Mechanical and related quantities



**S5** Nano and microtechnologies

**S3**  **Temperature control in the health field**



**S6** Metrology for health


WEDNESDAY 5

**S11** Industrial temperature



**S12** New developments in dimensional metrology



**S13**  **Tomorrow's careers in metrology ?**



**S14**  
**METROLOGY 2020**

 **Technical visit LNE**

THURSDAY 6

**S18** Uncertainties and capabilities




## POSTERS

- Management
- Electricity
- Chemistry
- Dimensional

**S19** Issues and strategies

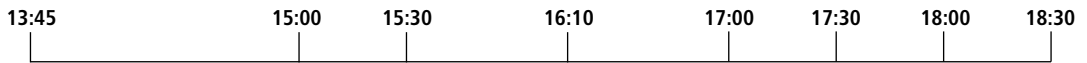


**S20**  **Controlling and saving energy in industry**







**S21** Photonics and perception metrology


 **Technical visit SYNCHROTRON**



<b>OPENING OF THE WELCOME DESK</b>	<b>OPENING SESSION</b>	<b>DRINK</b>
------------------------------------	------------------------	--------------

<b>POSTERS</b> <ul style="list-style-type: none"> <li>• Radioprotection / Health</li> <li>• Flow</li> <li>• Mechanical quantities</li> <li>• New definition for the kg: watt balance</li> </ul>	<b>S7</b> Radioprotection / Dosimetry		<b>COCKTAIL</b>	
	<b>S8</b> Metrology and environment	<b>S9</b> European research Programmes		
	<b>S10</b>  <b>Medical biology and accreditation: the keys to success</b>			
 <b>Technical visit EDF</b>				

<b>POSTERS</b> <ul style="list-style-type: none"> <li>• Temperature</li> <li>• Optics / Sensory metrology</li> <li>• Statistics</li> <li>• Training</li> </ul>	<b>S15</b> Statistical concepts and tools	<b>GALA</b>	
	<b>S16</b> Source of energy and metrology		
	<b>S17</b>  <b>R&amp;D, production and metrology</b>		
 <b>Technical visit SNCF</b>			

<b>S22</b> Performance of 3D measurements	<b>CLOSING SESSION</b>	<b>DRINK</b>
<b>S23</b> Extreme electrical measurements		
<b>S24</b>  <b>Better measurement for lower costs</b>		



## ORGANISING COMMITTEE

**Chairman** Antonio MAZZEI - IMQ (FR)

### Members

Vincent BOUDY - AP HP (FR)  
Valérick CASSAGNE - TOTAL (FR)  
Maguelonne CHAMBON - LNE (FR)  
Pierre CLAUDEL - CETIAT (FR)  
Philippe DE RYCK - Stork Intermed (BE)  
Susan EVANS - NPL (UK)  
Jean-Rémy FILTZ - LNE (FR)  
Carol HOCKERT - NIST et NCSLI (US)  
Daniel JULLIEN - Hexagon Metrology (FR)

Bernard LARQUIER - BEA Métrologie (FR)  
Jean-Marc LINARES - Université de la Méditerranée (FR)  
Jean-François MAGANA - IP (FR)  
Nathalie OUDIN-BARROIS - RENAULT (FR)  
Leslie PENDRILL - Euramet et SP (SE)  
Véronique REGRAGUI - SNCF (FR)  
Patrick REPOSEUR - ACAC (FR)  
Michael VANDENHENDE - GSK Biologicals (BE)  
José VEAU - EDF (FR)

## SCIENTIFIC AND TECHNICAL COMMITTEE

**Chairman** Mrs CHAMBON - LNE (FR)

### Members

Mr BENHAMOU - CT2M (FR)  
Mrs CARE - CETIAT (FR)  
Mr CHAUAUDRA - IP (FR)  
Mr COOREVITS - Arts & Métiers Paris Tech (FR)  
Mr FERDINAND - CEA (FR)  
Mr FISCHER - LNE (FR)  
Mr GUERDAT - Montres Rolex (CH)  
Mr GUETTLER, Mr KOCH - PTB (DE)  
Mr HIMBERT, Mrs RENAOT - LCM LNE-CNAM (FR)  
Mrs HOCKERT - NIST (US)  
Mr IKONEN - MIKES (FI)  
Mr JONES, Mr TOPLEY - NPL (UK)  
Mrs LANDA - INERIS (FR)

Mr LINARES - Université de Marseille (FR)  
Mr MAGANA - IP (FR)  
Mr MONAVON - Eurocopter (FR)  
Mr NUNES - IP (PT)  
Mr PECCHIOLI - COFRAC (FR)  
Mr PENDRILL - SP (SE)  
Mr PENIN - Norma System (FR)  
Mr PERRUCHET - UTAC (FR)  
Mrs SALVETAT - Ifremer (FR)  
Mrs THOMAS - BIPM (FR)  
Mrs TONIAZZO - Centre de Recherche Public Tudor (LU)  
Mr TWERENBOLD - METAS (CH)

## General Secretariat

Sandrine GAZAL - Collège Français de Métrologie  
429 rue de l'Industrie - CS 70003 - 34078 Montpellier Cedex 3 / France  
☎ : + 33 (0)4 67 06 20 36 - 📠 + 33 (0)4 67 06 20 35  
sandrine.gazal@cfmetrologie.com - www.metrologie2011.com

|| CONGRESS OPENING ||

17:00

Congress opening speeches

Mr CLAUDEL - CETIAT, Chairman of the Collège Français de Métrologie and Mr MAZZEI - IMQ, Chairman of Metrology 2011

Measurement to support climate science and a low carbon future

Mr SENÉ - NPL / United Kingdom

INAUGURATION of the EXHIBITION || || ||  
and COCKTAILS || || ||

18:30

|| FIRST LEVEL SPONSORS || || ||



**Hexagon Metrology** is, for the second time after 2009, one of the two first level sponsors of the International Congress of Metrology. This single event in our field brings together both the industry and the world of research and international standardisation. This concentration of experts during three days allows the exchanges between these unparalleled worlds that coexist without always understanding. Facilitating these exchanges is the reason for the success of the International Congress of Metrology. Hexagon Metrology is proud to share this success with the organising team

**Daniel Jullien**  
Managing Director, Hexagon Metrology



**Trescal** supports the International Congress of Metrology as a leading sponsor of the event, once again after 2005.

The congress is the place that brings together experts in metrology: an international event and Trescal, expert and specialist in global metrology, must be present. We meet our clients and prospects who can discover the extent of our unique range. It is also a special time for our experts and metrologists to exchange with their counterparts.

**Catherine Bourdoncle**  
Europe Communication Director, Trescal

| | | | **S1 | LIQUID FLOW MEASUREMENT** | | | |

Chairman: Isabelle CARE - CETIAT / France

**9:00** French water flow calibration facility: first experimental results at low flow rate  
Mr DAVID - CETIAT / France

**9:25** Experience feedback in the flow rate measurement by an orifice plate at EDF  
Mr VEAU, Mr PIEDFER - EDF / France

**9:50** Metrology for liquefied natural gas  
Mr KERKHOF - VSL / The Netherlands

**10:15** Modelling of measurement weirs of the Vallon Dol supply facility  
Mrs TOUZET, Mr VIALA - SOCIETE DU CANAL DE PROVENCE / France

**10:40** The specification, selection and use of liquid flow rate measuring devices  
Mr FERTELL - PROTEUS INDUSTRIES / United States of America

11:05  11:35



| | | | **S4 | GAS FLOW MEASUREMENT** | | | |

Chairman: David BENHAMOU - CT2M / France

**11:35** On site airflow measurement  
Mrs CARE - CETIAT / France

**12:00** 3D directional velocity measurement of an airflow  
Mr BARRE - KIMO / France

**12:25** Calibration of a measuring instrument in compliance with a new definition of VIM 2007.  
Application to a flow meter of the LNE gas flow laboratory  
Mrs YARDIN - LNE / France

12:50  13:45

| | | | **S2 | MECHANICAL AND RELATED QUANTITIES** | | | |

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

**9:00** Traceable dynamic measurement of mechanical quantities: a new European collaborative project  
Mrs BARTOLI - LNE / France, Mr BEUG, Mr BRUNS, Mr KOBUSH, Mr SCHLEGEL, Mr ELSTER - PTB / Germany, Mr ESWARD, Mr KNOTT - NPL / United Kingdom

**9:20** Uncertainty evaluation of a calibration bench for dynamic pressure sensors  
Mr LUC, Mr BOUVET, Mr MIOSSEC - CEA / France

**9:40** Creating a calibrating chain in order to evaluate automated blood pressure devices  
Mr FAHD, Mrs MORGADO - LNE, Mr BOIRON, Mr DELPLANO - IRPHE, Mr AIT MOKHTAR, Mr PAGANELLI - APHM / France

**10:00** Influence of the liquid properties in volumetric instrument accuracy  
Mrs FURTADO, Mr ALMEIDA, Mrs BATISTA, Mrs SPOHR, Mrs FILIPE - IPQ / Portugal

**10:20** Electro-mechanical device for generating small forces  
Mr KHELIFA - LCM LNE-CNAM / France

**10:40** Fully automated calibration factory for calipers and micrometers  
Mr SAECKER - METROLOGY SERVICE-BASIS / Germany

11:05  11:35

| | | | **S5 | NANO AND MICROTECHNOLOGIES** | | | |

Chairman: Claudine THOMAS - BIPM

**11:35** Atomic force microscopy measurement of carbon nanotubes diameter by comparison with reference gold nanoparticles  
Mrs PETRY - SPF ECONOMIE / Belgium

**12:00** Calibration of optical particle counters up to 5 µm  
Mr ANDRES, Mr AUDERSET, Mr SCHLATTER - METAS / Switzerland

**12:25** Metrological characterisation of manufactured titanium dioxide nanoparticles  
Mr MOTZKUS, Mr IDRAC, Mrs MACE, Mrs VASLIN-REIMANN - LNE, Mr AUSSET, Mr MAILLE - CNRS / France

12:50  13:45

## | S3 | TEMPERATURE CONTROL IN THE HEALTH FIELD |

**9:00** Adequate preservation of products such as drugs and vaccines, reagents, samples, organs and tissues is a major issue in the health field. This requires **control and management of environmental conditions**: temperature, moisture, use of equipment such as drying ovens, refrigerators and freezers, fixed or mobile for transport.

Short presentations and debates about key questions:

- How to ensure stable and uniform working conditions for such equipment?
- What are the most suitable **qualification methods**?
- How to maintain **product temperature under control** across all the steps of its processing, including transport?

**11:00** • Which means of measurement shall be used to **monitor and record** product temperature?

Animation: Mr CLAUDEL - CETIAT

With Mr BOUDY - APHP, Mr CARTALAS - JRI Maxant, Mr CAVALIER - Cemafrroid, Mr CINIER

- Froilabo, Mr GEORGIN - CETIAT, Mr LABRANQUE - Sofrigam, Mr VANDENHENDE - GSK Biologicals

11:05  11:35

## | | | | S6 | METROLOGY FOR HEALTH | | | |

Chairman: Hans KOCH - PTB / Germany

**11:35** Medical breath analysis using a highly sensitive mid-infrared cavity ring down spectrometer

Mr PERSIJN - VSL / The Netherlands

**12:00** How to perform traceable measurements for biomarkers quantification?

Mr DELATOUR, Mrs LALERE, Mrs VASLIN-REIMANN - LNE / France

**12:25** Development of a spectrometry detection system to characterise the quality and purity of beams in dosimetry for the energies lower than 300 keV

Mr PLAGNARD - CEA / France

12:50  13:45

## | | | | **S7** | **RADIOPROTECTION / DOSIMETRY** | | | |

Chairman: Jean CHAUDAUDRA - IP / France

- 15:30** Determination of decision threshold, detection limit and limits of the confidence interval for measurements of ionising radiation: evolution and impacts for laboratories of the ISO 11929:2010 standard  
Mrs DOMENECH - CT2M / France
- 15:50** A new primary standard developed at the ENEA-INMRI to measure the absorbed dose due to low dose rate brachytherapy sources emitting low energy photons, as <sup>125</sup>I  
Mrs TONI - ENEA / Italie
- 16:10** Establishment of absorbed dose to water references for medium energy x-rays by water calorimetry at LNE-LNHB  
Mr PERICHON, Mr BORDY, Mrs DAURES, Mr DENOZIERE, Mr OSTROWSKY, Mr RAPP - CEA / France
- 16:30** Use of radiochromic films for 2D dose verification prior to radiotherapy  
Mr EL BAROUKY, Mrs FOURNIER-BIDOZ, Mr MAZAL, Mr ROSENWALD - CURIE INSTITUTE / France
- 16:50** Calibration facility for low-level dose-rate calibration  
Mr BERCEA, Mrs CELAREL, Mr CENUSA, Mr MARGINEANU, Mrs STOCHIOIU, Mr TUDOR - IFIN-HH / Romania
- 17:10** Use of consensus standards to ensure traceability of some quantities in ionising radiation and other fields  
Mr SUDER - COFRAC / France



## | | | | **S8** | METROLOGY AND ENVIRONMENT | | | |

Chairman: Bernd GUETTLER - PTB / Germany

**15:30** Method validation and uncertainty estimation in the determination of heavy metals in feeds by using ICP MS technique

Mrs NOCENTINI, Mrs FOCARDI, Mrs FORTINI - IZSLT/ Italy

**15:55** Metrology of environmental pollutants: stability of gas mixtures

Mrs FARINHA, Mrs DIAS, Mrs FILIPE - IPQ / Portugal

**16:20** Joint Research Project ENV08: Traceable measurements for monitoring critical pollutants under the European Water Framework Directive 2000/60/EC

Mrs CABILLIC, Mrs PHILIPP, Mr SCHIEL, Mr EMTEBORG, Mrs GOENANA-INFANTE, Mrs LALERE - LNE / France



## | | | | **S9** | EUROPEAN METROLOGY RESEARCH PROGRAMMES: MEETING THE INDUSTRIAL CHALLENGES OF TOMORROW | | | |

Chairman: Duncan JARVIS - EURAMET and NPL / United Kingdom

**17:00** Short presentation about keys issues of the European Metrology Research Programmes:

- Overview of the Programmes
- Metrology research for tomorrow's medicine
- Metrology for industrial nanotechnology

**18:00** • Industrial high precision length measurements for large objects

## | S10 | MEDICAL BIOLOGY AND ACCREDITATION: THE KEYS TO SUCCESS |

**15:30** New regulation in France will require medical laboratories to receive full accreditation for their test operations before 2016 based on the requirements of NF ISO 15189 standard. The key factors of success in such accreditation are: **control of test methods**, management and control of testing and measuring equipment.

Short presentations and debates about key questions:

- How to **estimate the uncertainties** associated with the test results?
- Which **methods used in other fields** can be of help to **medical laboratories**?
- What contribution can metrology make to such process?

**17:30**

Animation : Mr BOUDY - APHP

With Mr ALDEBERT - Biomérieux, Mr DELATOUR - LNE, Mrs LEBLANC - Roma, Mrs MEHAY - COFRAC, Mr REYNAUD - CETIAT, Mr ZINS - LABAC



## ■ POSTERS | | | 13:45 to 15:15

### | RADIOPROTECTION | HEALTH | | | |

- Electrical characterisation of an ionisation chamber for absolute measurement of the absorbed dose for beta ray  
Mr BERCEA, Mr CENUSA, Mrs CELAREL - IFIN-HH / Romania
- Performance of a homemade ionisation chamber with a 0.34 cm<sup>3</sup> volume for <sup>60</sup>Co beams  
Mr NEVES, Mrs PERINI, Mrs CALDAS - CNEN, Mrs KHOURY - UNIVERSITY OF PERNAMBUCO / Brazil
- Accuracy in TLD audit of modern radiotherapy systems  
Mr VERES - EQUAL-ESTRO / France
- Towards a general framework to assess and promote technologies and services for ageing, health and autonomy  
Mr VUILLERME - CNRS / France

### | FLOW | | | |

- New top link in traceability chain for hot water meters in Ukraine  
Mr KUZMENKO, Mr PRONENKO - UKRMETRETESTSTANDARD / Ukraine
- Metrological control applied to flow computers: Brazilian case study  
Mr FERREIRA LAZARI, Mr ALVES DE AGUIAR, Mr DE ALMEDIA - INMETRO / Brazil
- Ultrasonic flow rate measurement through a composite pipeline in a nuclear power plant  
Mr VEAU, Mr ULPAT - EDF / France
- Evaluation of water flow measurement performance of portable ultrasonic flow meter technology  
Mr DAVID - CETIAT / France
- Evaluation of anemometers by EXERA  
Mrs CARE - CETIAT, Mr VEAU - EDF / France
- Numerical experimentation of the performances of the tube bundle flow conditioner on flow measurement  
Mr LARIBI, Mr CHADLI - UNIVERSITY OF KHEMIS / Algeria

■ **POSTERS** | | | **13:45 to 15:15**

| **MECHANICAL QUANTITIES** | | | |

- Investigation on experimental methods for oil-film thickness measurements in the piston-cylinder assembly  
Mr BENHAMOU, Mr BENAROUS - UNIVERSITY OF CHLEF, Mr BOUNIF - UNIVERSITY OF ORAN / Algeria,  
Mr MASPEYROT - UNIVERSITY OF POITIERS / France
- Issues and problems of accreditation in legal metrology for weighing  
Mr BOUILLON - CT2M / France
- Automated test equipment monitoring and exchange of calibration date with Primas Exchange according to the VDI/VDE 2623  
Mr KANSY - TESTO INDUSTRIAL SERVICES / Germany
- Ensemble of reference mass standards: dissemination of the mass unit after the redefinition of the kilogram  
Mrs DE MIRANDES, Mr IDREES, Mrs BARAT, Mr PICARD - BIPM
- Portuguese comparisons in pressure  
Mrs SPOHR, Mrs FILIPE - IPQ / Portugal
- Laser interferometry with phase amplitude measurements for absolute accelerometers calibration  
Mr OLIVEIRA, Mrs GODINHO, Mr RIBEIRO, Mrs FILIPE - IPQ / Portugal
- Calibration of large proving tank: method validation  
Mr ALMEIDA, Mrs BATISTA, Mrs FILIPE - IPQ / Portugal
- Mass standard conservation and transfer under vacuum or inert gas using adapted means  
Mr SILVESTRI, Mr PINOT - LCM LNE-CNAM / France
- Comparison of the different methodologies and standards to estimate the uncertainty of a weighing result  
Mrs DOMENECH - CT2M / France
- Use of regression to determine the errors of indication and associated uncertainty, starting from a calibration certificate  
Mrs VALCU - NATIONAL INSTITUTE OF METROLOGY / Romania
- A versatile vacuum chamber for French metrology  
Mr PINOT - LCM LNE-CNAM / France

■ **POSTERS** | | | **13:45 to 15:15**

| **NEW DEFINITION FOR THE KG: WATT BALANCE** | | | |

- Liquid sloshing dampers for the French watt balance experiment  
Mr PINOT - LCM LNE-CNAM / France
- A method to determine misalignment effects in watt balance  
Mr GENEVES - LNE / France
- Optical sensors for the LNE watt balance experiment  
Mr BIELSA - LNE / France
- Improvements in the BIPM watt balance  
Mrs FANG, Mr KISS, Mr ROBERTSSON, Mr BRADLEY, Mrs DE MIRANDES, Mr PICARD, Mr SOLVE,  
Mr STOCK - BIPM
- Data acquisition and synchronisation in the BIPM watt balance  
Mrs FANG, Mr KISS, Mr ROBERTSSON, Mr BRADLEY, Mrs DE MIRANDES, Mr PICARD, Mr SOLVE,  
Mr STOCK - BIPM
- Engineering of a super conducting moving coil system for the BIPM watt balance  
Mr BRADLEY, Mrs DE MIRANDES, Mrs FANG, Mr KISS, Mr PICARD, Mr STOCK - BIPM



| | | | **S11** | **INDUSTRIAL TEMPERATURE** | | | |

Chairman: Florence SALVETAT - Ifremer / France

**9:00** HiTeMS: a pan-european project to solve high temperature measurement problems in industry

Mr MACHIN, Mr PEARCE - NPL / United Kingdom, Mr ANHALT, Mr EDLER - PTB / Germany, Mr VAN DER HAM - VSL / The Netherlands, Mr SADLI - LCM LNE-CNAM / France, Mr STRNAD - CMI / Czech Republic

**9:25** Improving high temperature measurements for the nuclear industry at the European level

Mr SADLI, Mr FAILLEAU - LCM LNE-CNAM, Mr FOURREZ - THERMOCOAX / France, Mrs DEL CAMPO - CEM / Spain, Mr DE PODESTA, Mr PEARCE - NPL, Mrs SCERVINI - UNIVERSITY OF CAMBRIDGE / United Kingdom

**9:50** Temperature measurement dedicated to the compliance of the perishable foodstuff cold chain. Is metrological performance adequate?

Mr DEVIN, Mr CAVALIER - CEMAFROID / France

**10:15** First steps in commercially-manufactured humidity calibrators

Mr GEORGIN - CETIAT / France

**10:40** The contribution of the metrology of thermo physical properties of materials in automotive design

Mr HAY, Mr HAMEURY, Mr SCOARNEC, Mr DAVEE, Mr GRELARD - LNE / France

11:05  11:35



I I I I **S12** | **NEW DEVELOPMENTS**  
**IN DIMENSIONAL METROLOGY** | I I I I

Chairman: Alain Guerdat - Manufactures Montres Rolex / Switzerland

**9:00** Hand instruments for dimensional measuring: inter laboratory comparisons  
Mrs SARAIVA, Mrs EUSEBIO, Mrs GENTIL, Mrs FILIPE - IPQ / Portugal

**9:25** New method to perform inter laboratory comparison of CMM articulated arm  
Mr PIRATELLI-FILHO, Mr FERNANDES - UNIVERSITY OF BRASILIA, Mrs ARENCIBIA - UNIVERSITY OF  
UBERLANDIA / Brazil

**9:50** Establishment of measurement uncertainties in laser scan arms  
Mr GUILLOT - UNIVERSITY OF LAVAL, Mr EL OUAFI - UNIVERSITY OF QUEBEC / Canada

**10:15** Evaluation of metrology technologies for free form surfaces  
Mrs ARAMBULA, Mr SILLER, Mr DE CHIFFRE, Mr RODRIGUEZ CIRO - ITESM / Mexico

**10:40** Global navigation satellite system equipment calibration  
Mrs PAREJA, Mr DE VICENTE Y OLIVIA - UNIVERSITY OF MADRID / Spain

**11:05**  **11:35**



## | S13 | TOMORROW'S CAREERS IN METROLOGY? |

9:00

The role of metrologists in the future is a fundamental issue: will they remain operators performing simple tasks to bring corrections to company operations, or will they play a **significant role in shaping the industrial company strategy**? Permanent search for lowering risks and improving performance should lead to greater consideration of metrology issues when setting up the industrial company's strategy.

Short presentations and debates about key questions:

- Which **training programmes** are currently available?
- What are **the real needs as expressed by companies, SMEs and large multinational groups**?

11:00

- Are such needs similar?
- What are the **actions of public bodies** in the different countries?
- Suggestion to **raise metrology to its true place**.

Animation: Mr LARQUIER - BEA Métrologie

With Mrs DÉSENFANT - LNE, Mr DUVANEL - Arc High School, a representative for Metrology Board French Ministry of Industry, Mrs HOCKERT - NCSLi, Mr SENELAER - Douai Engineer School, Mr SIMAILLAUD - Afnor Compétences

11:05



11:35

## | S14 | METROLOGY 2020 | | |

Chairman: Susan EVANS - NPL / United Kingdom

11:35

Metrology challenges for 2020

Mr HOSSAIN - NPL / United Kingdom

Should we really make changes in the definitions of the SI units?

Mr HIMBERT - LCM LNE-CNAM / France

12:50

The measurement of perceptions, from needs to efficiency

Mrs VIENOT - MNHN / France

12:50



13:45

| | | | **S15** | **STATISTICAL CONCEPTS AND TOOLS** | | | |

Chairman: Christophe PERRUCHET - UTAC / France

**15:30** Is there a link between correlation and interaction?

Mrs DESENFANT - LNE, Mr PERNOT - CNRS, Mr VASSEUR - ONERA, Mr JEHL - UNIVERSITY OF NANCY / France

**15:55** Best estimate of a quantity on the basis of independent observations

Mr MATHIOULAKIS, Mr PAPANICOLAOU, Mr BELESSIOTIS - CENTER FOR SCIENTIFIC RESEARCH / Greece

**16:20** Which document is better: ISO 22517-7 or MSA 4?

Mr MARIE - Q-DAS / France

**16:45** Validation of a Josephson potentiometer uncertainty by Monte Carlo simulation

Mrs GODINHO, Mr RIBEIRO, Mrs FILIPE - IPQ, Mr NUNES - ip / Portugal

**17:10** Modelling measurement bias in inter laboratory comparisons to obtain robust estimates of the consensus value and its associated uncertainty

Mrs DEMEYER, Mr FISCHER - LNE, Mr SAPORTA - LCM LNE-CNAM / France

| | | | **S16** | **SOURCE OF ENERGY AND METROLOGY** | | | |

Chairman: Erkki IKONEN - MIKES / Finland

**15:30** Data reconciliation to determine conformance in commercial petroleum products

Mr OLIVEIRA, Mrs GOMES, Mrs SANTOS - PETROBRAS / Brazil

**15:55** Short-term stability study of oil and bio diesel from corn and sunflowers under Brazilian transportation conditions

Mr DA FONSECA, Mr BATISTA, Mrs DA SILVA, Mrs GONZAGA, Mr POGGI LEAL, Mr DARODA, Mr CUNHA - INMETRO / Brazil

**16:20** Traceability of photovoltaic module performance measurements

Mr DUBARD, Mr FILTZ - LNE, Mr CASSAGNE - TOTAL, Mr LEGRAIN - TENESOL / France

**16:45** Metrology for non sinusoidal signals appearing in energy harvesting applications

Mr FUNCK - PTB / Germany

**17:10** Power measurements at LNE

Mr POLETAEFF, Mr ESPEL, Mr NDILIMABAKE - LNE / France

## | S17 | R&D, PRODUCTION AND METROLOGY: SKILLS TO CONCILIATE |

15:30

All manufactured products involve some part of risk, minor for a pen cap or major for an airplane critical part. But are those risks always under control or even identified? At each stage, new safety margins are added, often separately and without consideration for the overall effort. This results in everyday examples of **unworkable machining requirements, overcomplicated assemblies or unachievable inspection schemes**. This approach shall be extended to all users, direct or indirect, of measurement results: design offices, R&D departments, production staff.

Short presentations and debates about key questions:

- The performance of measurement technologies with very large capabilities, at least in theory
- How to carry out the measurements required while guaranteeing that they are reliable?
- How to achieve «**what is just necessary**», **applied to tolerance as well as to measurement?**

17:30

Animation: Mr MAZZEI - IMQ

With Mr BROCOT - CNIM, Mr FARGES - Peugeot Citroën Automobiles, Mr GIRAUD - Trane Europe, Mr GOSSE - Contrôle Essais Mesures, Mr JULLIEN - Hexagon Metrology, Mr LAPIERRE - Symétrie, Mr LARQUIER - BEA Métrologie, Mr POU - Delta Mu, Mr VEAU - EDF



■ **POSTERS** | | | **13:45 to 15:15**

| **TEMPERATURE** | | | |

- Pd-C eutectic cells for self-validating type C (W5% Re/W26% Re) thermocouples  
Mrs ONGRAI, Mr PEARCE, Mr MACHIN - NPL, Mr SWEENEY - UNIVERSITY OF SURREY / United Kingdom
- Water triple point analysis comparing cells made from quartz against those from borosilicate glass  
Mr TAVENER - ISOTECH / United Kingdom
- Extrapolation of the 1990 international temperature scale functions  
Mrs SALVETAT - IFREMER / France
- Performance of mercury triple-point cells made in NIS  
Mr AHMED - NIS / Egypt
- Surface thermocouple characterisation and mathematical modelling in radiative conditions  
Mr DOGHMAN, Mr LANZETTA, Mr GAVIGNET, Mr BAILLY - CNRS / France
- Toward dilution principle for humid air generation at LNE-CETIAT  
Mr GEORGIN, Mr BONDOUX, Mr BONJUS - CETIAT / France
- Effect of the thermal radiation in thermostatic and climatic chambers  
Mrs MIRAMON, Mrs FERNANDES, Mrs VASLIN-REIMANN - LNE / France
- Design and performances of a micro thermocouple psychrometer  
Mr AMRANE, Mr GAVIGNET, Mr BEAUCOUR, Mr LANZETTA - UNIVERSITY OF FRANCHE-COMTE / France
- Review and prospects of the high temperature metrology activities at LNE-CNAM  
Mr SADLI, Mr BOURSON, Mr BRIAUDEAU, Mr DEUZE, Mr FAILLEAU, Mr N'GUEMA AGNANJI, Mrs OJANEN, Mr ROUGIE - LCM LNE-CNAM / France
- Comparison of INMETRO and INTI humidity standards  
Mr BRIONIZIO - INMETRO / Brazil, Mr SKABAR - INTI / Argentina

| **OPTICS** | **SENSORY METROLOGY** | | | |

- Absolute frequency measurement of two linear polarisation frequencies of Zeeman laser  
Mrs MONLUDEE - NATIONAL METROLOGY INSTITUTE / Thailand
- Parametric estimation method of the power spectral density based on modelling of the Laplace representation of the autocorrelation function  
Mr YAKIMOV - UNIVERSITY OF SAMARA / Russia
- Grid of optical frequencies in a near infra-red range spectrum  
Mr LUKIN, Mr TATYANKO - INSTITUTE FOR RADIOPHYSICS & ELECTRONICS, Mr MACHEKHIN - UNIVERSITY OF KHARKOV / Ukraine

■ **POSTERS** | | | **13:45 to 15:15**

| **OPTICS | SENSORY METROLOGY** | | | |

- Displacement interferometry for dimensional stability measurements  
Mr VOIGT - VSL / The Netherlands
- Optical measurements for the characterisation of LED lightings  
Mr POUSSET - NEOLUX, Mr ROUGIE, Mrs RAZET - LCM LNE-CNAM / France
- Wave propagation induced by an air flow on the surface of a liquid plane  
Mr RUIZ, Mr PALOMINO, Mr RENDON - UNIVERSITY OF MEXICO / Mexico
- Maintenance of the candela at the IPQ photometry laboratory  
Mr PIRES, Mr PELLEGRINO, Mrs FILIPE - IPQ / Portugal
- Comparison between thermo sonic and thermography for detecting delamination in aircraft composite  
Mr KUHN - VISIOLASER / France
- Development of an absolute reflectometer for spectral regular reflectance calibration of mirrors in the middle infrared region  
Mr SCOARNEC, Mr HAMEURY, Mr HAY - LNE / France
- Interrogation of micro resonator-based optofluidic sensors with phase sensitive optical low coherence interferometer for free-label biosensing  
Mr SANOGO, Mrs OBATON, Mr LIEVRE, Mr DUBARD - LNE, Mr DELEZOIDE, Mr LAUTRU, Mr LEDOUX-RAK, Mr NGUYEN - ENS CACHAN / France
- Measurements of perception: accessibility in railway transport system for travellers with and without functional limitations  
Mrs SUNDLING, Mr NILSSON, Mrs BERGLUNG - UNIVERSITY OF STOCKHOLM, Mr PENDRILL, Mr EMARDSON - SP / Sweden

| **STATISTICS** | | | |

- Consideration of sampling in the statement of conformity  
Mr SALIH - ENSET, Mr AFECHCAR - CNER / Morocco
- Uncertainty in measurement  
Mr HELMI - MINISTRY FOR INDUSTRY AND TRADE / Indonesia
- An approach to operational excellence in conformity assessment  
Mr PRIETO - LOMG / Spain
- An extension of the conditional probability concept to the possibility theory  
Mr FERRERO, Mr FERRERO, Mr PRIOLI, Mrs SALICONE - UNIVERSITY OF MILANO / Italy

■ **POSTERS** | | | **13:45 to 15:15**

| **STATISTICS** | | | |

- Horwitz equation as quality benchmark in ISO/IEC 17025 testing laboratory  
Mr RIVERA - BUFETE DE INGENIEROS INDUSTRIALES / Mexico
- NF EN ISO/CEI 17043, a new standard for inter laboratory comparisons organisers  
Mrs AMAROUCHE - LNE / France
- A testing scheme for operating systems in measurement instruments for legal metrology  
Mr THIEL, Mr GROTTKER, Mr RICHTER - PTB / Germany

| **TRAINING** | | | |

- Prospects and training in metrology in the area of the new LMD system at the Institute of Optics and Precision Mechanics  
Mrs KHANAFI BENGHALEM - UNIVERSITY OF SETIF / Algeria
- Process approach based ISO/IEC 17025 training  
Mr RODRIGUEZ, Mr RIVERA - BUFETE DE INGENIEROS INDUSTRIALES / Mexico



| | | | **S18** | **UNCERTAINTIES AND CAPABILITIES** | | | |

Chairman: Nicolas FISCHER - LNE / France

**9:00** The overall approach of PSA for assessing the capability of a measurement process in an extended company

Mr LELONG - PEUGEOT CITROEN AUTOMOBILES / France

**9:25** Interlaboratory comparisons in tri-dimensional measurement: effect of the constructor, software and category of the participant (manufacturer or subcontractor)

Mr POU - DELTA MU / France

**9:50** EURAMET interlaboratory comparison of 1000 L proving tank

Mr ALMEIDA, Mrs BATISTA, Mrs FILIPE - IPQ / Portugal, Mr SMITS, Mr VAN DER BEEK - VSL / The Netherlands

**10:15** Crushing of plants: evaluation of uncertainty, a challenge for the metrologist

Mr PRUNET, Mr MASSON, Mr SOULE, Mr DALIX, Mrs DESALME - INRA / France

**10:40** Method validations and uncertainties for medical biology: how to respect the deadlines of the reform?

Mr BENHAMOU - CT2M / France

11:05  11:35

| | | | **S19** | **ISSUES AND STRATEGIES** | | | |

Chairman: Carol HOCKERT - NIST / United States of America

**9:00** Presentation of the Metrology Network

Mr BERTHET - CNRS / France

**9:25** Valuing the benefits of measurement as an integral part of R&D Programmes: before, during and after

Mr JONES - NPL / United Kingdom

**9:50** Economical impact of calibration capabilities on conformity assessment decision

Mr BEGES, Mr DRNOVSEK - UNIVERSITY OF LJUBLJANA / Slovenia, Mr PENDRILL - SP / Sweden

**10:15** The new calibration concept from VIM 3

Mrs DESENFANT - LNE & all / France

**10:40** The evolving mission of the national metrology institutes

Mr ERARD - LNE / France

11:05  11:35

| **S20** | **CONTROLLING AND SAVING ENERGY IN INDUSTRY** |

9:00

Greenhouse gas reduction aimed at fighting global warming requires **limiting power consumption**. More recently, the economic crisis has led manufacturers to increase their search for potential savings of energy, preserving business operations and employment. Various standards and draft directives have been issued for management of energy (ISO 50001, EN16001, LP X30-120), and are in the course of implementation and experimentation.

Short presentations and debates about key questions:

- How companies approach environmental management directed to energy saving?
- What **eco-efficient and powerful solutions for manufacturers**?

11:00

- What is metrology contribution to energy control and saving in industry?

Animation: Mrs HITA - EDF

With Mr BRIE - Endress & Hauser, Mr CLAUDEL - CETIAT, Mr DERNAT - Total, Mr FILTZ - LNE, Mrs MOUTET - AFNOR, Mrs PHILIPPART - Raffinerie Tirllemontoise-Group SüdZucker, Mr STREIFF - Ademe

11:05  11:35

||| **S21** | **PHOTONICS AND PERCEPTION METROLOGY** |||

Chairman: Pierre FERDINAND - CEA / France

11:20

Measuring man and soft metrology. Influence of visual and auditory disturbing factors on contrast detection

Mrs ROSSI, Mrs IACOMUSSI, Mr SCHIAVI, Mr ROSSI - INRIM / Italy

11:40

Refractive index versus density traceable measurements of water-salt solutions

Mrs ASTRUA, Mr LOREFICE, Mr PISANI - INRIM / Italy

12:00

Assessing material visual gloss

Mr GED, Mr OBEIN, Mrs VIENOT - LCM LNE-CNAM / France

12:20

Metrology for LED and solid-state lighting

Mr RENOUX, Mr DUBARD, Mr FILTZ - LNE / France

12:50  13:45

| | | | **S22** | PERFORMANCE OF 3D MEASUREMENTS | | | |

Chairman: Jean-Marc LINARÈS - Université de la Méditerranée / France

- 13:45** Fully automated 3D metrology with high resolution computed tomography  
Mr LUBBEHUSEN - GE SENSING / Germany
- 14:10** Innovative education concept for coordinate metrology using blended learning  
Mr MARXER - NTB / Switzerland
- 14:35** Cylindrical measurement with nanometric-level of accuracy  
Mr NOUIRA, Mr VAILLEAU - LNE, Mr VISSIERE, Mr DAMAK - GEOMNIA, Mr DAVID, Mr LELEU,  
Mr GIBARU - ENSAM / France
- 15:00** 3D digitising data treatment for metrology applications  
Mr AUDFRAY, Mr MEDHI-SOUZANI, Mrs LARTIGUE - ENS CACHAN / France
- 15:25** Presentation of the first COFRAC accreditation on coordinate measuring machine  
Mr HENNEBELLE - UNIVERSITY OF BOURGOGNE, Mr COOREVITS - ENSAM, Mr SESSA - CETIM / France

| | | | **S23** | EXTREME ELECTRICAL MEASUREMENTS | | | |

Chairman: Luc ERARD - LNE / France

- 13:45** New electro-optic structure for sampling high-speed electrical signals  
Mr TIAN, Mr CHARLES, Mr ALLAL, Mrs VINCENT - LNE / France
- 14:10** A 600 MVA reference measuring and generation system for high voltage power loss measurements under low power factor conditions  
Mr LINDSKOG, Mr SVENSSON, Mr MANNIKOFF - SP / Sweden
- 14:35** Measurement of high impulse currents by Rogowski and Pearson coils  
Mrs ISTRATE, Mr FORTUNE, Mr POREE, Mrs BLANC - LNE / France
- 15:00** Coaxial multiplexer for high accuracy capacitance measurements  
Mr CORMINBOEUF - METAS / Switzerland
- 15:25** A new method for voltage event characterisation  
Mr BRUNA, Mr MELERO - UNIVERSITY OF ZARAGOZA, Mr DIAZ DE AGUILAR, Mrs ROMERO - CEM / Spain

| **S24** | **BETTER MEASUREMENT FOR LOWER COSTS** |

13:45

In fact, close analysis of rejects often shows that failure is on the measurement side and not on the product: **failing measurement** can also wrongly **reject or accept a product for non-conformity**. At the same time, product requirements are becoming increasingly high for no valid reason. This leads to over-quality, a very costly situation in production and quality control.

Short presentations and debates about key questions:

- How to define the **true functional need** for the product?
- Its production process and the way to measure it?
- **Excessive** or **insufficient quality** policies?

15:50

- How to improve **measurement, cut costs and improve profits?**

Animation: Mr LARQUIER - BEA Métrologie

With Mr BARTHELEMY - SGS, a representative for Metrology Board French Ministry of Industry,

Mrs REGRAGUI - SNCF, Mr RICHARD - Trescal, Mr SCHOUWEY - Johnson & Johnson,

Mr VANDENHENDE - GSK Biologicals

| | **CLOSING SESSION** |

15:50

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

Mrs CHAMBON - LNE, Chairman of the Scientific and Technical Committee / France

16:10

**CLOSING REFRESHMENTS** | | | |

■ **POSTERS** | | | **11:15 to 12:45**

| **MANAGEMENT** | | | |

- Industrial measurement as a source of methodology for solving metrology problems  
Mr GRANOVSKIY, Mr KUDRYAVTSEV, Mrs SIRAYA - ELEKTROPRIOBOR / Russia
- Measurement reliability stamp: an alternative for the recognition of research laboratories competences  
Mr GEYNET - CT2M / France
- The Portuguese experience at calibration laboratory evaluation  
Mrs FILIPE - IPQ / Portugal
- The process for measurement quality control regarding internal and external measures (subcontracted measures and measures from the suppliers)  
Mr BORDES - PEUGEOT CITROEN AUTOMOBILES / France

| **ELECTRICITY** | | | |

- Standards time behaviour and uncertainty of measurement in calibration of resistance standards  
Mr ARSOV, Mrs CUNDEVA-BLAJER, Mr GRKOV - FEIT / Macedonia, Mr MALARIC - FER / Croatia
- Flicker compliance testing for an electrical power standard according to the IEC 61000-4-15:2010 and IEC 61000-3-3:2008 implementations  
Mr BRUNA, Mr CASTELL, Mr CERVERO, Mr GARCIA, Mr MELERO - UNIVERSITY OF ZARAGOZA / Spain
- Measurement of the magnetic field gradient as a powerful tool for small magnetic fields  
Mr KOREPANOV, Mr MARUSENKOV - INSTITUTE FOR SPACE RESEARCH / Ukraine
- Realisation of an automated and guarded Hamon 10 x 10 GΩ network  
Mr GALLIANA, Mr CAPRA, Mr SOSSO, Mr SERAZIO - INRIM / Italy
- Isotropy for electric field meters  
Mr LE SAGE, Mr ALLAL, Mr PICOU - LNE / France
- Characterisation of signals containing fluctuating harmonics  
Mr POLETAEFF, Mr ESPEL - LNE / France
- Characterisation system for phase displacement of voltage dividers up to 1 MHz  
Mr BERGSTEN, Mr TARASSO, Mr RYDLER - SP / Sweden
- Monitoring smart grids using phasor measurement units.  
Mr NDILIMABAKA, Mrs BLANC - LNE / France, Mr RIETVELD - VSL / The Netherlands, Mr BRAUN - METAS / Switzerland

■ **POSTERS** | | | **11:15 to 12:45**

| **CHEMISTRY** | | | |

- Determination of standard PH values for reference potassium hydrogen phthalate buffer solutions in water-ethanol mixture (50WT%)  
Mrs STOICA, Mrs FISICARO - LNE / France
- Study of permeation of R134a into atmosphere and vacuum  
Mr PRAZAK, Mr ZUDA - CMI / Czech Republic
- Contribution of metrology to the long term management of waste from the sector of the French nuclear energy  
Mr MORICE - LNE, Mr BERTRAND - ANDRA / France
- Determination of sucrose mass fraction in aqueous solutions by refractometry and oscillation-type densimetry  
Mrs FURTADO, Mr PELLEGRINO, Mrs ALVES, Mrs SPOHR, Mrs FILIPE - IPQ / Portugal
- Probabilistic representations of uncertain branching ratios in chemical networks  
Mr PERNOT - CNRS / France
- Diode laser based on photo acoustic instruments for monitoring the concentration of pollutants in process gases or in the atmosphere  
Mr BOZOKI - UNIVERSITY OF SZEGED/ Hungary
- Development of a sustainable traceability and dissemination system providing Europe-wide comparable measurement results in water analysis under the WFD  
Mr LABARRAQUE - LNE / France, Mr SCHIEL - PTB / Germany
- Uncertainty budget for mass concentration of exhaled breath alcohol  
Mrs ANGHEL - NMI, Mr IACOBESCU - BUREAU OF LEGAL METROLOGY, Mr ANGHEL - DRÄGER SAFETY / Romania

| **DIMENSIONAL** | | | |

- The effect of indenter geometrical errors on the accuracy and uncertainty of Vickers hardness  
Mr HEGAZY, Mr IBRAHIM, Mr ABUELEZZ - NIS, Mr EL-SHERBINY - CAIRO UNIVERSITY / Egypt
- Precision non-destructive topography of micro surfaces by moire interferometry  
Mr MEGUELLATI - IOMP / Algeria
- Surface roughness measurement uncertainty estimation using random function  
Mr KULDERKNUP, Mr RIIM, Mr LAANEOTS - ESTONIAN ACCREDITATION CENTER / Estonia

■ **POSTERS** | | | **11:15 to 12:45**


| **DIMENSIONAL** | | | |

- Study of influence of the laser range sensor orientation on the 3D measurement uncertainties  
Mr BOUAZIZ, Mr BARKI - POLYTECHNIC NATIONAL SCHOOL / Algeria, Mr ISHEIL, Mr FONTAINE - UNIVERSITY OF BOURGOGNE / France
- Material measures of length for legal metrological control  
Mrs EUSEBIO, Mrs SARAIVA, Mrs GENTIL, Mrs FILIPE - IPQ / Portugal
- A simplified mode for the prediction and compensation of dynamic errors in coordinate measuring machines  
Mr EL OUAFI, Mr BARKA - UNIVERSITY OF QUEBEC, Mr GUILLOT - UNIVERSITY OF LAVAL / Canada
- Reliability and traceability of 1-D CMM artefact (step gauge) in Thailand  
Mr SUDATHAM - NATIONAL INSTITUTE OF METROLOGY / Thailand
- Contactless 3D metrology on intangibles  
Mr MANLAY - CEA / France
- Flatness calibration of XY translation stages through modal parameterisation  
Mr FAVRELIERE, Mr BELIN - ALTIMET, Mr LE GOÏC, Mr SAMPER - UNIVERSITY OF SAVOIE / France
- Traceable long distance measurements at INRIM  
Mr PISANI, Mrs ASTRUA, Mr ZUCOO - INRIM / Italy
- Calibration of capacitive sensors and electronic levels for the straightness measurements using multiprobe method  
Mr BORIPATKOSOL - BANGKOK INSTITUTE OF TECHNOLOGY / Thailand, Mr LELEU, Mr GIBARU, Mr DAVID, Mr COOREVITS - ENSAM / France
- Normative entrelacs between measurement and GPS specifications  
Mrs DE LUZE - UNM, Mr MORETTI - ADES, Mr VINCENT - CETIM / France
- Alternative method for the metrological characterisation of spur gears in the sub-millimeter range using optical equipment  
Mr CAJA, Mr GOMEZ, Mr BARAJAS, Mr MARESCA, Mr BERZAL - UNIVERSITY OF MADRID / Spain



# PLAN OF PAVILLON 7.3





[www.mesuroptovision.com](http://www.mesuroptovision.com)

The measurement,  
testing, simulation and  
vision solutions trade show

**4<sup>th</sup>, 5<sup>th</sup>, 6<sup>th</sup> october 2011**  
Paris expo Porte de Versailles





# INFORMATION



## The best price for your air ticket

Get the best price for your flight with Air France and KLM Global Meetings.

Event ID Code to keep for the booking : 12676AF



 Paris expo  
Porte de Versailles



Please complete in block letters

FAMILY NAME : .....

SURNAME : .....

FUNCTION : .....

COMPANY : .....

ADDRESS : .....

COUNTRY : .....

.....

.....

ADDRESS of INVOICE : .....

.....

**Congress registration  
(including VAT 19.6 %)**

**+ 20% after September 10, 2011**

- |  |                               |                               |                               |                  |  |
|--|-------------------------------|-------------------------------|-------------------------------|------------------|--|
| <input type="checkbox"/> Full Congress               | <input type="checkbox"/> 4/10 | <input type="checkbox"/> 5/10 | <input type="checkbox"/> 6/10 | 873.08 Euros TTC |  |
| <input type="checkbox"/> 2 days                      | <input type="checkbox"/> 4/10 | <input type="checkbox"/> 5/10 | <input type="checkbox"/> 6/10 | 681.72 Euros TTC |  |
| <input type="checkbox"/> 1 day                       | <input type="checkbox"/> 4/10 | <input type="checkbox"/> 5/10 | <input type="checkbox"/> 6/10 | 478.40 Euros TTC |  |
| <input type="checkbox"/> Speakers / Professors       |                               |                               |                               | 478.40 Euros TTC |  |
| <input type="checkbox"/> Evening Gala on 5th October |                               |                               |                               | 80 Euros TTC     |  |

Total : .....

CFM  
members  
-15%

I am specially interested by the sessions:

- |                             |                             |                             |                             |                             |                             |                             |                             |
|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| <input type="checkbox"/> 1  | <input type="checkbox"/> 2  | <input type="checkbox"/> 3  | <input type="checkbox"/> 4  | <input type="checkbox"/> 5  | <input type="checkbox"/> 6  | <input type="checkbox"/> 7  | <input type="checkbox"/> 8  |
| <input type="checkbox"/> 9  | <input type="checkbox"/> 10 | <input type="checkbox"/> 11 | <input type="checkbox"/> 12 | <input type="checkbox"/> 13 | <input type="checkbox"/> 14 | <input type="checkbox"/> 15 | <input type="checkbox"/> 16 |
| <input type="checkbox"/> 17 | <input type="checkbox"/> 18 | <input type="checkbox"/> 19 | <input type="checkbox"/> 20 | <input type="checkbox"/> 21 | <input type="checkbox"/> 22 | <input type="checkbox"/> 23 | <input type="checkbox"/> 24 |

**Technical visit: one visit only**

Limited places, registrations allocated in order of booking

- |                                      |                        |
|--------------------------------------|------------------------|
| <input type="checkbox"/> EDF         | Tuesday 4, afternoon   |
| <input type="checkbox"/> INE         | Wednesday 5, morning   |
| <input type="checkbox"/> SNCF        | Wednesday 5, afternoon |
| <input type="checkbox"/> SYNCHROTRON | Thursday 6, morning    |

I would like to receive a reduced railway form

Please return this form with copy of the international bank transfer to :

**GL EVENTS EXHIBITIONS**

38-40 avenue de New York - 75016 Paris - France

+ 33 (0)1 44 31 83 42

Registration and payment online: [www.metrologie2011.com](http://www.metrologie2011.com)

**New address**

INFOS :

+ 33 (0)4 67 06 20 36 - [info@cfmetrologie.com](mailto:info@cfmetrologie.com)