

# 2012 Photonics Europe

16-20 April 2012

## Call for Papers

Submit your abstract  
by 7 November 2011

Present your research on photonics, optics,  
lasers, and micro/nanotechnologies

### Conference dates

16-20 April 2012

### Location

The Square Conference Centre  
Brussels, Belgium

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### Technologies

- Micro/Nano Technologies
- Disruptive Organic and Bio Photonics
- Highly Integrated and Functional Photonic Components
- Advances in Laser and Amplifier Technologies
- Photonics in Industrial Applications



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Photonics Europe

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Brussels, Belgium

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PHOTONICS<sup>21</sup>



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Photonics Europe brings together different disciplines, technologies, and perspectives from across Europe and around the world. As a participant, you will be among the leaders who are presenting research, developing new contacts, and learning about the latest funding opportunities.

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- The Innovation Village: a special display of creative products developed by universities and research centres
- Networking opportunities with colleagues and potential collaborators

Brussels' historical city centre provides a great atmosphere, against a backdrop of excellent dining, comfortable facilities, and easy transportation.

The leadership of Photonics Europe 2012 has selected many of the toughest issues facing optical and photonics technologies today as the basis for their programmes. These current research issues will drive the development of new products and solutions to some of the grand challenges we face, in areas such as energy, environment, manufacturing, and security.

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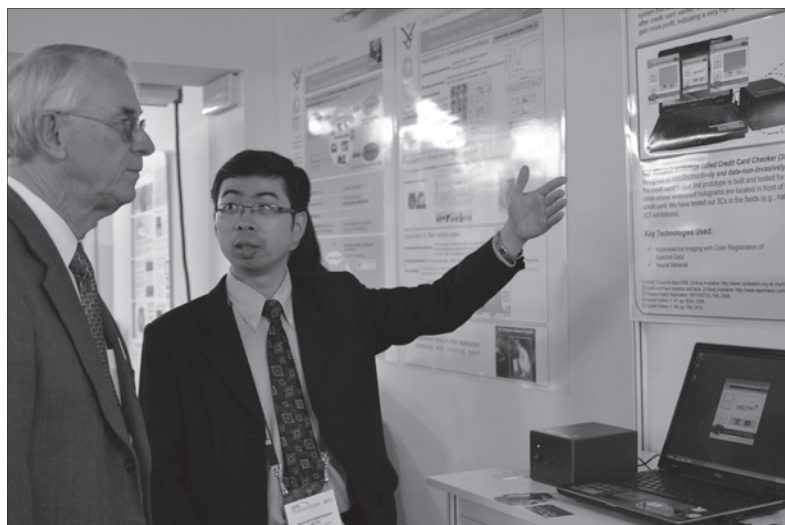
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**Submissions due 14 November 2011** | [www.spie.org/pecallpdf](http://www.spie.org/pecallpdf)



## Metamaterials (EPE101)

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This conference will bring together the international community of researchers in the burgeoning and exciting field of metamaterials and interaction of electromagnetic radiation with sub-wavelength scale structures.

**This year the conference will emphasize nonlinear, sensor and quantum metamaterials.**

In addition to invited talks, the conference programme will feature oral and poster presentations on the following topics that include, but are not limited to:

- engineering of electromagnetic properties and nano-engineering
- active and tunable metamaterials
- light-harvesting, sensors and other potential downstream applications
- advances in nonlinear metamaterials: fundamentals and applications
- quantum and superconducting metamaterials
- gain, compensation of losses and plasmonic effects
- waveguides, complex devices and metamaterials systems
- acoustic metamaterials with electromagnetic analogues
- transformation optics with metamaterials
- sub-wavelength concentration of light and imaging.

### Critical Dates

Abstract Due Date: 7 November 2011

Manuscript Due Date: 19 March 2012

**Please Note:** Submissions imply the intent of at least one author to register, attend the conference, present the paper as scheduled, and submit a full-length manuscript for publication in the conference proceedings.

## Nanophotonics (EPE102)

*Conference Chairs:* **David L. Andrews**, Univ. of East Anglia Norwich (United Kingdom);

**Jean-Michel Nunzi**, Queen's Univ. (Canada); **Andreas Ostendorf**, Ruhr-Univ. Bochum (Germany)

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The highly distinctive field of nanophotonics continues to experience a phenomenal growth at both the fundamental research and applications level. In structures whose optical response is determined by nanoscale features, the character of optical propagation and measurement commonly involves an interplay of structural, quantum mechanical and quantum optical features, concisely exhibited by the term 'nanophotonics'. It is the purpose in this conference, the fourth of a series launched and firmly established at Photonics Europe, to address the latest developments in the physical optics, materials and physics-related aspects of this exciting area, with an emphasis on fundamental principles, systems and mechanisms, identifying new directions for further exploration and applications, and reporting new technical advances.

The conference will cover a broad range of topics in nanophotonics including the detailed theoretical foundations, mechanisms, optical techniques, characterization principles, novel fabrication and synthetic methods, calculational and modeling advances, and device applications. Contributed papers are solicited from researchers, practitioners and commercial organizations working in these broad areas, especially focusing on the following and related topics:

- nanoscale optical transmission, reflection and scattering
- plasmonics and surface nanostructuring
- surface plasmons and devices
- nanoplasmonic sensors
- nanomaterials for energy storage and conversion
- quantum confined lasers and laser components
- control of nanoscale optical and electronic processes
- optically driven molecular motors
- energy transfer and harvesting in dendrimeric polymers

- quantum optical computing and informatics
- photoactive arrays, materials and devices
- quantum and nonlinear optics in nanostructures
- nonlinear surface plasmonics
- near-field optics and evanescent wave formation
- nanomicroscopy and associated imaging technology
- optical tweezers and spanners; nanomanipulation with light
- optical lattices and holographic trapping
- photonic propagation in biological nanostructures
- quantum dots; fluorescence labeling and imaging
- polariton propagation and dispersion
- functionalized nanoparticles and optical sensing
- optical nanofabrication and characterization
- light harvesting, optical antennas and nanonantennas.

## Photonic Crystal Materials and Devices (EPE103)

*Conference Chairs:* **Hernán R. Míguez**, Consejo Superior de Investigaciones Científicas (Spain); **Sergei G. Romanov**, Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany); **Lucio C. Andreani**, Univ. degli Studi di Pavia (Italy); **Christian Seassal**, Ecole Centrale de Lyon (France)

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The conference will be focused on recent advances in the field of photonic crystals and related materials, aiming particularly at the design and development of novel devices with enhanced performance. Special emphasis will be put on materials processing, and new photonic architectures with multiple functionalities, theoretical and experimental investigations of novel optical phenomena in fundamental and applied domains. Presentations on integration of photonic nanostructures into devices, and evaluation of the added value (higher efficiency, better control, lower thresholds) they provide are expected. Submissions that address potential applications in telecommunications, colour displays, LEDs, lasers, photovoltaics, and chemical and biological sensing are encouraged. It is anticipated that the European Community dimension will be reflected in both invited and contributed presentations.

Topics include, but are not limited to:

- recent advances in materials processing for the fabrication of novel photonic micro- and nanostructures
- recent advances in the design of novel photonic structures and devices
- intrinsic and extrinsic disorder effects in the optical properties of ordered structures
- multifunctional photonic micro- and nanostructures
- anomalous wave propagation in photonic crystals

- nonlinear optical effects in periodic and nonperiodic or disordered structures
- photonic crystal based integrated optics
- photonic crystal waveguides, fibres and microcavities
- magnetic photonic crystals
- metal-dielectric periodic electromagnetic and plasmonic structures
- photonic-phononic crystal structures
- photonic crystal-based electro-optic displays
- applications of photonic crystals in biology and chemistry
- biologically inspired photonic crystals
- light managing in photovoltaic devices using photonic crystals.

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## Micro-structured and Specialty Optical Fibres (EPE104)

*Conference Chairs:* **Kyriacos Kalli**, Cyprus Univ. of Technology (Cyprus); **Alexis Mendez**, MCH Engineering LLC (USA)

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Specialised optical fibres have become essential optical components, designed to control and manipulate light guided within an optical network, enabling selective confinement, routing, dispersion or filtering to occur directly in the optical domain. Specialised optical fibres can be broadly classified as solid step or gradient index types, liquid core fibres and as photonic crystal or microstructure designs. In the former case, selective material doping of the fibres can afford unique properties that allow for optical amplification or photosensitivity. In the latter case, photonic crystal fibre allows for photon propagation in the most intricate of ways with great flexibility; we have far more control over the properties of photonic crystals than we do over the electronic properties of semiconductors. There are three key features that define the development of a specialised fibre i) the composition of the host material, ii) the waveguide design and iii) the use of specialised coatings.

This conference aims to provide a forum for scientists and engineers-involved with the modelling, design, fabrication, device integration, and application of PCFs and specialty optical fibres-to present and share their latest research and findings. This conference will expand on the existing innovations that relate to microstructure and specialty optical fibres, detailing progress in the areas of fibre manufacture, devices, and applications that target the fields of optical communications, sensing and spectroscopy; and incorporating modelling of novel fibre geometries.

The conference program will consist of both oral and poster presentations. Papers are solicited on, but not limited to, the following topics:

### • **Materials, Processes and Fabrication Advances**

Advances in specialty and microstructure fibre manufacture based on, silica, chalcogenide and multi-component glasses, rare-earth doped fibres, single crystal material fibre and polymer optical fibres, as well as new and advanced coating materials.

### • **Theory and Modeling**

Modelling and simulation of linear and non-linear characteristics of novel optical fibres, including modal analysis, birefringence, polarisation and dispersion properties, confinement and bending losses, evanescent coupling in multi-core fibre and fibre tapers.

### • **Test & Characterisation Methods**

Characterisation of optical fibres, e.g. measurements of fibre geometry, birefringence, dispersion, non-linearity and distributed measurements

### • **Optical Components, Sensors and Devices**

Speciality and microstructure fibre-based devices and their applications cover a broad spectrum of research areas that can include:

- Supercontinuum generation, wavelength conversion, fibre lasers and amplification, ultra-high power and ultra-short pulse delivery, optical clocks, pulse shaping, dispersion compensation, micro fluidic devices, liquid crystal fibres, and optical transport of microparticles.
- Optical sensors, e.g. chemical and biosensors, vectorial (multi-core structures) and birefringent sensors (temperature and pressure), Bragg and long period grating sensors in specialised fibres.
- Near-field microscopy, spectroscopy of gases and liquids.

We also encourage papers on hot topics and fields of commercial interest such as:

- optical nanowires and sub-wavelength diameter fibres
- mid-IR and infrared fibres
- specialty fibres for bio and chemical sensing
- fibres for harsh environments
- fibres for use in the aerospace industry
- fibres for oil and gas applications
- optical fibres in renewable energy applications.

## Biophotonics: Photonic Solutions for Better Health Care (EPE105)

**Conference Chairs:** **Jürgen Popp**, Institut für Photonische Technologien e.V. (Germany); **Wolfgang Drexler**, Medizinische Univ. Wien (Austria); **Valery V. Tuchin**, N.G. Chernyshevsky Saratov State Univ. (Russian Federation); **Dennis L. Matthews**, UC Davis Medical Ctr. (USA)

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The research area of biophotonics provides novel photonic technologies and tools for medical diagnosis and therapy. Its solutions for an efficient and affordable health care help to deal with the challenges of aging societies and exploding health care costs. Furthermore, biophotonics research aims for a deeper understanding of the processes within living cells, which is a prerequisite for the improvement of early recognition and targeted treatment of diseases.

The importance of biophotonics is obvious not only from the impressive annual growth rates of the related industries, but also from the significant amount of research funding in this field.

The highly interdisciplinary character of this field of research requires an intensive dialogue between scientists from the various disciplines in order to align, promote and amplify their efforts. Especially the connection between technology and method developers and the biomedical enduser still needs further improvement as biophotonic solutions can only effectively reach the clinics when they are tailored according to the biomedical needs. To spread and promote this way of thinking is one of the major aims of the conference.

A broader notion of health includes the environment, as well as the quality of food and pharmaceutical products as its determining factors; thus the conference will cover applications of light in these areas as well.

Contributed papers are solicited concerning, but not limited to, the following areas:

### Photonics and Nanophotonics for Analysis and Diagnosis

- advanced microscopic and spectroscopic methods
- spectroscopic methods on a cellular and molecular level
- optical biochips and array technology
- optical nanoprobe and nanobiosensors
- fiber and photonic crystal biomedical technologies

### New Photonic Nanomanipulation Tools

- nano-optical tools and methods for biophotonics and biomedical optics
- light-tissue interaction
- optical tweezers and laser catapulting
- cell sorting and cell positioning
- optical transfection.

### Biomedical Optics in Clinical Routine

- coherence domain optical methods and optical coherence tomography
- optical Diffuse Tomography
- in vivo cellular and tissue diagnostics, telepathology
- minimally invasive surgery
- photodynamic therapy
- skin therapy
- ophthalmological applications of light.

### Photonic Solutions for Environmental, Food, and Drug Analysis

- microscopic and spectroscopic methods for food and drug analysis
- optical sensors for hazardous substances in air, soil, and water
- detection and identification of infectious germs (epidemiology)
- optical technologies for process analytics and quality control
- agricultural applications like in Animal epidemics and plant pathogen detection.

**Best Poster Award:** The "Journal of Biophotonics" Poster Award will honour the best poster presentation in the field of Biophotonics.

The award is sponsored by:



# SPIE Photonics Europe 2012

## Micro-Optics (EPE106)

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Micro-optics is a generic technology that allows the manipulation of light and the management of photons with 'micron'- and 'submicron'- scale structures and components. Combined with MEMS structures complex optical systems emerge. Micro-optics is therefore the cornerstone technology to interface the macroscopic world we live in with the microscopic world of opto- and nanoelectronic data processing. It is recognized as the key link between photonics and nano-electronics, the two dominant information technologies of tomorrow's society.

This conference aims at providing a forum to bring together designers, process- and packaging engineers, and researchers as well as people from various application fields to present the latest developments in micro-optics and MOEMS fabrication, components, integration and systems and to discuss challenges and to present solutions related to design, prototyping, low-cost volume fabrication, packaging, assembly and integration, reliability, and standardization of micro-optical components and modules, and micro-optics-based sub-systems and systems. The conference will also be a forum devoted to micro-optics and micro-optics systems in applications, such as optical interconnects, lighting and display, data communications, sensors and many others.

The conference should stimulate inter-disciplinary discussions and cross-fertilization over the boundaries of the specific research areas and seek new solutions bearing in mind lower manufacturing costs. Papers are solicited on all aspects of this rapidly evolving multidisciplinary field.

Examples of topics that are welcome include, but are not limited to:

- optical materials for micro-optics
- modeling and design of novel refractive and diffractive microoptical components and systems
- tolerance and sensitivity analysis of micro-optical components
- prototyping, mastering and fabrication of micro-optical components and systems
- mass-fabrication of micro-optics
- optical MEMS components, systems, and applications
- large area micro-optics
- free-form micro-optics
- holographic optical elements
- microactuators and micromechanical components
- microfluidics, bioMEMS, and medical microsystems
- packaging and assembly of micro-optical components and systems
- integration of optical, micromechanical and/or fluidic devices
- reliability of micro-optical components and systems
- micro-optics and standardization challenges
- MEMS display and imaging systems
- RF MEMS components, systems, and applications
- micromachined optical, physical, chemical and biological sensors
- photonic interconnects and computer architectural issues
- modeling, design, fabrication and characterization of VCSELs for photonic interconnects

- VCSEL-based smart pixels
- VCSEL-based WDM schemes for short distance photonic interconnects
- modeling, design, tolerancing, and scaling of VCSEL-and MQW-modulator-based photonic interconnect systems
- novel detector devices and schemes for photonic interconnects
- free-space and guided-wave optical interconnect modules
- optical interconnects at the PCB level
- micro-optical components and modules for photonic interconnection, switching and routing
- monolithic and hybrid integration of VCSELs, MQW modulators and detectors with CMOS
- heterogeneous integration and packaging aspects of photonic device-based interconnection modules
- flip-chip mounting
- fiber-coupling
- photonic device-based system demonstrators
- reconfigurable optical interconnects
- optical clock distribution.

*A special session on 'Micro-Optics, VCSELs, and Photonic Interconnects' will be jointly organised with the conference on 'Semiconductor Lasers and Laser Dynamics'.*

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## Critical Dates

Abstract Due Date: 7 November 2011

Manuscript Due Date: 19 March 2012

**Please Note:** Submissions imply the intent of at least one author to register, attend the conference, present the paper as scheduled, and submit a full-length manuscript for publication in the conference proceedings.

## Optical Modelling and Design (EPE107)

*Conference Chairs:* **Frank Wyrowski**, Friedrich-Schiller-Univ. Jena (Germany); **John T. Sheridan**, Univ. College Dublin (Ireland); **Jani Tervo**, Univ. of Eastern Finland (Finland); **Yuri Meuret**, Vrije Univ. Brussel (Belgium)

*Programme Committee:* **Pierre Ambs**, Univ. de Haute Alsace (France); **Pierre H. Chavel**, Institut d'Optique Graduate School (France); **Zbigniew Jaroszewicz**, Instytut Optyki Stosowanej (Poland); **Bahram Javidi**, Univ. of Connecticut (USA); **Norbert Lindlein**, Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany); **M. G. Moharam**, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA); **Cristian Neipp**, Univ. de Alicante (Spain); **Vladimir S. Pavelyev**, Image Processing Systems Institute (Russian Federation); **Hagen Schweitzer**, LightTrans GmbH (Germany); **Colin J. R. Sheppard**, National Univ. of Singapore (Singapore); **Boris Spektor**, Technion-Israel Institute of Technology (Israel); **Jari Turunen**, Univ. of Eastern Finland (Finland)

The ability to efficiently model and design optical systems and devices and to analyse and calibrate the performance of optical materials and fabrication techniques are central to modern optical engineering.

In order to develop such tools it is necessary to have available a fundamental physical and chemical understanding of such materials and systems, to develop appropriate models based on this knowledge, and to implement such models in computationally efficient ways. Iterative comparisons with experimental outcomes then permits design optimization under a variety of practical constraints. In this way, combining fundamental expertise, (i.e., electromagnetics, solid state physics, etc.), optical engineering techniques, (i.e., design and analysis software and hardware tools, etc.), and appropriate materials and fabrication knowledge, (i.e. micromachining, lithography, interferometric-holographic etc.) very flexible manipulation of light in time and space can be achieved.

Follow the above description this conference seeks to not only attract papers which deal with the requirement to fundamentally understand such physical processes and to calibrate and analyse the outputs of specific optical systems. We also seek to attract submissions which combine and apply such knowledge to model and design optical systems. Papers of interest include those dealing with devices involving diffractive, refractive, and guided-waves effects and those dealing in which general optical signal processing, for example imaging/non-imaging, coherent/incoherent radiation etc., are employed.

This conference is specifically being organised to provide a forum where workers from a variety of specialist and engineering backgrounds can promote and exchange ideas. It is intended to be very broad and inclusive, suitable for those interested in presenting work on optical materials, devices, systems and fabrication technologies, which al-

low novel optical signal processing, (i.e. optical signal processing systems: including metrology, microscopy and imaging, 3-D holographic etc.), and/or optoelectronic control of power transfer (i.e. switching networks).

Applications under discussion shall include beam splitting, shaping, forming, multiplexing, switching, encryption and compression for use in the areas of optical computing, optical data and information processing, imaging, sensing and metrology. The presentation of work involving both analysis and design techniques and the development of simulation tools based on the use of pure and hybrid geometric, paraxial, Fourier, Wigner, and generalised electromagnetic optical models, are also of interest. Modelling and calibration of fabrication processes, including both material effects and production tolerances are also of concern.

Topics include but are not limited to:

- wave-optical engineering
- 2- and 3D optical signal processing, encryption and compression
- diffractive optics and holography
- optical engineering techniques and simulation tools
- light source modelling and characterisation
- beam switching and multiplexing
- modelling of light propagation in systems
- design strategies for photon management
- novel image forming concepts
- splitting, shaping and diffusing light
- subwavelength and novel diffractive structures
- temporal pulse shaping
- novel materials, devices and systems
- fabrication, assembly and tolerancing of systems.

## Optical Micro- and Nanometrology (EPE108)

*Conference Chairs:* **Christophe Gorecki**, Univ. de Franche-Comté (France); **Anand K. Asundi**, Nanyang Technological Univ. (Singapore); **Wolfgang Osten**, Univ. Stuttgart (Germany)

*Programme Committee:* **Karsten Buse**, Fraunhofer -Institute for Physical Measurement Techniques, IPM (Germany); **Jürgen W. Czarske**, Technische Univ. Dresden (Germany); **Peter J. de Groot**, Zygo Corporation (USA); **Pietro Ferraro**, Istituto Nazionale di Ottica (Italy); **Cosme Furlong**, Worcester Polytechnic Institute (USA); **Kay Gastinger**, Norwegian Univ. of Science and Technology (Norway); **Joby Joseph**, Indian Institute of Technology Delhi (India); **Malgorzata Kujawinska**, Warsaw Univ. of Technology (Poland); **Peter H. Lehmann**, Univ. Kassel (Germany); **Yukitoshi Otani**, Utsunomiya Univ. (Japan); **Heidi Ottevaere**, Vrije Univ. Brussel (Belgium); **Christof Pruss**, Univ. Stuttgart (Germany); **Yingjie Yu**, Shanghai Univ. (China)

Microsystems and particularly MEMS or MOEMS ask integration of heterogeneous technologies including micromechanical components, optics, electronics, sensors and actuators. Since wafer stack of ICs and discrete electronic components are being assembled in the same package with MEMS/MOEMS and/or photonic or optoelectronic devices, there is a need of new measurement techniques for characterization and testing, operating during the chip-production and for lifetime cycle prediction. Fortunately, optical inspection systems provide an ideal way to validate and verify product quality. Optical probes are non-destructive, non-contact diagnostics and particularly appropriate for probing materials destined for use in optoelectronic and photonic devices, where the interaction of light with the material provides the basis for device operation.

This conference will focus on the application of optical and related measuring techniques in nano- and micro-measurements, reliability study, failure analysis of MEMS/MOEMS and characterization with special emphasis in microelectronics, micromechanical structures and nanostructures. The complete research and development process including modeling, simulation, and implementation and testing shall be demonstrated on different examples. Special emphasis is directed to the development of new methods and algorithms into modern sensor systems. The application of these systems close-to-production is of general interest.

Topics will include:

- wafer-scale metrology
  - unification of modeling, simulation and measurement
  - interferometry, holography, speckle, Moiré and grating imaging
  - classical microscopy and confocal systems for measurement
  - scanning electron microscopy and thermal imaging
  - near-field scanning microscopy and atomic force microscopy
  - nanometric probes and nano-lithography
  - fiber optic sensors and waveguide devices
  - ellipsometry and scatterometry
  - image correlation
  - laser Doppler vibrometry and micro PIV
  - electro-optic techniques
  - polarimetry and diffractometry
  - optical phase conjugation
  - image processing
  - rigorous modeling and simulation
  - and others.
- With applications in:
- shape, contour, diameter, angle and length
  - temperature, pressure, refractive index and magnetic fields
  - micro- and nano topographic inspection
  - nano-scale measurements and thin films characterization
  - near-field optics, fluorescence, local spectroscopy
  - sub-wavelength structure inspection
  - static and dynamic characterization of MEMS/MOEMS
  - metrology of microoptics
  - investigation of photonic structures and cavities
  - local analysis of material properties and defects including reliability aspects such fracture, fatigue and wear and life cycle predictability
  - contact and surface problems
  - failure analysis including identification of failure modes and mechanisms
  - reliability methodology and long term stability investigation of microstructures, devices and systems
  - deformation, displacement, vibration, stress, strain, fatigue and fracture, shock waves analysis
  - line width/cd-metrology, defectoscopy
  - line edge roughness measurement
  - fluid mechanics and microfluidics
  - reliability of microsystems
  - qualification of devices or systems and environmental testing
  - packaging and integration or/and interface to macro world
  - and others.

## Silicon Photonics and Photonic Integrated Circuits (EPE109)

*Conference Chairs:* **Laurent Vivien**, Univ. Paris-Sud 11 (France); **Seppo K. Honkanen**, Aalto Univ. School of Science and Technology (Finland); **Lorenzo Pavesi**, Univ. degli Studi di Trento (Italy); **Stefano Pelli**, Istituto di Fisica Applicata Nello Carrara (Italy)

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Smaller, faster, more complex and less expensive component solutions are needed for the future photonic systems. Photonic building blocks of any subsystem, integrated optical circuits (IOCs), and photonic integrated circuits (PICs) are designed and developed with the goal of achieving higher performance and functionality. In addition, power consumption and environmental impacts are getting more and more relevant also in photonics. There is a hope that integrated photonics allows a more green photonics. Advances in knowledge of the fundamental phenomena, as well as in photonic materials, structures, and technologies, are needed in order to properly respond to these demands. It is clear that the successful development of this field depends on the productive collaboration between industry and research groups at all levels of technology development and adoption. An important objective of this symposium will be to contribute towards building a dialogue and generating cooperative actions between the community itself and the industry and the research and training institutions.

Of significant application interest, silicon photonics should play an important role in:

- optical interconnects and integration with microelectronics
- filtering, switching and routing in communications
- remote and high-resolution imaging
- disposable photonics for medical applications
- green and environmental friendly photonics.

The deployment of the silicon photonics platform, in particular, is a challenging goal. Silicon-on-silicon (SOS), silicon oxynitride (SiON) and silicon-on-insulator (SOI) structures represent viable and efficient routes to the implementation of low-cost optoelectronic circuits. Indeed, the

maturity of Si process technology provides many ways to integrate optoelectronic and electronic components on the same substrate, taking benefit in particular of the high compactness offered by SOI microphotonics.

Nanowires, plasmonics nanostructures, micro-resonators and photonic crystals are nowadays viable platforms for nanophotonics where new phenomena and new devices are frequently proposed and demonstrated.

Another big challenge is represented by the move towards new wavelength ranges, up to the region of Terahertz frequencies for imaging, bio-applications and communications, and down to visible wavelengths for optical sensing. Furthermore, the use of integrated photonics for low power consumption circuits to sustain green photonic technologies and for light harvesting and solar spectrum modifications in photovoltaic domain emerges as news concepts.

This Conference intends to provide a forum to discuss the latest development in these different areas, and to review technologies relevant to integration of active and passive photonic components, with the aim of eventually developing full photonic systems.

The broad scope of applications and techniques covered by the topics of this conference include the development and use of many classes of materials (silicon, glass, crystals, polymers, ...), which will all find a perfect showcase in the framework of this symposium.

Original theoretical and experimental contributions are solicited from the international guided-wave and photonic community in the general areas listed below:

## **Modeling and Theory**

- optical system and network modelling
- models for integrated photonic circuits
- numerical and semi-analytical methods for the modelling of guided-wave optics, active, passive and nonlinear components.

## **Semiconductor Devices and Silicon Photonics**

- advances in materials and processes
- semiconductor modulators, integrated amplifiers, filters, switches
- Si-based photodetectors
- compound semiconductor WDM components
- integration of optical functionality in silicon ICs
- photonic crystals
- silica-on-silicon photonics platform
- silicon micro and nanophotonics
- plasmonic nanostructures for silicon IC

## **Dielectric Waveguides and Integrated Circuits**

- active and passive waveguide components, modulators and switches
- glass integrated optics
- silicon oxynitride based integrated optics
- lithium niobate integrated optics
- polymer photonic components
- rare-earth-doped lasers and amplifiers
- microresonators
- nonlinear integrated optics
- silicon, germanium and silica nanowires
- photonic components for microwave and Terahertz systems.

## **Characterization and Testing**

- novel methods and instruments for testing optical waveguides, photonic components and integrated circuits
- characterization of linear and nonlinear photonic devices and systems.

## **Applications**

- components and subsystems for optical telecommunications
- photonic components for optical networks on and out of the chip
- integrated optical and photonic circuits for optical signal processing
- on-chip optical interconnects
- components and circuits for optical and optoelectronic sensors
- components and circuits for measurement and screening in biological, clinical, genomics, proteomics, environmental applications
- sensing and imaging systems at THz frequencies.

Several specific events will be also devoted to “CMOS Photonics for theranostics”, “nonlinear integrated photonics” and “non-silicon integrated optical devices” in order to highlight on these very hot topics.

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## Semiconductor Lasers and Laser Dynamics (EPE110)

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The conference will be concerned with all types and all aspects of semiconductor lasers. Topics include, but are not limited to:

- Fabry-Perot, DFB, DBR laser diodes, multisegment devices
- VCSELs
- semiconductor VECSELs (optically or electrically pumped)
- quantum cascade lasers
- novel laser structures like micro-, nano-cavities, photonic crystals
- single-photon sources
- modulator-integrated lasers
- lasers for silicon photonics
- epitaxial growth and processing aspects
- low-dimensional active regions in semiconductor lasers (quantum dashes, dots, etc.)
- novel semiconductor laser materials
- UV to IR laser emission wavelengths
- wavelength tuning, spectral properties
- laser emission profile shaping
- high power generation, high brightness emission
- laser diode dynamics

- high-speed modulation
- external feedback, optical injection and coupled semiconductor lasers
- mode locking
- laser diode synchronization
- complex semiconductor laser systems
- patterns and localized structures in semiconductor lasers
- noise
- new phenomena in semiconductor lasers
- advanced laser diode integration and system applications aspects
- physics and theory of semiconductor lasers
- numerical methods, modeling and simulations
- semiconductor optical amplifiers.

Submissions of papers addressing one or more of these items are welcome.

## Laser Sources and Applications (EPE111)

*Conference Chairs:* **Thomas Graf**, Univ. Stuttgart (Germany); **Jacob I. Mackenzie**, Univ. of Southampton (United Kingdom); **Helena Jelinková**, Czech Technical Univ. in Prague (Czech Republic); **John Powell**, Luleå Univ. of Technology (Sweden)

*Program Committee:* **Friedrich G. Bachmann**, LUMERA Laser GmbH (Germany); **Francesc Diaz**, Univ. Rovira i Virgili (Spain); **Pascal Dupriez**, ALPhANOV (France); **Efstratios Georgiou**, Technological Education Institute of Crete (Greece); **Stefan Kaierle**, Fraunhofer-Institut für Lasertechnik (Germany); **Alexander F. H. Kaplan**, Luleå Univ. of Technology (Sweden); **Norbert Lichtenstein**, Oclaro, Inc. (Switzerland); **Beat Neuenschwander**, Berner Fachhochschule Technik und Informatik (Switzerland); **Andreas Ostendorf**, Ruhr-Univ. Bochum (Germany); **Nicolai Pavel**, National Institute for Laser, Plasma and Radiation Physics (Romania); **Yehoshua Shimoni**, Soreq Nuclear Research Ctr. (Israel); **Akira Shirakawa**, The Univ. of Electro-Communications (Japan)

The scope of the Laser Sources and Applications conference is broad, covering many recent advances in the design, development and use of various laser architectures including; extending to new wavelength regimes, ultrashort pulse generation, nonlinear frequency conversion schemes, power-scaling techniques, and direct diode-laser systems. Emphasis will be given to emerging applications of lasers in the industrial, medical, and scientific fields.

Topics will include but are not limited to:

### Lasers and Amplifiers Architectures:

- fibre and waveguide
- thin-disc
- rod and slab
- microchip

### New Developments in Gain Media and Wavelength Regimes:

- novel laser materials
- visible solid-state lasers
- mid-IR solid-state lasers
- tunable solid-state lasers
- gas lasers.

### Pulsed Operation:

- laser Q-switching
- solid-state saturable absorbers
- ultrafast lasers and mode locking
- ultrashort pulse amplification
- frequency conversion.

### Power-Scaling:

- diode-pumped systems
- resonator design
- beam shaping elements
- beam combining.

### Laser Applications

- materials processing laser applications
- fibre-optic beam delivery components
- photonics in medicine
- new science with lasers
- direct diode processing.



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## Nonlinear Optics and its Applications (EPE112)

*Conference Chairs:* **Benjamin J. Eggleton**, The Univ. of Sydney (Australia); **Alexander L. Gaeta**, Cornell Univ. (USA); **Neil G. Broderick**, The Univ. of Auckland (New Zealand)

*Programme Committee:* **Stephane Coen**, The Univ. of Auckland (New Zealand); **Arnaud Couairon**, Ecole Polytechnique (France); **Richard M. De La Rue**, Univ. of Malaya (Malaysia) and Univ. of Glasgow (United Kingdom); **Christophe Dorrer**, Univ. of Rochester (USA); **John M. Dudley**, Univ. de Franche-Comté (France); **Majid Ebrahim-Zadeh**, ICFO - Institut de Ciències Fotòniques (Spain); **Marc Hälterman**, Univ. Libre de Bruxelles (Belgium); **John D. Harvey**, The Univ. of Auckland (New Zealand); **Peter Horak**, Univ. of Southampton (United Kingdom); **Yuri S. Kivshar**, The Australian National Univ. (Australia); **Colin J. McKinstrie**, Alcatel-Lucent Bell Labs. (USA); **Leif K. Oxenløwe**, Technical Univ. of Denmark (Denmark); **David J. Richardson**, Univ. of Southampton (United Kingdom); **John E. Sipe**, Univ. of Toronto (Canada)

This conference on nonlinear optics and applications is focused on the most recent advances in nonlinear optics and its applications. The objective is to update the research and applications in the field providing a forum for discussion and interaction to all people working in the area or interested in the new results. Papers describing advances in every aspect of nonlinear optics and its applications particularly in, but not limited to, the following areas are welcome:

- all-optical processing
- ultrafast optical communications
- slow light
- functional nonlinear materials
- highly nonlinear and emerging waveguides
- plasmonics and metamaterials
- ultrafast measurement and pulse characterization
- frequency combs and optical clocks
- nonlinear propagation and filamentation
- Terahertz/microwave photonics
- optical parametric amplifiers and oscillators
- generation and applications of optical supercontinuum
- nonlinear localization effects and solitons
- nonlinear optics for quantum information.

## Organic Photonics (EPE113)

*Conference Chairs:* **Barry P. Rand**, IMEC (Belgium); **Chihaya Adachi**, Kyushu Univ. (Japan); **Volker van Elsbergen**, Philips Research (Germany)

*Programme Committee:* **Heinrich Becker**, Merck OLED Materials GmbH (Germany); **David Beljonne**, Univ. de Mons (Belgium); **Paul W. M. Blom**, Univ. of Groningen (Netherlands); **Donal D. C. Bradley**, Imperial College London (United Kingdom); **Franco Cacialli**, Univ. College London (United Kingdom); **Enrico Da Como**, Ludwig-Maximilians-Univ. München (Germany); **Richard H. Friend**, Univ. of Cambridge (United Kingdom); **Alan J. Heeger**, Univ. of California, Santa Barbara (USA); **Paul L. Heremans**, IMEC (Belgium); **René A. J. Janssen**, Technische Univ. Eindhoven (Netherlands); **Junji Kido**, Yamagata Univ. (Japan); **Jang-Joo Kim**, Seoul National Univ. (Korea, Republic of); **Guglielmo Lanzani**, Politecnico di Milano (Italy); **Karl Leo**, Technische Univ. Dresden (Germany); **Niyazi Serdar Sariciftci**, Johannes Kepler Univ. Linz (Austria); **Paul van der Schaaf**, BASF Schweiz AG (Switzerland); **Chia-Ching Wu**, National Taiwan Univ. (Taiwan)

This conference aims to bring together a broad forum of scientists and engineers working on optoelectronics and photonics enabled by molecular, organic, and polymer materials. The purpose is to trigger lively interaction between the chemistry, physics, and engineering aspects of this research domain. The call topics have therefore been selected to cover materials, devices, physics, optics, technology, and applications. The call also explicitly includes new and emerging nano-optoelectronics and nano-photonics materials, devices and concepts. There will be oral presentations as well as poster sessions.

Topics include, but are not limited to:

- OLED displays
- materials and devices for OLED lighting
- materials and devices for organic photovoltaics
- organic materials and devices for optical sensors
- emerging nano-optoelectronic and nano-photonics materials and devices
- OLEDs and PLEDs
- organic solar cells
- technology and manufacturing of OLEDs and organic solar cells
- organic light-emitting transistors
- organic lasers and amplifiers
- organic photodectors
- electroactive and photonic materials

- organic materials for light manipulation and management
- charge injection and transfer processes
- junctions and interfaces relevant to organic optoelectronics
- transport and exciton phenomena
- optical nonlinear phenomena and devices
- ultrafast processes involving energy and charge transport
- excited states at the single molecule level
- theoretical modeling of optoelectronic and photonic processes
- optical micro- and nano-probes of organic materials and devices
- scanning probe mapping of materials and devices
- advanced approaches for materials nanostructuring for opto-electronic devices.

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## Optics, Photonics and Digital Technologies for Multimedia Applications (EPE114)

*Conference Chairs:* **Peter Schelkens**, Vrije Univ. Brussel (Belgium); **Touradj Ebrahimi**, Ecole Polytechnique Fédérale de Lausanne (Switzerland); **Gabriel Cristóbal**, Consejo Superior de Investigaciones Científicas (Spain); **Frédéric Truchetet**, Univ. de Bourgogne (France); **Pasi Saarikko**, Nokia Research Ctr. (Finland)

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In recent years, Moore's law has fostered the steady growth of the field of digital image processing, though computational complexity remains a significant problem for most of the digital image processing applications. At the same time, also research in the field of optical image processing has matured, potentially bypassing the limitations of digital approaches and giving rise to new applications. Additionally, from image acquisition perspective the rapid convergence of digital multimedia devices is driving a strong industrial growth of photonics technologies. Already, photonics based enablers can be found in a myriad of multimedia applications such as displays and image sensing, illumination systems, and high-performance light engines - all of which have major volume positions in the photonics market. Along with the growing interest for emerging multimedia applications the demand for new photonics enablers is steadily increasing, and new technologies are continuously created to meet the needs.

One example is the use of compact visible laser sources for laser projection systems, which are attracting considerable interest. In miniaturizing digital cameras new challenges emerge when striving for high performance combined with mass volume production. This requires the design of sophisticated lens elements and new types of imaging optics; optimized image processing pipelines; compact high-performance sensors etc. In addition, photonics has enabled fully digital media, with accompanied growth in image processing, in multimedia storage, retrieval and transmission techniques, and in related hardware and software. These new applications all have their specific requirements and put new challenges on the optical designs.

The aim of this conference is to create a joint forum for both research and application communities to share expertise, to solve present-day application bottlenecks and to propose new ap-

plication areas. Consequently, this conference has a broad scope, ranging from basic and applied research to dissemination of existing knowledge. The conference sessions will address (but not be limited to) following topics:

- image acquisition (new sensors, image reconstruction, phase image restoration, image fusion, high dynamic range imaging, plenoptic imaging)
- miniature camera optics (imaging lenses, design, flashes, adaptive optics, wafer-level optics, novel lenses, extended depth of focus, etc.)
- miniature image sensors (CCD, CMOS, and others like OPD arrays)
- camera systems and characterization (system design, testing, metrics, standards, image processing chains)
- photonics components and enabling technologies for multimedia (micro-optics, lens arrays, filters, optical interconnects, optical storage)
- image transformations (wavelet theory, space theory, geometrical transforms, restoration)
- image analysis (motion estimation, segmentation, object tracking, pattern recognition)
- image information management (coding, cryptography, watermarking, storage and retrieval systems, resolution enhancement)
- scientific visualization
- multimedia displays and applications (3D visualization, near-eye, projection, holographic)
- optical engines for displays (LED and RGB-laser based engines, holographic modulators)
- display illumination (light guide solutions, micro-optics, design)
- interaction between architectures, systems or devices for optical and digital image processing
- applications (medical imaging, surveillance, security, remote sensing, industrial inspection, multimedia).

## Real-Time Image and Video Processing (EPE115)

*Conference Chairs:* **Nasser Kehtarnavaz**, The Univ. of Texas at Dallas (USA); **Matthias F. Carlsohn**, Computer Vision and Image Communication in Bremen (Germany)

*Programme Committee:* **Mohamed Akil**, École Supérieure d'Ingénieurs en Electronique et Electrotechnique (France); **Philip P. Dang**, Intel Corp. (USA); **Barak Fishbain**, Univ. of California, Berkeley (USA); **Sergio R. Goma**, Qualcomm Inc. (USA); **Christos Grecos**, Univ. of the West of Scotland (United Kingdom); **Reinhard Koch**, Christian-Albrechts-Univ. zu Kiel (Germany); **Rastislav Lukac**, Epson Canada Ltd. (Canada); **Mehrube Mehrübeoglu**, Texas A&M Univ. Corpus Christi (USA); **Antonio J. Plaza**, Univ. de Extremadura (Spain); **Volodymyr I. Ponomaryov**, Instituto Politécnico Nacional (Mexico); **Luis Salgado**, Univ. Politécnica de Madrid (Spain); **Jorge Santos**, European Commission (Belgium); **Mukul V. Shirvaikar**, The Univ. of Texas at Tyler (USA); **Athanassios N. Skodras**, Hellenic Open Univ. (Greece); **Stephan C. Stilkerich**, EADS Deutschland GmbH (Germany); **Leonid P. Yaroslavsky**, Tel Aviv Univ. (Israel)

Real-time image and video processing involves algorithmic, hardware, and software aspects of making an image or video processing system to operate in real-time. The SPIE Real-Time Image and Video Processing Conference is the only conference that is dedicated to the subject of real-time image and video processing. It is intended to be the field catalyst bringing together scientists and researchers from industry and academia working in real-time image and video processing to present recent research results pertaining to new real-time algorithmic, hardware, and software approaches as well as real-time system designs and applications.

Papers addressing real-time issues are solicited but not limited to the following topics:

- real-time image and video processing algorithms
- real-time embedded image/video processing systems
- real-time image and video processing hardware including FPGA, DSP, GPU, GPP, ASIC, SoC and SiP implementations
- real-time software optimizations and related design paradigms
- real-time image and video processing via parallel processing and related computer architectures
- real-time computational photography, augmented reality and 3D applications
- real-time image and video compression and coding for storage and broadcasting applications including HD TV
- real-time depth acquisition methods for 3D digital video and cinema
- real-time image and video processing applications including digital, cell-phone and smart cameras
- real-time image and video processing for automatic visual inspection and machine vision
- real-time image and video processing for CCTV applications, intelligent surveillance and security, including biometric imaging
- real-time image and video processing for robot vision and autonomous systems
- real-time image and video processing for multi-dimensional image analysis, spectral imaging and remote sensing.

## Photonics for Solar Energy Systems (EPE116)

*Conference Chairs:* **Ralf B. Wehrspohn**, Martin-Luther Univ. Halle-Wittenberg (Germany); **Andreas Gombert**, Soitec Solar GmbH (Germany)

*Programme Committee:* **Benedikt Bläsi**, Fraunhofer-Institut für Solare Energiesysteme (Germany); **Christoph J. Brabec**, Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany); **Mark L. Brongersma**, Stanford Univ. (USA); **Gion Calzaferrì**, Univ. Bern (Switzerland); **Martin P. Pfeiffer**, heliatek GmbH (Germany); **Bryce S. Richards**, Heriot-Watt Univ. (United Kingdom); **Geoffrey B. Smith**, Univ. of Technology, Sydney (Australia); **Hiroo Yugami**, Tohoku Univ. (Japan)

The conference will be concerned with novel optical approaches for use in solar energy systems. It will cover basic physics, new phenomena, materials properties, modeling, device design, fabrication technologies, and characterization. Developments in optics, in nanostructures, in materials, and in fabrication technologies such as photonic crystals, plasmonics, quantum dots, rare-earth systems, conjugated polymers, and self-organisation or micro-replication are stimulating the research on solar energy conversion significantly. A broad range of optical concepts exists for the application of micro- and nanostructures in solar thermal systems and photovoltaic cells and modules.

Submissions that address optical effects in nano- and microstructured materials for management of solar radiation and daylight are highly welcome.

Topics include, but are not limited to:

- wavelength selective and antireflective surfaces
- surfaces, which are selective with respect to the angle of incidence
- switchable coatings
- fluorescence collectors
- radiation steering incl. concentration
- windows, transparent covers, and receivers
- novel light trapping concepts
- up- and down conversion
- multi-stage solar radiation conversion
- intermediate band gap solar cells
- organic, dye inorganic, and hybrid solar cells.

### Critical Dates

Abstract Due Date: 7 November 2011

Manuscript Due Date: 19 March 2012

**Please Note:** Submissions imply the intent of at least one author to register, attend the conference, present the paper as scheduled, and submit a full-length manuscript for publication in the conference proceedings.

## Optical Sensing and Detection (EPE117)

*Conference Chairs:* **Francis Berghmans**, Vrije Univ. Brussel (Belgium); **Anna G. Mignani**, Istituto di Fisica Applicata Nello Carrara (Italy); **Piet De Moor**, IMEC (Belgium)

*Programme Committee:* **Francesco Baldini**, Istituto di Fisica Applicata Nello Carrara (Italy); **Hartmut Bartelt**, Institut für Photonische Technologien e.V. (Germany); **Brian Culshaw**, Univ. of Strathclyde (United Kingdom); **Jiri Homola**, Institute of Photonics and Electronics of the ASCR, v.v.i. (Czech Republic); **Leszek R. Jaroszewicz**, Military Univ. of Technology (Poland); **Elfed Lewis**, Univ. of Limerick (Ireland); **Alexis Mendez**, MCH Engineering LLC (USA); **Luc Thévenaz**, Ecole Polytechnique Fédérale de Lausanne (Switzerland); **Moshe Tur**, Tel Aviv Univ. (Israel); **Waclaw Urbanczyk**, Wroclaw Univ. of Technology (Poland); **Jan Van Roosbroeck**, FOS&S Inc (Belgium); **David J. Webb**, Aston Univ. (United Kingdom)

The optical sensing and detection conference will emphasize the principles, characteristics and performance of photonic sensor and measurement systems. The former consider new and advanced optical- and photo-detector technologies, while the latter include point sensor, distributed sensor, inspection and remote sensing systems based either on guided or free space optics.

The conference welcomes contributions on essentially all aspects of optical sensors, including transduction principles, measurement and encoding principles, data-processing, user interfacing and field trials. Materials, components, architectures, structures, sources, detectors and analyzers for optical sensors will be presented. A wide variety of application areas will be considered, including safety & security, manufacturing industry, energy production, mining and extraction, entertainment, robotics, environmental and structural health monitoring, non-destructive evaluation, aerospace, chemical industry, food and drug processing and control, medicine and health.

Considering the growth in the field of photonic crystal and specialty fiber sensors a joint session will be organized with the Micro-structured and Specialty Optical Fibres conference.

The objective in bringing these technologies and application fields together is to provide a forum for interchange among researchers and users of the various techniques and to support crossfertilization of ideas which may benefit research and development in future photonic sensing and optical instrumentation systems.

We therefore encourage the research and development community to submit contributions to the conference in the broad field of optical sensing systems and more particularly on:

- detection and transduction materials, technologies and techniques
- technological advances in photodetectors, e.g. in the field of IR imaging or for low wavelength photosensors
- components for sensor systems, e.g.: detectors, analyzers, packages, etc.
- optical and electronic signal handling, processing, routing and user interfacing
- data analysis for multi-sensor arrays, multi-component sensing and data fusion
- fibre optic sensors
- sensitivity enhancement in optical sensing techniques such as for example interferometry, spectroscopy, laser ranging
- sensor component, system and network reliability
- applications of optical sensing techniques in the various fields given above
- field trials.

## Quantum Optics (EPE118)

*Conference Chairs:* **Thomas Durt**, Ecole Centrale Marseille (France); **Victor N. Zadkov**, Lomonosov Moscow State Univ. (Russian Federation)

*Programme Committee:* **Alain Aspect**, Institut d'Optique Graduate School (France); **Victor Balykin**, Institute of Spectroscopy (Russian Federation); **Immanuel Bloch**, Max-Planck-Institut of Quantum Optics (Germany); **Vladimir Buzek**, Institute of Physics, Slovak Academy of Sciences (Slovakia); **Berthold-Georg Englert**, National Univ. of Singapore (Singapore); **Gerard J. Milburn**, The Univ. of Queensland (Australia); **Arno Rauschenbeutel**, Vienna Ctr. for Quantum Science and Technology (Austria); **Alexander V. Sergienko**, Boston Univ. (USA); **Paolo Tombesi**, Univ. degli Studi di Camerino (Italy); **Vlatko Vedral**, Univ. of Leeds (United Kingdom); **Anton Zeilinger**, Univ. Wien (Austria)

This conference will be devoted to the recent advances in quantum optics and atom optics. During the last decades, the studies of fundamental issues in quantum mechanics exploded from their originally confidential circle of specialists and became a major field of research that covers a large range of sub-disciplines, from nanotechnologies to quantum optics, including Bose-Einstein condensates, technologies for engineering quantum states and manipulating single atoms and ions, as well as quantum dots, etc. Although those researches are clearly foundationally oriented, they fit closely to experiments and already found amazingly successful applications in top-level metrology (spectroscopy, atomic clocks, measure of fundamental constants and so on).

The conference will bring a great opportunity to listen to some of the world renowned experts in these interconnected disciplines, as well as to discover new trends that result from the convergence of these fields. It will offer an updated review of recent activities both in theoretical and experimental

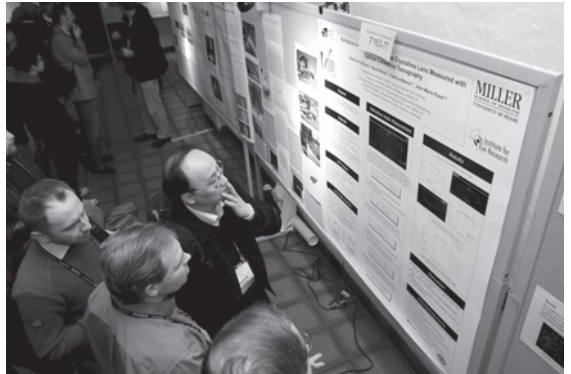
research. The conference programme will consist of oral and poster presentations on the following topics that include, but are not limited to:

- nonclassical field states
- quantum entanglement
- quantum states engineering and reconstruction
- atom optics and quantum simulators with cold atoms
- neutron, atom, and molecular quantum optics
- quantum memory for light, quantum interfaces, slow light, EIT
- cavity quantum electrodynamics
- quantum communication and information processing
- quantum effects and entanglement in biology
- cold atom ensembles and Bose-Einstein condensates.



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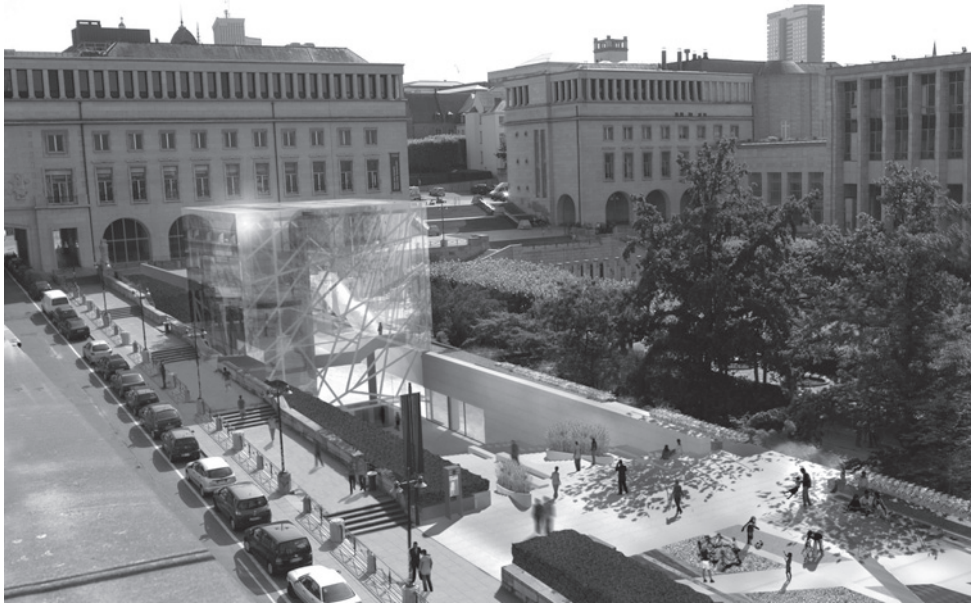
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## Important Dates

Abstract Due Date: 7 November 2011

Author Notification: 25 January 2012

Manuscript Due Date: 19 March 2012

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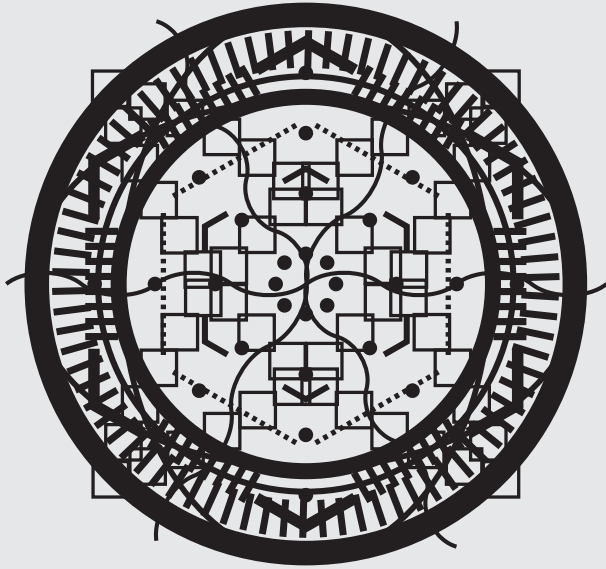
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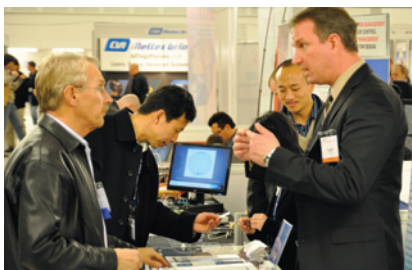
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