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2012 Optical Systems Design

26–29 November 2012

Technical Programme

www.spie.org/osd

Location
CCIB—Centre Convencions Internacional Barcelona
Barcelona, Spain

Conference
26–29 November 2012

Exhibition
27-28 November 2012



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Stuart David, Synopsys, Inc. (United States)

Marta de la Fuente, Indra Sistemas, S.A. (Spain)

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David M. Williamson, West Malvern (United Kingdom); NRCA Fellow, Nikon Research Corporation of America (United States)

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Welcome!

Optical instruments are addressing an ever-increasing number of industrial and research applications: imaging and vision, defense, space, telecommunications, transportation, industrial process control, laser fusion, etc. As end users are expecting more demanding performances, optical systems designers and manufacturers are faced with growing challenges.

This symposium on Optical Systems Design in Barcelona will be the eighth of its kind in Europe. It is intended to provide an interdisciplinary forum for technicians, engineers, researchers, and managers who are involved in instrumental optics at all levels: design, specification, production, and testing.

Get face-to-face feedback from your colleagues in an interdisciplinary forum. The symposium represents an excellent opportunity to stay informed and further the debate about the latest developments in optical design. There is no doubt that Barcelona will be the perfect host for SPIE Europe Optical Systems Design 2012; it is our great pleasure to welcome you.

Juan Carlos Miñano, Univ. Politécnica de Madrid (Spain)
Symposium Chair

David M. Williamson, West Malvern (United Kingdom); NRCA Fellow, Nikon Research Corporation of America USA)
Symposium Co-chair

Tina Kidger, Kidger Optics Associates (United Kingdom)
Honorary Chair

Barcelona

Barcelona is the second largest city in Spain and is known for its stunning architecture and major harbor and is amongst Spain's most historic, attractive and popular cities. Barcelona is also a hub of industrial activity, home to many emerging technology base small and medium sized companies involved in photonics, as well as large established companies, such as Ficosa International, and a number of first rate research centers in optics and photonics. Most of the major Spanish companies involved in photonics, such as Indra, have also facilities in this area. Barcelona province also gives home to SECPhO, the Southern European Cluster in Photonics and Optics, an industrial association which has been stimulating activity in optics and photonics, allowing for the Spanish photonics sector to be rapidly recognized in Europe and internationally.

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Cooperating Organisation:

SECPhO
Southern European Cluster in Photonics and Optics

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In addition to providing membership services, SPIE Europe Ltd. organises and manages internationally recognised conferences, education programmes, and technical exhibitions featuring emerging technologies in optics and photonics.

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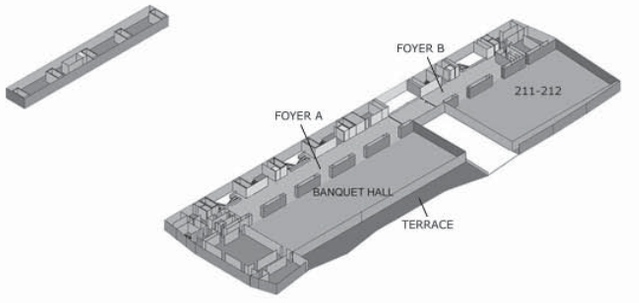
SPIE would like to express its deepest appreciation to the symposium chairs, conference chairs, programme committees, session chairs, and authors who have so generously given their time and advice to make this symposium possible.

The symposium, like our other conferences and activities, would not be possible without the dedicated contribution of our participants and members. This programme is based on commitments received up to the time of publication and is subject to change without notice.

Convention Centre

LEVEL 2



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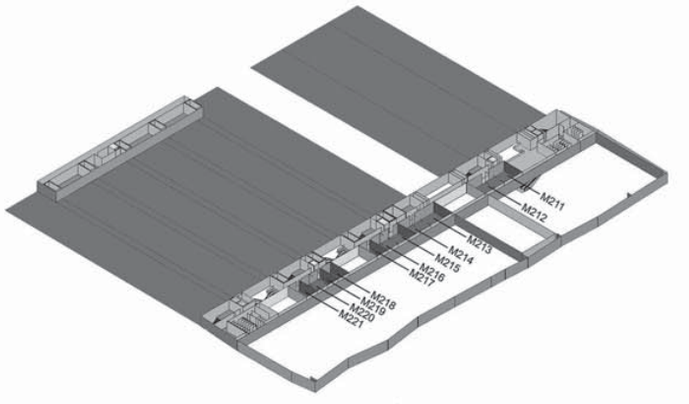
- BANQUET HALL 1665 M²
- MEETING ROOM 1284 M²
- TERRACE 447 M²

LEVEL M2



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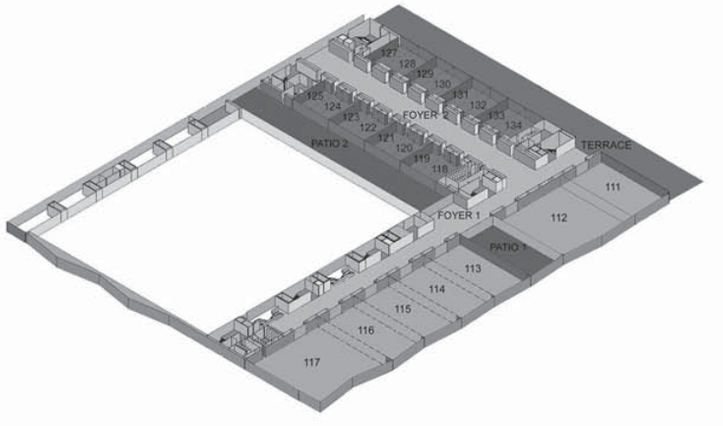

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- MEETING ROOM 116 420 M²
- MEETING ROOM 117 878 M²
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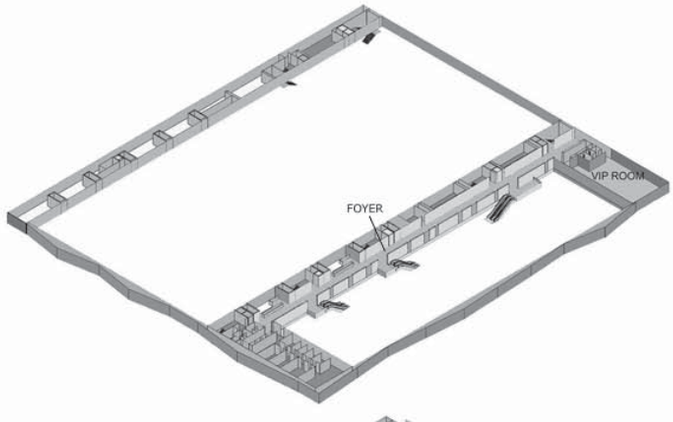

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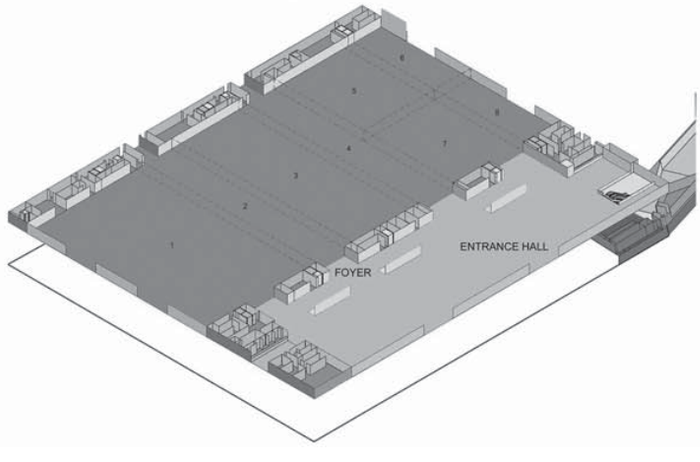

- EXHIBITION AREA TOTAL 11340 M²
- AREA 1 3476 M²
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- AREA 5 1133 M²
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MONDAY	TUESDAY	WEDNESDAY	THURSDAY

CONFERENCES

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8550B **Detectors and Associated Signal Processing V** *(Tissot, Raynor)* p. 14

8550D **Physical Optics II** *(Smith, Wyrowski, Erdmann)* p.17

8550C **Illumination Optics III** *(Kidger, David, Benitez)* p. 15

SPECIAL EVENTS

Plenary Session	Synopsys Reception
Welcome Reception	Poster Session
SCHOTT User Workshop	

SCHOTT User Workshop

Monday 26 November | 14:45 to 17:10

SCHOTT offers an in-depth information and the latest news about optical materials and components such as optical glass, special optical glass, filters from colored glasses made by coating, and the zero-expansion glass ceramic Zerodur. SCHOTT technical experts will discuss these topics and more during the SCHOTT User Workshop.

A short introduction will present the SCHOTT Advanced Optics and its production sites, and in the first part of the Workshop will be followed by the optical glass review. After defining the optical glass, an overview of the glass types program including the eco -, classical -, low Tg- and high-transmittance, glass types will be given, alongside with the introduction of the new glass types and their development trends.

Optical materials are of high strategic relevance, and their future availability is not granted; it must be managed. The so called Positive List issued by SCHOTT denominates glass types with availability guaranteed for at least five years, and in the necessary cases it also indicates expiry dates of individual glass types in an early stage.

Melting and annealing, i.e. the production process of optical glass, will be presented in respect to its influence on the glass properties such as the refractive index, dispersion, homogeneity, bubbles and inclusions, striae and stress birefringence, including their dependence on the size of optical elements, their tolerances and measurement methods such as interferometry, spectrometry,etc.

SCHOTT produces optical glass types optimized for special requirements: radiation resistant glasses, low fluorescent glasses, IR transmitting glasses and optical glass for digital projection. In addition to being a supplier of material, SCHOTT also offers a wide variety of highly value-added optical components. This will be illustrated in a short overview section of the Workshop.

The zero-expansion glass ceramic ZERODUR has proven to be an enabling material for many applications where extreme length or shape accuracy is crucial. Its properties, particularly its coefficient of thermal expansion CTE, and its high homogeneity, have been mastered to a very high degree of precision and reproducibility. Its cryogenic properties are of interest for the future applications.

The production process, melting, ceramization and shaping, is continuously improved as well as the characterization of its properties. This has led to a significant progress in the production of light-weight structures, to extended information about the bending strength, and to precise tailoring of CTE for the very application temperature conditions.

SCHOTT offers a wide program of optical colored glass filters covering the visible and neighboring UV and IR ranges. These glasses are used in a different manner than optical glass and therefore they are also specified differently. The Workshop will cover their properties and the relevant tolerances as well as their typical applications. A filter calculation worksheet is available for a free download from the SCHOTT Internet website. The worksheet provides numerous calculation possibilities that are based on the detailed and continuously updated original glass properties database.

Optical coated glass filters complete the capability range of SCHOTT. Many different types of sophisticated filter solutions are available for the variety of existing equipment. Their typical applications and compare the properties of colored glass with the properties of coated filters will be presented and possibilities of combination of both filter types to elements with unique characteristics will be discussed.

The Workshop will also address a new ISO standard on optical raw glass (ISO 12123) and its relation to the optical elements standard ISO 10110 along with other topics being subject to standardization at present. Further data and information of what is available on the SCHOTT Internet website will be made available in the form of selected examples.

14:00 **SCHOTT Advanced Optics - Company introduction**

14:10 **Optical Glass**
Definition, glass types program, eco -, classical -, low Tg and high transmittance glass types
New glass type development trends, new glass types
Strategic relevance, future availability, positive list
Production process: melting and annealing"

Optical Glass:
Properties (refractive index, dispersion, homogeneity, inclusions, striae, stress birefringence)

15:20 **Optical Colored Glass Filters**
Program, characteristics, applications,
Filter calculation program

15:40 to 16:10 **Coffee Break**

16:10 **Optical Coated Glass Filters**
Program, characteristics, applications
Comparison between colored glass and coated filters

16:30 **Special optical glass types and other optical materials**:
Radiation resistent ~, low fluorescent ~, IR transmitting ~, large glass blanks,
Zero-expansion glass ceramic Zerodur: properties and applications

17:10 **Closing Remarks**

08:45 to 8:50

Welcome and Opening Remarks

Juan Carlos Miñano, Univ. Politécnica de Madrid (Spain)

8:50 to 9:00

Welcome

Francesc Xavier Mena, Minister of Enterprise and Labour of Generalitat de Catalunya, Barcelona (Spain)

9:00 to 9:10

Plenary Speakers Introduction

Juan Carlos Miñano, Univ. Politécnica de Madrid (Spain)

9:10 to 9:50

Photon Absorption in Intermediate Band Solar Cells

Antonio Luque, Instituto de Energía Solar, Univ. Politécnica de Madrid, Spain

The Intermediate Band (IB) solar cell is a device that delivers to the external circuit photons with energy below the bandgap at a voltage limited by the bandgap, using a band of energy located within the bandgap a stepping stone (two photons are needed for generate an electron hole pair). A very high efficiency limit has been calculated for this device. They are manufactured either using as IB the confined levels of quantum dots (QDs) with IBs formed by certain impurities.

The QD way is probably closer to current cell technology. A major problem of current IB solar cells is the below-bandgap photons. Simplified quantum calculations are presented to explain the QD energy spectrum and why QDs absorb photons poorly. More desirable QDs are presented taking also into account the preservation of the voltage. Furthermore, photon management techniques to enhance the absorption based on far and near field photon absorption are presented.

Biography: **Antonio Luque.** Full Professor at the Universidad Politécnica de Madrid since 1970, he serves at the Instituto de Energía Solar he founded in 1979. He invented the bifacial cell in 1976 and, to make them, in 1981 he founded Isofotón, a solar cell company with a turnover of 300 million € in 2007. In 1997 he proposed the intermediate band solar cell. Today more than hundred centres worldwide have published on this topic in (ISI) registered journals. He is the recipient of several important prizes and distinctions, including the membership to the Real Academia de Ingeniería of Spain and of the Russian Academy of Sciences.

9:50 to 10:30

Manufacturing of Freeform Optical Components

Feng Zhou Fang, State Key Laboratory of Precision Measuring Technology & Instruments, Centre of MicroNano Manufacturing Technology, China

Optical freeform surfaces find wide applications in the fields of optics, photonics, telecommunication, and commercial products. Due to the geometrical complexity and optical particularity, machining of optical freeform surfaces is more difficult comparing to conventional machining. The freeform feature points are designed according to the application requirements. These points are fitted to the NURBS formula with the calculation of linear equation. Therefore, the designed points of freeform become math formula, and the attributions of freeform surface can be calculated. At the same time, the given points have the mapping coordinates in the NURBS variable space, where other points in the freeform surface also have their NURBS coordinates due to interpolation technique. The tool path of machining can be generated by the formula derivation of fitting surface considering the mechanism of three-axis lathe.

Another important thing for the machining is to get the cutting tool path with the radius compensation. The cutting interrelation is the main problem in freeform machining because the surface is undefined. The interrelation would impact the machining accuracy, and even destroy the machine, cutting tool and workpiece. The solution for this problem is to determine the right parameters of cutting tool before cutting. The range values of cutting tool parameters, including the rake angle, cutting edge radius and clearance angle are calculated in advance according to the surface feature. The feature of freeform surface is analyzed using the proposed sectional curve method.

Biography: **Dr F. Z. Fang** is currently working as a professor at Tianjin University. He has been involved as a project leader or principal investigator in more than 80 projects in the fields of ultra-precision machining, freeform machining, micro/nano machining and metrology funded by government or industrial partners. He is also the principal investigator for the national key program of 973 on fundamentals of manufacturing freeform optics. Dr Fang as the pioneer initiated the series of international conferences on nanomanufacturing (nanoMan), which is one of the leading conferences in the field of manufacturing. He is a fellow of the International Academy for Production Engineering (CIRP), the president of the International Society for Nanomanufacturing (ISNM), the editor-in-chief of the International Journal of Nanomanufacturing (IJNM).

10:30 to 11:00: Coffee Break

11:00 to 11:40

Transformation optics

Ulf Leonhardt, Univ. of St Andrews, United Kingdom

The field of transformation optics and metamaterials has been named by Science as one of the top ten research insights of the last decade (in fact, it was the only one in physics and engineering that made it into the top ten). What is it? In transformation optics manmade dielectric materials, called metamaterials, are used to implement a coordinate transformation of space (or in some cases of space and time). What can it do? For example, such transformation devices can make things invisible or create perfect images with a resolution no longer limited by the wave nature of light. These and other applications will be discussed in the lecture.

Biography: **Ulf Leonhardt,** born in Schlema, in former East Germany, studied at Friedrich-Schiller University Jena, Germany, at Moscow State University, Russia, and at Humboldt University Berlin, Germany. He received the Diploma in Physics from Friedrich-Schiller University in 1990 and the PhD in Theoretical Physics from Humboldt University in 1993. Ulf Leonhardt was a research associate at the Max Planck Research Group Nonclassical Radiation in Berlin 1994-1995, a visiting scholar at the Oregon Center for Optics in Eugene, Oregon, 1995-1996, a Habilitation Fellow of the German Research Council at the University of Ulm, Germany, 1996-1998, and a Feodor-Lynen and Göran-Gustafsson Fellow at the Royal Institute of Technology in Stockholm, Sweden, 1998-2000.

Since April 2000 he is the Chair in Theoretical Physics at the University of St Andrews, Scotland. In 2008 he was a Visiting Professor at the National University of Singapore and in 2011 at the University of Vienna. Ulf Leonhardt is the first from former East Germany to win the Otto Hahn Award of the Max Planck Society. For his PhD thesis he received the Tiburtius Prize of the Senate of Berlin. In 2006 Scientific American listed him among the top 50 policy business and research leaders. In 2008 he received a Royal Society Wolfson Research Merit Award and in 2009 a Theo Murphy Blue Skies Award of the Royal Society. He is a Fellow of the Institute of Physics and of the Royal Society of Edinburgh.

11:40 to 12:20

Recent developments in optics for Solid State Lighting

Rubén Mohedano, Managing Director, LPI-Europe, Spain

LED performance features have experienced a spectacular evolution in the recent years. The possibility of getting high quality white light, along with the increase in luminance, make LEDs a worthwhile alternative in almost all illumination applications. This not-new-anymore type of light source has its own challenges, tough, which make lamp retrofitting a quite inefficient choice in most cases. Customized optical designs, adapted to LED characteristics and to the specific illumination goals can make LED-based concepts a real alternative even in high flux applications. This work will show examples of advanced optical designs adapted to particular illumination problems and overcoming the specific LED challenges in such contexts.

Biography: **Rubén Mohedano** got his PhD degree in January 2002 with Summa Cum Laude, his research being focused on Nonimaging Optics design, manufacturing and applications. He is currently the Managing Director of LPI-Europe, an intense R&D company that he joined by 2002. He has been involved in more than 30 projects since then, mostly in the Concentration Photovoltaics (CPV) and Illumination fields. He has led projects for various major Automotive and CPV companies: most of the systems developed are already available in the market. He is the author of 1 book, co-author of two books, more than 6 patents, 7 papers and several congress publications.

12:20 to 12:35

Kidger Scholarship Award

Fabian Duerr, a Ph.D student at the Brussels Photonics Team B-PHOT in the Department of Applied Physics and Photonics, Vrije Universiteit Brussel, has been chosen as the 2012 Michael Kidger Memorial Scholarship awardee. He has an undergraduate degree (Physik-Vordiplom) and a master's level degree (Physik-Diplom) from the University of Karlsruhe. Fabian's thesis topic is "Tracking integration in concentrating photovoltaics using laterally moving optics" and is being carried out under the guidance of Chair, Department Head and Professor Hugo Thienpont

The Kidger Scholarship Award will be presented by **Tina E. Kidger.**

The Michael Kidger Memorial Scholarship was established in 1998 to honour Michael John Kidger, a well-respected educator, design software developer and member of the optical science and engineering community. The 2012 award is anticipated to consist of a study grant of $5,000.

Special Events

Welcome Reception

Location: La Pedrera, Provença, 26-265, 08008 Barcelona

Monday 26 November . . . . . 18:00 to 20:00

- Bus: 7, 16, 17, 22, 24, and 28.
- Metro: lines 3 and 5, Stop: “Diagonal”.
- FGC: Stop: “Provença”.
- RENFE: Stop: “Passeig de Gràcia”.

Location site: **http://www.lapedrera.com/en/location-and-opening-hours**

All attendees are invited to relax, socialise, and enjoy light refreshments. Please remember to wear your conference registration badges. Dress is casual.

Location Map

La Pedrera, Provença, 26-265, 08008 Barcelona

- Bus: 7, 16, 17, 22, 24, and 28.
- Metro: lines 3 and 5, Stop: “Diagonal”.
- FGC: Stop: “Provença”.
- RENFE: Stop: “Passeig de Gràcia”.

Location site: **http://www.lapedrera.com/en/location-and-opening-hours**

Sagrada Família Tour

Tuesday 27 November . . . . . 11:00 to 15:00

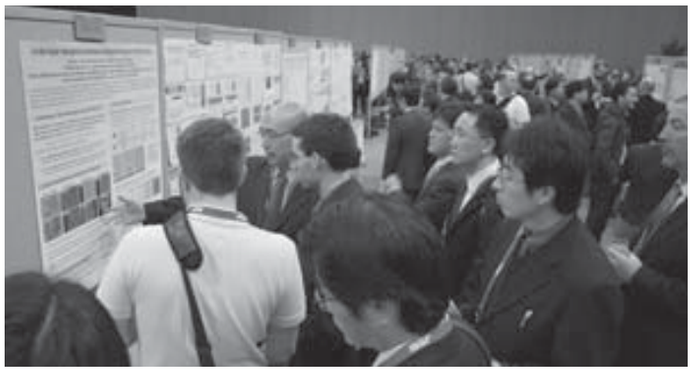
A tour the Sagrada Família will be organized on Tuesday 27 November. 20 spaces are available and registration is required in order to attend the tour. Registration is free.

The bus will leave at the venue on Tuesday 27 November at 11:00 and return at 15:00 hrs. The tour will commence at 12:00 and conclude at 14:00 hrs. It will consist of one hour presentation and one hour technical visit. Interested participants may continue visiting the Sagrada Família on their own.

TOUR REQUIREMENTS:
- Interested participants must pre-register at the SPIE onsite registration desk. 20 spaces are available.
- Participants cannot suffer from vertigo.
- Participants must wear sneakers or similar footwear with thick soles.
- Complete tour times and details will be available upon registration.

The Basílica i Temple Expiatori de la Sagrada Família (Basilica and Expiatory Church of the Holy Family), commonly known as the Sagrada Família is a large Roman Catholic church in Barcelona, Catalonia, Spain, designed by Catalan architect Antoni Gaudí (1852–1926). Although incomplete, the church is a UNESCO World Heritage Site, and in November 2010 was consecrated and proclaimed a minor basilica by Pope Benedict XVI.

Though construction of Sagrada Família had commenced in 1882, Gaudí became involved in 1883, taking over the project and transforming it with his architectural and engineering style—combining Gothic and curvilinear Art Nouveau forms. Gaudí devoted his last years to the project, and at the time of his death in 1926, less than a quarter of the project was complete. Construction passed the midpoint in 2010 with some of the project’s greatest challenges remaining and an anticipated completion date of 2026—the centennial of Gaudí’s death.



Poster Session

Tuesday 27 November . . . . . 17:30 to 18:30

All registered symposium attendees are invited to attend Tuesday poster session provided as an opportunity to enjoy networking and refreshments while reviewing poster papers. The interactive poster sessions are designed to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high quality papers that are presented in this alternate format and to interact with the poster authors. Posters will be on display after 10.00 Tuesday morning in the Conference Area Hallway. An interactive poster session and reception with authors present will be held on Tuesday 17:30 to 18:30. Light refreshments will be served.

Synopsys Cocktail Reception

Tuesday 27 November . . . . . 18:45 to 22:00

Location: Hotel Princess (in front of the conference centre)

The reception is open to all attendees. For further information please contact Yan Cornil at the LightTec stand in the exhibition.

Exhibition Directory
spie.org/osd

2012 Optical Systems Design

Moving Technology to Market™

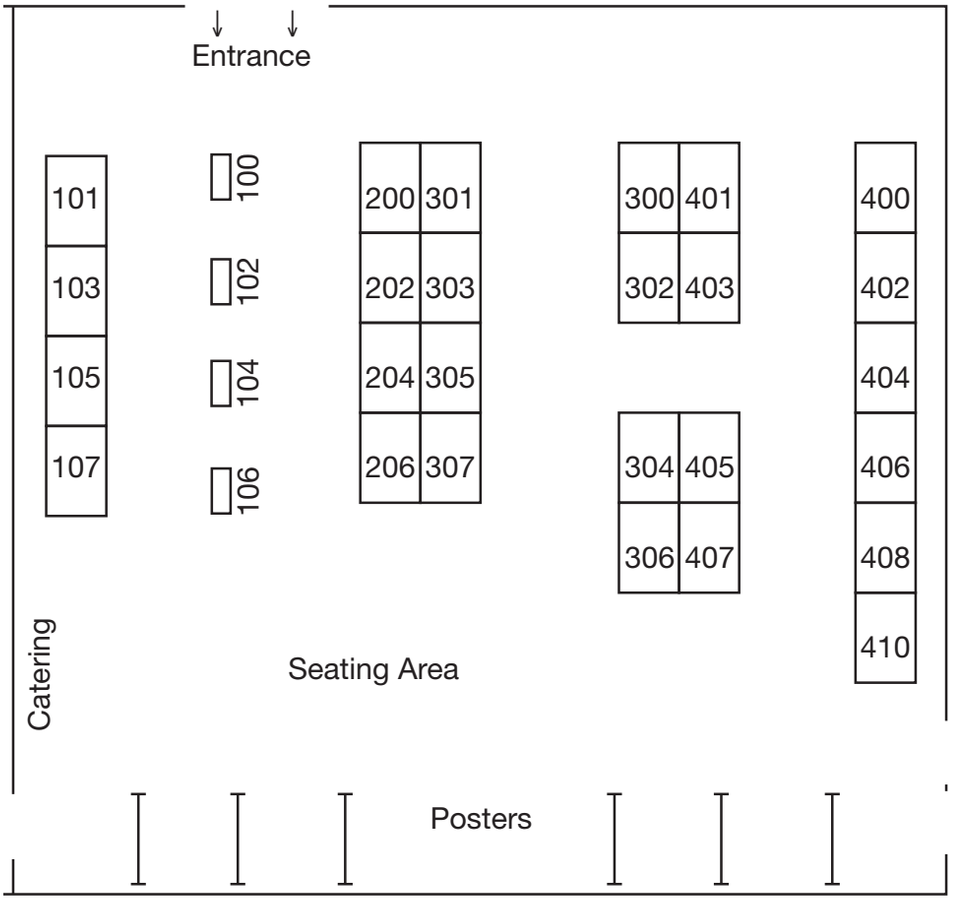
Exhibition Dates:

27 – 28 November 2012

Centre Convencions Internacional Barcelona

Tuesday . . . . . .10:00 am to 17:30

Wednesday . . . . . .10:00 am to 17:30



Company Name	Booth #
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CD6 UPC	#302
CeramOptec GmbH	#107
CHYLAS	#407
Computer Vision Ctr.	#307
Easy Laser S.L.	#403
FIBERSUNTECH S.L.	#410
FRACTAL S.L.N.E.	#402
Hamamatsu Photonics	#400
Hellma Materials GmbH	#103
Iberoptics Sistemas Opticos	#301
IN2UB - Univ De Barcelona	#306
IREC	#408
J.D. Photo Tools Ltd	#104
Lasing, S.A.	#406
Light Prescriptions Innovators Europe, S.L.	#304
Light Tec	#204
LightTrans VirtualLab UG	#106
MONOCROM S.L.	#405
Ohara GmbH	#206
optics.org	#105
Optimax Systems, Inc.	#100
OPTIS EUROPE SAS	#101
Radiant Zemax	#200
Radiantis	#404
SECPhO	#305
Sensofar-Tech, S.L.	#300
SMETHODS/Technische Univ. Delft.	#102
TRIOPTICS GmbH	#202

Exhibition Guide Listing

Alava Ingenieros Group #401

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Alava Ingenieros Group is an entirely privately owned group which has been providing high technology solutions in the Testing, Measurement, Communications Security, Defence and Preventive Maintenance fields since it was first founded in 1973. The group offers consultancy, engineering, distribution, training and technical services, providing turn-key projects for several sectors including Aerospace, Automotive, Security, Defence, Communications and Finance, as well as Testing and Research Centres, Universities, Public Services and Industry in general.

ASE Optics Europe #303

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+34 659743583
http://aseoptics.eu/

Need help with a challenging optical application? ASE Optics Europe provides optical engineering talent for world-class optical systems. We create applied engineering solutions for a wide range of applications. Our focus is on innovative, cost-effective designs. We enjoy solving problems with creativity and collaboration. Our highly skilled PhD, MS, and BS level engineers bring extensive experience and knowledge of both theoretical and applied systems. Based in Barcelona, Spain, our team has the expertise to tackle the most complex of challenges. As an RPO Company, ASE Optics Europe helps customers move from lens and assembly design to prototype to full production if needed. Rochester Precision Optics offers expanded access to technology, facilities and testing to speed our customers? time to market.

CD6 UPC #302

Ramblas Sand Nebridi, 10 Terassa, Barcelona, 8222 Spain
http://www.cd6.upc.edu

The Centre for Sensor, Instrument and Systems Development (CD6) is a research centre belonging to the Technical University of Catalonia (UPC). Its purpose is to provide services to companies and to carry out technological innovation projects in the field of optical engineering. The CD6's facilities include mechanics and electronics workshops and specialised laboratories. The work carried out at the CD6 has resulted in numerous publications in internationally renowned journals, patents and spin-off companies.

CeramOptec GmbH #107

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CeramOptec is a German based medium sized company located in Bonn, and specialized in producing quartz glass multimode step-index fibers. Our product range contains fibers and cables for industrial application as well as fiber bundles for spectroscopy, various laser applications, sensor technology etc. Through our own perform production we are able to offer innovative customized fibers and fiber optic products. Special fiber designs with non-circular-core are possible. Different geometries such as square, rectangular, hexagonal or octagonal effect low-loss mode mixing are combined with minimal focal radiation degradation (FRD). Recently we offer NCC fibers with rectangular silica core and rectangular fluorine doped silica cladding, for an efficient coupling in and bundling of laser diodes radiation with its special characteristic. Standard products and Customized Solutions: fused silica optical pre-forms, fused silica optical fibers, fused silica fiber assemblies, fused silica bundles and fused-end bundles, medical fibers.

CHYLAS #407

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sales@chylas.com; http://chylas.com/

ChyLas manufactures fiber-optic components and advanced optical fiber lasers for industrial and scientific applications. Optical fiber lasers are a reliable solution for systems that require a coherent light source with an extreme high quality of the beam, such as marking, printing or welding industrial systems. In addition, the technological capacities of the company allow designing and fabricating of multiple hybrid components, with a broad range of applications. ChyLas was established in June, 2006, as a spin-off company of the Universitat de València, to exploit the technology originated at the Optical Fiber Laboratory. The know-how of ChyLas covers a wide range of areas, from optical components such as fiber Bragg gratings or tapered fibers, to fiber lasers and photonic crystal fiber components, as well as difeent electronic sistems. ChyLas offers a catalogue with a number of products for different applications. In addition, we offer the possibility of contact us to combine our different abilities to fabricate the optical fiber system you need for your application

Computer Vision Ctr. #307

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+34 93 581 18 28; fax +34 93 581 16 70
cvc@cvc.uab.es; http://www.cvc.uab.es/

The Computer Vision Centre is a non-profit institution and leading research and development centre in the Computer Vision field. On account of its good practices, the CVC has positioned itself as an authority in the Computer Vision field and is regarded as a reference of knowledge generation for society.

Easy Laser S.L. #403

Formentera 24, Sant Quirze Del Valles, 08192 Spain
+34 937 369 370; fax +34 937 369 371
easy@easy-laser.biz; http://www.easy-laser.biz/eng/easy-laser-company.html

We place at your disposal over 30 years of experience in laser technology, to offer you real solutions with the maximum cost-effectiveness for your business. We are specialists in lasers: whatever the application, we offer you the most appropriate solution for your requirements at the best price. At present more than 3160 systems made by Easy Laser are operating in 61 different countries, more than 95% of them outside Spain (data March 2012).

FIBERSUNTECH S.L. #410

Parque Technologico De Madrid, C/Torres Quevedo 7, TRES CANTOS 28760 Spain
+34 936113188

FRACTAL S.L.N.E #402

Calle Tulipán 2 portal 13 1-A, Las Rozas de Madrid, 28231 Spain
+34 916379640; fax +34 917 91 71 13
info@fractal-es.com; http://www.fractal-es.com/Fractal-ingles.htm

FRACTAL has an expert, stable and committed team. We cover the subjects of Astronomy, Management, System Engineering, Optics, Opto-mechanics, Mechanics, Electro-mechanics, Cryogenics, Detectors, Data Acquisition Systems, and Software (Real Time Systems, Distributed Systems, Mechanisms Control, Data Base, Telescope's Control Systems and Data Reduction).

Hamamatsu Photonics #400

C Argenters 4 Edif 2, Parque Tecnologico del Valles, Cerdanyola Barcelona, 08290 Spain
+34 3 582 4430; fax +34 3 582 4431
dcastrillo@hamamatsu.es; http://sales.hamamatsu.com/en/contact-us.php

Behind this commitment to quality stands an equally important commitment to research. Hamamatsu is known for its research into both the basic and applied aspects of the science of light. Working in our labs and through collaborative partnerships with a variety of research organizations, Hamamatsu sees light and its research not only as a springboard for new knowledge and technologies but for the improvement of life itself. This philosophical commitment to research is backed by a strong financial commitment. Over a five year period the company's overal ratio of R&D expenses to net sales averaged 13%.

Hellma Materials GmbH #103

Moritz-von-Rohr-Str 1, Jena, 07745 Germany
+49 3641 2877 0; fax +49 3641 2877 203
info.materials@hellma.com; www.hellma-materials.com

Featured Product: Calcium Fluoride crystals (max. 440 mm diameter), Barium Fluoride crystals, Laser crystals

Hellma Materials produces high quality materials for various optical applications from deep UV to IR. Continuing the Calcium Fluoride business of Schott Lithotec, we supply to diverse markets including Microlithography, Excimer Laser Optics, Analytical Instrumentation, Astronomy, Defense and more. Contact: Daniel Hahn, Area Sales Manager, daniel.hahn@hellma.com

Iberoptics Sistemas Opticos #301

Gamonal No 16 Ofina 4-l, Madrid, 28031 Spain
+34 91 3854 395; fax +34 91 3352 910
info@iberoptics.com; http://www.iberoptics.com/

In Iberoptics we provide high-performance Optical Systems: Cameras CCD / CMOS lenses, lighting, accessories ..., backed by industry leading brands. In Iberoptics work to meet their needs, based on the experience and knowledge, offering a quick and timely service. We invite you to explore this site to view our full range of products and ask as much information as needed through the contact channels.

IN2UB - Univ De Barcelona #306

Martí i Franquès 1, Barcelona, 08028 Spain
+34 93 4039708
in2ub@ub.edu; http://www.ub.edu/in2ub/

The Institute for Nanoscience ans Nanotechnology of the University of Barcelona (IN2UB) was created in 2006 with the purpose of encouraging research and promoting its outcome within society, in order to contribute to the progress of science and innovation and to spur industrial excellence as well. In this framework, the Institute explores six different research areas which comprehend several specific lines. A part of this research is focused on photonics and optics, with outstanding results. The Institute offers services such as polarimetric characterization and laser direct writing techniques for microfabrication, as well as design, modeling and fabrication of novel photonic structures and devices and comprehensive characterization of photonic performance. Some examples of ongoing research at the institute are the development of optical sources integrated in silicon photonics and the study of the optical properties of 2D-crystal structures for photonic applications.

IREC #408

Jardins de les Dones de Negre 1 2@ pl, St Andria de Besos, Barcelona, 08930 Spain
+34 933 562 615; fax +34 933 563 802
info@irec.cat; http://www.irec.cat

The Catalan Institute for Energy (ICAEN), the Research Centre for Energy, Environment and Technology (CIEMAT) and the Catalonia Institute for Energy Research (IREC) today signed an agreement to create a research and technology development programme in the area of nuclear fusion energy technologies. One of the initiative's main goals is to promote the participation of the maximum number of Catalan businesses in bidding for programmes to supply equipment and services for the ITER project being built in Cadarache (France). In this regard, the participation of the Catalan industrial network is of major importance because of the presence in Barcelona of the European Unions Fusion for Energy (F4E) Agency, responsible for managing the projects equipment and services purchases.

J.D. Photo Tools Ltd #104

Meridian Centre, King Street, Oldham, OL8 1E, United Kingdom
+44 1616272949; fax +44 1616200764
sales@jdphoto.co.uk

Lasing, S.A. #406

Julian Camarillo 16 1° 7-8, Madrid, 28037 Spain
+34 91 377 5006; fax +34 91 407 3624
info@lasing.com; http://www.lasing.com/

Lasing, S.A. is, since 1980, a company dedicated to the distribution in Spain of the highest technology in instrumentation and photonic products. Lasing, S.A. activities are based mainly in three areas where the company has been specialised being leader in the sector because its high professionalism and excellent technical support, having in Spain a big number of installations in Investigation Centres, Universities, Hospitals and the main Industries.

Light Prescriptions Innovators Europe, S. L. #304

Campus de Montegancedo UPM, Edificio CeDInt,
Pozuelo (Madrid), 28223 Spain
+34 91 452 4890; fax +34 91 452 4892
info@lpi-europe.com; http://www.lpi-llc.com/

LPI´s Design and R&D group includes some of the most prominent talent in the fields of Nonimaging Optics with applications in Solid State Illumination and Concentrated Photovoltaics. These experienced optical scientists, combined with its extensive fabrication know-how, make LPI uniquely capable of conducting developmental projects with minimum time-to-market. The LPI management team consists of a group of highly qualified experts with international reputation in the optics fields, both in the US as well as in Europe. The list on the right shows some of these team members. To learn more about a particular team member, click on the name.

Light Tec #204

359 rue Joseph St, Espace Alexandra, Hyeres, 83400 France
+33 494 12 18 48; fax +33 494 12 18 49
sales@lighttec.fr; http://www.lightec.fr

Featured Product: Code V , LightTools , RSOFT, TFCalc,SigFit, Reflet, Mini- Diff ....

Light Tec provides a wide range of optical simulation software covering areas as different as:

- illumination - displays - straylight analysis - optical design - optical communication - integrated optics - laser propagation - thin film design - grating design - laser diode design.

Light Tec provides also scattering mesurements as a service or as instruments. We have also a photometric laboratory allowing us to measure the photometry of prototypes, commercial LEDs or materials. Contact: Yan Cornil, yan.cornil@lighttec.fr; Nathalie Pucci, export assistant, nathalie.pucci@lighttec.fr

LightTrans VirtualLab UG #106

Kahlaische Str 4, Jena, 07745 Germany
+49 36 41 5312950; fax +49 36 41 5312901
service@lighttrans.com; http://www.lighttrans.com

Featured Product: LightTrans VirtualLab 5 – field tracing software for optical modeling and design

The field tracer provides suitable modeling and design techniques based on unified optical modeling. New: the Lighting Toolbox for the design and simulation of non-paraxial optical systems, e.g. setups using LED's or other highly divergent partially coherent sources. Also: several optimization strategies, as parametric methods and the iterative Fourier transform algorithm, supporting the design of optical systems and components incl. aspherical lenses, beam shapers, diffusers, gratings. Contact: Volkmar Betz, Account Mananger, betz@lighttrans.com; Petra Wyrowski, CEO, p.wyrowski@lighttrans.com

Exhibition Guide Listing

MONOCROM S.L. #405

C/ Vilanoveta 6, Vilanova i la Geltrú, 08800 Spain
+34 93 814 9450; fax +34 93 814 3767
info@monocrom.com; http://www.monocrom.com

We are creating and manufacturing laser modules to our customers for more than fifteen years, thanks to the effort of a highly qualified, creative and motivated team. Our courage, creativity and dynamism make us different. We have demonstrated the applicability of new concepts in laser physics and technology, like our patented clamped high power diode laser, or our Q-Switched green SSL, capable of providing microseconds pulses and considered the most important development in Eye surgery from the last years. Our present challenge is to design an ultra light-weight and resistant green laser device for a Space mission to Mars.

Ohara GmbH #206

Nordring 30 A, Optisches Glas, Hofheim, 65719 Germany
+49 61 9296 5050; fax +49 6192 6950 51
info@ohara-gmbh.com; http://www.ohara-gmbh.com

Ohara is a world leader in the development and manufacturing of optical glasses. We are concentrating on optical applications and related technical fields. For example, optoelectronics. Our progress and success in the supply of advanced optical materials is more than anything else determining the future development and direction of the Ohara Group. Ohara was the first supplier to redesign his existing assortment of optical glasses, turning nearly all of them into so called ECO glasses.

optics.org #105

Ffordd Pengam, 2 Alexandra Gate, Cardiff, CF24 2SA United Kingdom
+44 29 2089 4747; fax +44 29 2089 4750
sales@optics.org; http://www.optics.org

optics.org where the business of photonics meets the global photonics community! Excellent editorial quality, exclusive, must -read content makes optics.org essential for keeping up-to-date on news, market trends, new products, business analysis and financial updates. It also has a comprehensive buyers guide, international career centre and events info.

Optimax Systems, Inc. #100

SPIE Corporate Member

6367 Dean Pkwy, Ontario, NY, 14519-8939 United States
+1 877 396 7846; fax +1 585 265 1033
sales@optimaxsi.com; http://www.optimaxsi.com

Featured Product: Cost Tolerancing: this interactive tool shows the major variables that affect the cost of optics.

Optimax grinds and polishes optical materials to make aspheres, cylinders, spheres, and prisms to customer specifications. We specialize in small lot sizes with diameters up to 300mm. With more than 100 opticians, CNC machining, in-house coating capabilities, and our newly completed 20,000 square-foot expansion, Optimax can deliver prototype optics in 1 week! Contact: Rick Plympton, CEO, sales@optimaxsi.com

OPTIS EUROPE SAS #101

176 Av. Joseph Louis Lambot 83130 La Garde France
+33 494 087 717; fax +33 494 086 694
www.optis-world.com

Radiant Zemax #200

SPIE Corporate Member

Stoney Common Rd, 8 Riverside Business Park, Stansted, CM24 8PL United Kingdom
+44 1279 810911; fax +44 1279 810912
eusales@radiantzemax.com; http://www.radiantzemax.com

Featured Product: Zemax: Optical Design Software

Radiant Zemax Europe is the regional supplier of the Zemax optical design software. Zemax offers power, speed, flexibility, ease of use and value in one comprehensive program. You can perform lighting and illumination system design, stray light analysis, classical lens design and also laser beam propagation. Radiant Zemax Europe offers expert technical support on the use of the software and a range of Zemax and other optical engineering training courses. Contact: Chris Normashire, Zemax Analyst, chris.normanshire@radiantzemax.com; Neil Barrett, Managing Director, neil.barrett@radiantzemax.com

Radiantis #404

Carrer Copèrnic 2-4 nave 1, Polígon Camí Ral Gavà Barcelona, 09960 Spain
+34 936389763
sales@radiantis.com; http://www.radiantis.com

SECPhO #305

Rambla Santa Nebridi 10, Terrassa (Barcelona), 08222 Spain
+34 937398922; fax +34 937398923
info@secpho.org; http://www.secpho.org/

The optics industry in Spain pooled together to create the Southern European Cluster in Photonics and Optics – SECPhO, founded in April 2009, with the mission to help the sector increase competitiveness, specially through collaboration. From 10 founding members, SECPhO now incorporates over 55 members, from all over Spain and Portugal, representing Large Enterprises, SMEs and Research Centers involved in optics and photonics.

Sensofar-Tech, S.L. #300

Crta BV1274 Km 1, Parc Audiovisual de Catalunya, Terrassa Barcelona, 08227 Spain
+34 93 700 14 92; fax +34 93 786 01 16
info@sensofar.com; http://www.sensofar.com

SENSOFAR is a leading-edge technology company operating at the highest quality standards within the field of non contact surface metrology. We provide high-accuracy optical profilers based on interferometry and confocal techniques. From standard setups for R&D and quality inspection laboratories, to complete non contact metrology solutions for online production processes, Sensofar is offering a technology enabling our customers to achieve the most challenging breakthroughs, particularly in semiconductor, precision optics, data storage, display devices, thick and thin films and material testing technologies, in more than 25 countries.

SMETHODS/Technische Univ. Delft #102

Lorentzeg 1, Faculteit Technische Natuurwetenschappen, Delft, Netherlands

TRIOPTICS GmbH #202

SPIE Corporate Member

Hafenstrasse 35-39, Wedel, 22880 Germany
+49 4103 18006 0; fax +49 4103 180062 0
info@trioptics.com; http://www.trioptics.com

Featured Product: Measuring Lens Centering, Air Spacing, and Center Thickness inside of Assembled IR Optical Systems

ImageMaster® complete characterization of lenses. OptiCentric® automatic alignment, cementing, bonding, assembly. OptiSpheric® integrated optical testing. WaveMaster® wavefront analysis of spherical & aspherical lenses. TriAngle® autocollimator for angle,wedge & straightness. PrismMaster® accurate automatic goniometer featuring ultra-accurate angle measurements SpectroMaster® measurement of refractive index from UV to IR. µPhase® Interferometer measures the quality of spherical,aspherical & flat optic.

Conference 8550A

Monday - Thursday 26–29 November 2012 • Proceedings of SPIE Vol. 8550

Optical Design and Engineering V

Conference Chairs: **Laurent Mazuray,** EADS Astrium (France); **Rolf Wartmann,** Carl Zeiss MicroImaging GmbH (Germany); **Andrew P. Wood,** Qioptiq Ltd. (United Kingdom); **Marta C. de la Fuente,** Indra Sistemas, S.A. (Spain)

Programme Committee: **Errico Armandillo,** European Space Research and Technology Ctr. (Netherlands); **Francoise M. Cau,** Sagem Defense Securite (France); **Andres F. Cifuentes,** SECPhO (Spain); **Andrew J. Court,** TNO (Netherlands); **Mike A. Cutter,** Surrey Satellite Technology Ltd. (United Kingdom); **Michael Duparré,** Friedrich-Schiller-Univ. Jena (Germany); **Jean-Jacques Fermé,** Société Européenne de Systèmes Optiques (France); **Regis Grasser,** CILAS (France); **Ullrich Krüger,** JENOPTIK Optical Systems GmbH (Germany); **Paolo Laporta,** Istituto di Fotonica e Nanotecnologie (Italy); **Iain A. Neil ,** ScotOptix (Switzerland); **Jannick P. Rolland,** Univ. of Rochester (United States); **Kevin P. Rolland-Thompson,** Synopsys, Inc. (United States); **Elisabetta Rugi Grond,** RUAG Space AG (Switzerland); **Simon Thibault,** Univ. Laval (Canada); **Wilhelm Ulrich,** Carl Zeiss AG (Germany); **Min Wang,** INO (Canada); **Richard N. Youngworth,** Riyo LLC (United States); **Maria Josefa Yzuel,** Univ. Autònoma de Barcelona (Spain)

Monday 26 November

Welcome and Introduction . . . . . 13:55 to 14:00

Session 1

Room: 131/132 . . . . . Mon 14:00 to 15:20

Software and Modelling I

Session Chair: **Rolf Wartmann,**
Carl Zeiss MicroImaging GmbH (Germany)

14:00: **Comprehensive modelling and simulation of micro-optical subsystems**, Ingo Sieber, Karlsruher Institut für Technologie (Germany) . . . . . [8550-1]

14:20: **Accuracy of geometric point spread function estimation using the ray-counting method**, Javier Portilla, Sergio Barbero Sr., Consejo Superior de Investigaciones Científicas (Spain) . . . . . [8550-2]

14:40: **Super resolution using a modified spherical geodesic waveguide suitable for manufacturing**, Hamed Ahmadpanahi, Dejan Grabovickic, Juan Carlos González, Pablo Benítez, Juan Carlos Miñano, Univ. Politécnica de Madrid (Spain) . . . . . [8550-3]

15:00: **Integrating optical simulation into CAD/CAM solutions: advantages to designers of optical imaging systems**, Jacques Delmau, OPTIS (France)[8550-4]

Coffee Break . . . . . Mon 15:20 to 15:50

Session 2

Room: 131/132 . . . . . Mon 15:50 to 17:10

Software and Modelling II

Session Chair: **Rolf Wartmann,**
Carl Zeiss MicroImaging GmbH (Germany)

15:50: **Tolerancing free form elements considering manufacturing characteristics**, Susanne Zwick, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany); Roberto Knoth, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Gibraltar); Ralf Steinkopf, Gunther Notni, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany). . . . . [8550-5]

16:10: **Design and modelisation of a straylgth facility for space optical instrument**, Emmanuel Mazy, Yvan G. Stockman, Marie-Laure Hellin, Univ. de Liège (Belgium) . . . . . [8550-6]

16:30: **A simulation model for the development of an aspheric lens adjustment system**, Christian Bräuer-Burchardt, Susanne Zwick, Gunther Notni, Matthias Beier, Andreas Gebhardt, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany). . . . . [8550-7]

16:50: **Forward tracing technique for diffraction analysis applied to the design of an IR endoscope**, Andres F. Cifuentes, ASE Optics Europe (Spain); Josep Arasa, Univ. Politècnica de Catalunya (Spain) . . . . . [8550-8]

Tuesday 27 November

Session 3

Room: 131/132 . . . . . Tue 9:00 to 10:00

Software and Modelling III

Session Chair: **Andrew P. Wood,** Qioptiq Ltd. (United Kingdom)

9:00: **Experiences with CodeV® 'Glass Expert'**, Mark Jeffs, Qioptiq Ltd. (United Kingdom) . . . . . [8550-10]

9:20: **Applying optical design methods to the development of application specific photonic crystal fibres**, Francis Berghmans, Thomas Geernaert, Vrije Univ. Brussel (Belgium); Marek Napierala, Vrije Univ. Brussel (Belgium) and Wroclaw Univ. of Technology (Poland); Tigran Baghdasaryan, Camille Sonnenfeld, Sanne Sulejmani, Vrije Univ. Brussel (Belgium); Tomasz A. Nasilowski, Military Univ. of Technology (Poland); Pawel Mergo, Univ. Marii Curie-Sklodowskiej (Poland); Elzbieta M. Beres-Pawlik, Wroclaw Univ. of Technology (Poland); Hugo Thienpont, Vrije Univ. Brussel (Belgium) . . . . . [8550-12]

9:40: **Computer modelling approach to decrease stray light in low light non-imaging optical designs**, Selcuk Seyhun, Huseyin Sari, Ankara Üniv. (Turkey) . . . . . [8550-77]

Coffee Break . . . . . Tue 10:00 to 10:30

Session 4

Room: 131/132 . . . . . Tue 10:30 to 12:20

Optical Solutions I

Session Chair: **Marco Hanft,** Carl Zeiss Jena GmbH (Germany)

10:30: **Chromatic information coding in optical systems for hyperspectral imaging and chromatic confocal sensing** *(Invited Paper)*, Matthias Hillenbrand, Mohamed Bichra, Adrian Grewe, Raoul Kirner, Robert Weiss, Stefan Sinzinger, Technische Univ. Ilmenau (Germany) . . . . . [8550-13]

11:00: **Quantify passive athermalization in infrared imaging lens systems**, Norbert Schuster, Umicore Electro-Optic Materials (Belgium) . . . . . [8550-14]

11:20: **Development of a real-time optical imaging system for monitoring food quality and assessing human body parts using diffused light**, Tsuneaki Genta, Hiromu Tashima, Toyohashi Univ. of Technology (Japan); Ryo Shimokita, Genial Light, Inc. (Japan); Ahinichi Arai, Mitsuo Fukuda, Toyohashi Univ. of Technology (Japan). . . . . [8550-15]

11:40: **Multifocus FCS**, Vit Dolezal, Lars Kreutzburg, Richard Börner, Christian G. Hübner, Univ. zu Lübeck (Germany) . . . . . [8550-16]

12:00: **Calculation of frontal components for microobjectives**, Alexey D. Frolov, National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation); Olga A. Vinogradova, Dmitry N. Frolov, FOCUS Inc. (Russian Federation) . . . . . [8550-17]

Lunch/Exhibition Break . . . . . Tue 12:20 to 13:40

Session 5

Room: 131/132 . . . . . Tue 13:40 to 15:30

Optical Solutions II

Session Chair: **María J. Yzuel,** Univ. Autònoma de Barcelona (Spain)

13:40: **Improving laser material processing objective lenses towards better utilization of high brilliance light sources** *(Invited Paper)*, Lutz

14:10: **Optical design of a low-loss demultiplexer for optical communication systems in the visible range**, Matthias Haupt, Ulrich H. P. Fischer, Hochschule Harz (Germany) . . . . . [8550-19]

14:30: **Recent development in light-sheet fluorescence microscopy-ultramicroscopy using aspherical optical elements**, Saiedeh Saghafi, Klaus Becker, Christian Hahn, Hans-Ulrich Dodt, Technische Univ. Wien (Austria) . . . . . [8550-20]

14:50: **Accurate and efficient fiber optical shape sensor for MRI compatible minimally invasive instruments**, Maurits S. van der Heiden, TNO (Netherlands); Kirsten Henken, Technische Univ. Delft (Netherlands); Lun Kai Chen, Boudewijn G. van den Bosch, Rens van den Braber, TNO (Netherlands); John J. van den Dobbelsteen, Jenny Dankelman, Technische Univ. Delft (Netherlands) . [8550-21]

15:10: **Study of aberrational performance and manufacturing tolerances of Klevtsov family of sub-aperture catadioptric telescopes and field correctors for them**, Alexey N. Yudin, M. V. Keldysh Institute of Applied Mathematics (Russian Federation) . . . . . [8550-22]

Coffee Break . . . . . Tue 15:30 to 16:00

Session 6

Room: 131/132 . . . . . Tue 16:00 to 17:40

Optical Solutions III

Session Chair: **Elisabetta Rugi Grond,** RUAG Space AG (Switzerland)

16:00: **Dynamic aberration correction for an optical see-through head-mounted display**, Patrice J. Twardowski, Ecole Nationale Supérieure de Physique de Strasbourg (France); Marc Beuret, Joseph-Joël Fontaine, Ecole Nationale Supérieure de Physique de Strasbourg (France) and Institut National des Sciences Appliquées de Strasbourg (France). . . . . [8550-23]

16:20: **Blue glass lens elements used as IR cut filter in a camera design and the impact of inner quality onto lens performance**, Steffen Reichel, Frank-Thomas Lentes, SCHOTT AG (Germany) . . . . . [8550-24]

16:40: **Development of a nano-profiler using the follow-up normal vector of the surface for next-generation ultraprecise mirrors**, Koji Usuki, Osaka Univ. (Japan). . . . . [8550-25]

17:00: **High numerical aperture silicon collimating lens for mid-infrared quantum cascade lasers manufactured using wafer-level techniques**, Eric Logean, Lubos Hvozdara, Joab Di-Francesco, Hans Peter Herzig, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Reinhard Voelkel, Martin Eisner, SUSS MicroOptics SA (Switzerland); Pierre-Yves P. Baroni, Michel Rochat, Antoine Müller, Alpes Lasers SA (Switzerland) . . . . . [8550-26]

17:20: **Alignment of phase-shifting interferograms in the two-beam point diffraction interferometer**, Nikolay B. Voznesenskiy, Mariia Voznesenskaia, Natalia Petrova, VTT-NTM OÜ (Estonia); Artur Abels, Smart Stuff OU (Estonia). . . . . [8550-27]

Posters—Tuesday . . . . . Tue 17:30 to 18:30

Conference attendees are invited to attend the Optical Systems Design Poster Session on Tuesday afternoon. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions on page six of the Advance Programme.

Co/Mo_2C mirror as studied by x-ray fluorescence and photoelectron spectroscopies induced by x-ray standing wave, Philippe Jonnard, Karine Le Guen, Yanyan Yuan, Jean-Michel André, Univ. Pierre et Marie Curie (France); Subhrangsu Mukherjee, Angelo Giglia, Lab. Nazionale TASC (Italy); Stefano Nannarone, Lab. Nazionale TASC (Italy) and Univ. degli Studi di Modena e Reggio Emilia (Italy); Nicola Mahne, Sincrotrone Trieste S.C.p.A. (Italy); Zhanshan Wang, Haochuan Li, Jingtao Zhu, Tongji Univ. (China) . . . . . [8550-53]

XRC-PhOBOS: software for optimization of the multi-blade MARS-XRD collimator, an update, Carlo Pelliciari, International Research School of Planetary Sciences (Italy) . . . . . [8550-54]

Design of an optical position detection unit for fast 2D-MOEMS scanners, Andreas Tortschanoff, Carinthian Tech Research AG (Austria); Thilo Sandner, Fraunhofer Institute for Photonic Microsystems (Germany); Andreas Kenda, Carinthian Tech Research AG (Austria). . . . . [8550-55]

Optimizing an active extreme asphere based optical system, Tibor Agocs, ASTRON (Netherlands) . . . . . [8550-56]

Marco Polo-Return narrow angle camera: a three-mirror anastigmat design proposal with a smart finite conjugates refocusing optical system, Jacopo Antichi, INAF - Osservatorio Astrofisico di Arcetri (Italy); Massimiliano Tordi, Space Technologies s.r.l. (Italy); Demetrio Magrin, Roberto Ragazzoni, Gabriele Cremonese, INAF - Osservatorio Astronomico di Padova (Italy) . . . . . [8550-57]

Effective speckle noise reduction of laser projection displays by high frequency driving current superposition for blue, red and direct green emission laser diodes, Yoshifumi Kono, Kohei Kamada, Kenta Chihaya, Wakao Sasaki, Doshisha Univ. (Japan); Hiroki Matsubara, Atsuya Hirano, Kenji Nagashima, Funai Electric Co., Ltd. (Japan) . . . . . [8550-58]

Optical relay design for an IR imaging diagnostic system in TJ-II fusion reactor, Carlota Ruiz de Galarreta, Ana Manzanares Ituarte, Univ. Complutense de Madrid (Spain); Eduardo de la Cal, Macarena Liniers, Gilles Wolfers, Ctr. de Investigaciones Energéticas, Medioambientales y Tecnológicas (Spain) [8550-59]

Design of computer-generated holograms used for testing aspheric mirrors, Jie Feng, Institute of Optics and Electronics (China) . . . . . [8550-60]

The wavefront aberrations in off-axis spherical mirror with object point or image point, Armando Gomez-Vieyra, Univ. Autónoma Metropolitana (Mexico); Daniel Malacara-Hernandez, Centro de Investigaciones en Óptica, A.C. (Mexico); Julio C. Hidalgo-Gonzalez, Carlos A. Vargas, Univ. Autónoma Metropolitana (Mexico) . . . . . [8550-61]

Optical device for precision Moiré topography of micro surfaces, Saïd Meguellati, Smaïl Djabi, Univ. Ferhat Abbas de Sétif (Algeria) . . . . . [8550-62]

Flux optimization and construction of a multi-blade collimator, Carlo Pelliciari, International Research School of Planetary Sciences (Italy) . . . . . [8550-63]

The simulation of cylindrical interferometric testing with position error of engine cylinder, Junqi Liu, Yingjie Yu, Dongbao Ge, Shanghai Univ. (China) . . . . . [8550-64]

Realization of low-losses mirrors with sub-nanometer flatness for future gravitational wave detectors, Christophe Michel, Nazario N. Morgado, Laurent Pinard, Benoit Sassolas, Romain Bonnand, Guillaume Cochez, Jerome Degallaix, Danielle Forest, Raffaele Flaminio, Lab. des Matériaux Avancés (France) . . . . . [8550-66]

X-ray focusing lens obtained by coupling flat FCC crystals in transmission configuration, Carlo Pelliciari, International Research School of Planetary Sciences (Italy) . . . . . [8550-67]

New adaptive optics concepts for future ELT instrumentation, Kacem El-Hadi, Lab. d'Astrophysique de Marseille (France); Thierry Fusco, ONERA (France); Brice Le Roux, Lab. d'Astrophysique de Marseille (France). . . . . [8550-68]

The detection of the interaction of protein and cell by a laser scanning confocal imaging-surface plasmon resonance system, Hongyan Zhang, Technical Institute of Physics and Chemistry (China) . . . . . [8550-69]

EchMod: a MATLAB toolbox for modeling astronomical echelle spectrographs, Stuart I. Barnes, Stuart Barnes Optical Design (New Zealand). . . . . [8550-70]

Investigation of the x-ray reflectivity of the Co/Mo_2C system upon thermal treatment, Yanyan Yuan, Karine Le Guen, Jean-Michel André, Univ. Pierre et Marie Curie (France); Zhanshan Wang, Haochuan Li, Jingtao Zhu, Tongji Univ. (China); Philippe Jonnard, Univ. Pierre et Marie Curie (France) . . . . . [8550-71]

Preliminary optical design of a polychromator for a Raman LIDAR for atmospheric calibration of the Cherenkov Telescope Array, Vania Da Deppo, Consiglio Nazionale delle Ricerche (Italy); Michele Doro, Univ. Autònoma de Barcelona (Spain); Oscar Blanch, Institut de Física d'Altes Energies (Spain); Lluis Font, Univ. Autònoma de Barcelona (Spain); Alicia Lopez, Institut de Física d'Altes Energies (Spain); Markus Gaug, Univ. Autònoma de Barcelona (Spain); Manel Martinez, Institut de Física d'Altes Energies (Spain) . . . . . [8550-72]

High speed surface slope measuring profiler for an aspheric shape, Yasuo Higashi, High Energy Accelerator Research Organization (Japan) . . . . . [8550-73]

Design of hybrid optical tweezers system for automated 3D micro manipulation, Yoshio Tanaka, National Institute of Advanced Industrial Science and Technology (Japan); Shogo Tsutsui, Hiroyuki Kitajima, Kagawa Univ. (Japan). . . . . [8550-74]

A space-based Far Infrared Interferometer (FIRI) instrument simulator and test-bed implementation, Roser Juanola-Parramon, Univ. College London (United Kingdom) . . . . . [8550-76]

Wednesday 28 November

Session 7

Room: 131/132 . . . . . Wed 9:00 to 10:20

Optical Solutions IV

Session Chair: **Ullrich Krüger,**
JENOPTIK Optical Systems GmbH (Germany)

9:00: **Optical design of power adjustable sphero-cylindrical ophthalmic systems**, Sergio Barbero Sr., Consejo Superior de Investigaciones Científicas (Spain); Jacob Rubinstein, Technion-Israel Institute of Technology (Israel)[8550-28]

9:20: **Planar plano-convex microlens**, Eric Markweg, Matthias Hillenbrand, Stefan Sinzinger, Martin Hoffmann, Technische Univ. Ilmenau (Germany) . . . . [8550-29]

9:40: **110 years BK7: optical glass type with long tradition and ongoing progress**, Peter Hartmann, SCHOTT AG (Germany) . . . . . [8550-30]

10:00: **Laser-diode digital holography with frequency-modulated continuous-wave techniques**, Yukihiro Ishii, Tokyo Univ. of Science (Japan); Takeshi Takahashi, Ribun Onodera, Polytechnic Univ. (Japan) . . . . . [8550-31]

Coffee Break . . . . . Wed 10:20 to 10:50

Session 8

Room: 131/132 . . . . . Wed 10:50 to 11:50

Optical Solutions V

Session Chair: **Andres F. Cifuentes,** ASE Optics Europe (Spain)

10:50: **The design of a multi-point probe for a low-coherence distance measuring interferometer**, Christopher T. Cotton, ASE Optics (United States); Damon W. Diehl, Monroe Community College (United States); Christopher J. Ditchman, Nathan Burdick, ASE Optics (United States) . . . . . [8550-32]

11:10: **MWIR zoom with focal extender**, Marta C. de la Fuente, Jose M. Infante Herrero, Luis Rivera, Indra Sistemas, S.A. (Spain) . . . . . [8550-33]

11:30: **Verification of the optical design by simultaneous measurement of centering errors and relative surface distances inside of optical systems**, Patrik Langehanenberg, TRIOPTICS GmbH (Germany) . . . . . [8550-78]

Lunch/Exhibition Break . . . . . Wed 11:50 to 13:40

Session 9

Room: 131/132 . . . . . Wed 13:40 to 15:10

Theory and Design Methods I

Session Chair: **Marta C. de la Fuente,** Indra Sistemas, S.A. (Spain)

13:40: **Skew aberration analysis** *(Invited Paper)*, Garam Yun, Synopsys, Inc. (United States); Russell A. Chipman, College of Optical Sciences, The Univ. of Arizona (United States) . . . . . [8550-36]

14:10: **SMS design and aberration theory**, Fabio Corrente, Pablo Benítez, Juan Carlos Miñano, Wang Lin, Fernando Muñoz, Univ. Politécnica de Madrid (Spain) . . . . . [8550-37]

14:30: **Single optical surface imaging designs with unconstrained object to image mapping**, Jiayao Liu, Univ. Politécnica de Madrid (Spain); Juan Carlos Miñano, Pablo Benítez, Light Prescriptions Innovators, LLC (United States); Lin Wang, Univ. Politécnica de Madrid (Spain). . . . . [8550-38]

14:50: **Perfect imaging analysis of the spherical geodesic waveguide**, Juan Carlos González, Pablo Benítez, Juan Carlos Miñano, Dejan Grabovickic, Univ. Politécnica de Madrid (Spain) . . . . . [8550-39]

Coffee Break . . . . . Wed 15:10 to 15:40

Session 10

Room: 131/132 . . . . . Wed 15:40 to 16:20

Theory and Design Methods II

Session Chair: **Marta C. de la Fuente,** Indra Sistemas, S.A. (Spain)

15:40: **Improved wavefront reconstruction using difference Zernike polynomials for two double-shearing wavefronts**, Hai Wang, Yanqiu Li, Ke Liu, Jianfeng Wang, Beijing Institute of Technology (China) . . . . . [8550-41]

16:00: **Double tailoring of freeform surfaces for off-axis aplanatic systems**, Angelika Hofmann, Julia Unterhinninghofen, Harald Ries, Stefan Kaiser, OEC AG (Germany) . . . . . [8550-42]

Thursday 29 November

Session 11

Room: 131/132 . . . . . Thu 9:00 to 10:20

Space Applications I

Session Chair: **Laurent Mazuray,** EADS Astrium (France)

9:00: **Lightweight stable sandwich mirrors: current achievements in the development**, Gerard N. Harbach, Andreas P. Herren, T. Hausner, Elisabetta Rugi Grond, RUAG Space AG (Switzerland); Jean-Jacques Fermé, Société Européenne de Systèmes Optiques (France) . . . . . [8550-43]

9:20: **Development of a light-weight beryllium cassegrain telescope**, Jacques Viertl, Ralf Greger, Maurizio Di Domenico, Laurent Francou, Marina Ellouzi, Steffen Blum, Klaus Kudielka, Elisabetta Rugi Grond, Daniele Piazza, Thomas Weigel, RUAG Space AG (Switzerland) . . . . . [8550-44]

9:40: **Ultra stable off-axis telescope: lessons learnt from the optical design to the correlation of the test results**, Antonio Casciello, Thomas Weigel, Matthias Raunhardt, Andreas P. Herren, Steffen Blum, Nicolas de Roux, Thibault Seure, Ulrich E. Krähenbühl, Martin Herbert, RUAG Space AG (Switzerland) . . [8550-45]

10:00: **Multiespectral optical design of the Dust Sensor for MetNet Space Mission for the measurements of the heat transfer parameters in Martian Boundary Layer: Dust, CO2 and Surface Temperature**, Francisco Cortes, Amelia González Dosal, Andres Llopis Lozano, Antonio J. de Castro González, Juan Meléndez Sanchez, Fernando Lopez Martinez, Univ. Carlos III de Madrid (Spain) . . . . . [8550-47]

Coffee Break . . . . . Thu 10:20 to 10:50

Session 12

Room: 131/132 . . . . . Thu 10:50 to 12:10

Space Applications II

Session Chair: **Laurent Mazuray,** EADS Astrium (France)

10:50: **Microscope with 3D mapping capabilities for planetary exploration applications**, Michel Doucet, INO (Canada); Peter Dietrich, MDA Corp. (Canada); François Châteauneuf, INO (Canada) . . . . . [8550-49]

11:10: **Predict and simulate final optical performances of TMAs: application to the NIRSpec instrument**, François Riguet, Sagem Défense Sécurité (France) . . . . . [8550-50]

11:30: **Alignment based on 'no adjustment' philosophy for Immersion GRating INfrared Spectrometer (IGRINS)**, Jeong-Yeol Han, Insoo Yuk, Kyeongyeon Ko, Heeyeong Oh, Jakyoung Nah, Chan Park, Sungho Lee, Moo-Young Chun, Korea Astronomy and Space Science Institute (Korea, Republic of); Daniel T. Jaffe, The Univ. of Texas at Austin (United States); Soojong Pak, Kyung Hee Univ. (Korea, Republic of); Michael Gully-Santiago, The Univ. of Texas at Austin (United States) . . . . . [8550-51]

11:50: **MEGARA Optical design: the new integral field unit and multi-object spectrograph for the GTC 10m telescope**, María Luisa Garcia-Vargas, Ernesto Sánchez-Blanco, FRACTAL S.L.N.E (Spain); Eleazar R. Carrasco, Instituto Nacional de Astrofísica, Óptica y Electrónica, INAOE (Mexico); Armando Gil de Paz, Univ. Complutense de Madrid (Spain); Grendy G. Paez, Centro de Investigaciones en Óptica, CIO (Mexico); Antonio Perez, FRACTAL S.L.N.E (Spain); Josune Gallego, Univ. Complutense de Madrid (Spain); Fermin Sanchez, Univ. Politécnica de Madrid (Spain); Jose M. Vilchez, Instituto de Astrofísica de Andalucía, IAA-CSIC (Spain) . . . . . [8550-75]

Conference 8550B

Tuesday 27–27 November 2012 • Proceedings of SPIE Vol. 8550

Detectors and Associated Signal Processing V

Conference Chairs: **Jean-Luc M. Tissot,** ULIS (France); **Jeffrey M. Raynor,** STMicroelectronics (R&D) Ltd. (United Kingdom)

Programme Committee: **Wolfgang A. Cabanski,** AIM INFRAROT-MODULE GmbH (Germany); **Peter N. Dennis,** QinetiQ Ltd. (United Kingdom); **Hai-mei Gong,** Shanghai Institute of Technical Physics (China); **Ernest Grimberg,** Opgal Optronic Industries Ltd. (Israel); **Pierre Magnan,** Institut Supérieur de l'Aéronautique et de l'Espace (France); **Trevor Martin,** QinetiQ Ltd. (United Kingdom); **Peter Pool,** E2V technologies plc (United Kingdom); **Pierre Potet,** New Imaging Technologies SAS (France); **Piotr Pregowski,** Pregowski Infrared Services (Poland); **Steffen R. Schmidt,** JENOPTIK Optical Systems GmbH (Germany); **Peter Markus Seitz,** Ecole Polytechnique Fédérale de Lausanne (Switzerland); **Fiodor F. Sizov,** V. Lashkaryov Institute of Semiconductor Physics (Ukraine)

Tuesday 27 November

Welcome and Introduction . . . . . 8:55 to 9:00

Session 13

Room: 129 . . . . . .Tue 9:00 to 10:20

Technology

Session Chair: **Jean-Luc M. Tissot,** ULIS (France)

9:00: **Image registration software data correction algorithm for hyperspectral imager**, Pradip Mainali, IMEC (Belgium) and Katholieke Univ. Leuven (Belgium); Gauthier Lafruit, IMEC (Belgium); Shuyang Liu, IMEC (Belgium) and Katholieke Univ. Leuven (Belgium); Klaas Tack, Bart Masschelein, IMEC (Belgium); Luc Van Gool, Katholieke Univ. Leuven (Belgium); Rudy Lauwereins, IMEC (Belgium) and Katholieke Univ. Leuven (Belgium) . . . . . [8550-81]

9:20: **Towards image data processing in vehicles under adverse weather conditions**, Frank Pagel, Dieter N. Willersinn, Michael Grinberg, Daniel Manger, Nick Schneider, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany) . . . . . [8550-82]

9:40: **Optomechanical device for the sensitive metal ion concentration measurement based on changes in the fluorescence lifetime of GFP**, Benjamin Hötzer, Timo Scheu, Steinbeis-Stiftung für Wirschaftsförderung (Germany); Gregor Jung, Biophysical Chemistry, Saarland University (Germany); Stefan Castritius, Steinbeis-Stiftung für Wirschaftsförderung (Germany) . . . . . [8550-83]

10:00: **Multichannel serial-parallel analog-to-digital converters based on current mirrors for multi-sensor systems**, Vladimir G. Krasilenko, Vinnitsa Social Economy Institute (Ukraine); Aleksandr I. Nikolskyy, Alexander A. Lazarev, Vinnytsia National Technical Univ. (Ukraine) . . . . . [8550-84]

Coffee Break . . . . . .Tue 10:20 to 10:50

Session 14

Room: 129 . . . . . .Tue 10:50 to 12:30

Signal Processing

Session Chair: **Jeffrey M. Raynor,**
STMicroelectronics (R&D) Ltd. (United Kingdom)

10:50: **Low-light signal detection using a high dynamic range, high-responsivity image sensor with multiple sampling modes**, Robert Golding, STMicroelectronics (R&D) Ltd. (United Kingdom) and The Univ. of Edinburgh (United Kingdom); Jeffrey M. Raynor, STMicroelectronics (R&D) Ltd. (United Kingdom); Robert K. Henderson, The Univ. of Edinburgh (United Kingdom) . . . . . [8550-85]

11:10: **New generation CMOS 2D imager evaluation and qualification for semiconductor inspection applications**, Wei Zhou, Darcy Hart, Rudolph Technologies, Inc. (United States) . . . . . [8550-86]

11:30: **2D simulation for the impact of edge effects on the performance of planar InGaAs/InP SPADs**, Michele Anti, Fabio Acerbi, Alberto Tosi, Franco Zappa, Politecnico di Milano (Italy) . . . . . [8550-87]

11:50: **Diffraction grating-based optical readout for thermal imaging**, Ulas Adiyan, Refik B. Erarslan, Koç Univ. (Turkey); Onur Ferhanoglu, The Univ. of Texas at Austin (United States); Hamdi Torun, Bogaziçi Üniv. (Turkey); Hakan Urey, Koç Univ. (Turkey) . . . . . [8550-88]

12:10: **MM-wave hybrid narrow-gap hot-carrier and Schottky diodes detector arrays**, Fiodor F. Sizov, Vladimir A. Petriakov, Vyacheslav V. Zabudsky, V. Lashkaryov Institute of Semiconductor Physics (Ukraine); Dmitriy Krasilnikov, National Technical Univ. of Ukraine (Ukraine); Sergei Dvoretski, A.V. Rzhanov Institute of Semiconductor Physics (Russian Federation); Mariya Smoliy, Sergiy Prishlin, V. Lashkaryov Institute of Semiconductor Physics (Ukraine) . . [8550-89]

Wednesday 28 November

Posters-Tuesday . . . . . Wed 17:30 to 18:30

Conference attendees are invited to attend the Optical Systems Design Poster Session on Tuesday afternoon. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions on page six of the Advance Programme.

Infrared small target tracking technology under complex background, Lei Liu, Nanjing Univ. of Science and Technology (China); Xin Wang, Hohai Univ. (China); Jilu Chen, Tao Pan, Nanjing Univ. of Science and Technology (China) . [8550-90]

Evaluation of optical radiation detectors in the range from 0.8 to 20 µm at the NIST infrared spectral calibration facility, Vyacheslav B. Podobedov, George P. Eppeldauer, Thomas C. Larason, National Institute of Standards and Technology (United States) . . . . . [8550-91]

Algorithm for concentration analysis with laser absorption spectroscopy, Alberto Rodrigues, Volker Lange, Dietrich Kühlke, Hochschule Furtwangen Univ. (Germany) . . . . . [8550-92]

Spatial-temporal order of the photoresponse of the sensor materials, Andrii But, Valerij Mygal, National Aerospace Univ. (Ukraine); Ivan Bodnar, Belarusian State Univ. of Informatics and Radioelectronics (Belarus) . . . . . [8550-93]

Conference 8550C

Monday - Tuesday 26–27 November 2012 • Proceedings of SPIE Vol. 8550

Illumination Optics III

Conference Chairs: **Tina E. Kidger,** Kidger Optics Associates (United Kingdom); **Stuart David,** Synopsys, Inc. (United States); **Pablo Benítez,** Univ. Politécnica de Madrid (Spain)

Programme Committee: **William J. Cassarly,** Synopsys, Inc. (United States); **Joshua M. Cobb,** Corning Tropel Corp. (United States); **Florian R. Fournier,** Synopsys, Inc. (United States); **Niall E. McGee,** Knowles Electronics GmbH (United Kingdom); **Rubén Mohedano,** Light Prescriptions Innovators Europe, S. L. (Spain); **Teresa Molina-Jiménez,** AIDO Instituto Tecnológico de Óptica, Color e Imagen (Spain); **Julius A. Muschaweck,** OSRAM AG (Germany); **Jannick P. Rolland,** Univ. of Rochester (United States)

Monday 26 November

Welcome and Introduction . . . . . 13:40 to 13:50

Session 15

Room: 130 . . . . . Mon 13:50 to 16:10

LED Applications

Session Chair: **Julius A. Muschaweck,** OSRAM AG (Germany)

13:50: **Optimization of LED primary optics with orthogonal polynomial surface description** *(Invited Paper)*, Peter Brick, OSRAM Opto Semiconductors GmbH (Germany); Christopher Wiesmann, OSRAM AG (Germany). . . . . [8550-101]

14:20: **Development of standardized light sources ray file format**, Julius A. Muschaweck, OSRAM AG (Germany). . . . . [8550-152]

14:40: **Optical design and prototyping of a light module for constant climate chambers based on LED technology**, Paola Belloni, Hochschule Furtwangen Univ. (Germany); David Rose, Hochschule Furtwangen Univ. (United States) . . . . . [8550-103]

15:00: **VLC oriented energy efficient driver techniques**, Guillermo del Campo Jiménez, Francisco José López Hernández, Univ. Politécnica de Madrid (Spain) . . . . . [8550-104]

Coffee Break . . . . . Mon 15:20 to 15:50

15:50: **Estimating the performance of remote phosphor SSL devices by simulations**, Christopher Wiesmann, Julius A. Muschaweck, Alexander Linkov, OSRAM AG (Germany) . . . . . [8550-105]

Tutorial

Room: 130 . . . . . 16:10 to 16:50

16:10: **Illumination optimization using angle to position mapping**, William J. Cassarly, Synopsys, Inc. (United States) . . . . . [8550-106]

Tuesday 27 November

Session 16

Room: 130 . . . . . Tue 8:30 to 10:00

Illumination Applications

Session Chair: **Rubén Mohedano,**
Light Prescriptions Innovators Europe, S. L. (Spain)

8:30: **Analytic free-form lens design for tracking integration in concentrating photovoltaics** *(Invited Paper)*, Fabian Duerr, Vrije Univ. Brussel (Belgium); Pablo Benítez, Juan Carlos Miñano, Univ. Politécnica de Madrid (Spain) and Light Prescription Innovators, LLC (United States); Youri Meuret, Hugo Thienpont, Vrije Univ. Brussel (Belgium) . . . . . [8550-107]

9:00: **Novel lateral moving tracking optics with the SMS design method**, Wang Lin, Pablo Benítez, Univ. Politécnica de Madrid (Spain); Juan Carlos Miñano, Univ. Politécnica de Madrid (United States). . . . . [8550-108]

9:20: **Volume scattering characterization for illumination design**, Quentin Kuperman-Le Bihan, Light Tec (France) . . . . . [8550-109]

9:40: **Optical design of a laser scanning pico-projector**, Ian R. Wallhead, Roberto Ocaña Pérez, AIDO Instituto Tecnológico de Óptica, Color e Imagen (Spain) . . . . . [8550-110]

Coffee Break . . . . . Tue 10:00 to 10:30

Session 17

Room: 130 . . . . . Tue 10:30 to 12:20

LED Coupling

Session Chair: **Stuart David,** Synopsys, Inc. (United States)

10:30: **Investigation of the design space for low aspect ratio LED collimators** *(Invited Paper)*, Oliver Dross, Philips Research (Netherlands). . . . . [8550-111]

11:00: **Design of LED optics with two aspherical surfaces and the highest efficiency**, Mikhail A. Moiseev, Image Processing Systems Institute (Russian Federation) and LED Optics Design, LLC (Russian Federation) and Samara State Aerospace Univ. (Russian Federation); Sergey V. Kravchenko, Leonid L. Doskolovich, Image Processing Systems Institute (Russian Federation) and Samara State Aerospace Univ. (Russian Federation) and LED Optics Design, LLC (Russian Federation); Nikolay L. Kazanskiy, Image Processing Systems Institute (Russian Federation) and Samara State Aerospace Univ. (Russian Federation) . [8550-112]

11:20: **Design and manufacturing of LED primary optics for road lighting engine**, Jae Young Joo, Wan Ho Kim, Korea Photonics Technology Institute (Korea, Republic of); Soon Sub Park, Korea Institute of Industrial Technology (Korea, Republic of); Sang Bin Song, Korea Photonics Technology Institute (Korea, Republic of) . . . . . [8550-113]

11:40: **Novel LED coupling design for semiconductor inspection applications**, Wei Zhou, Rudolph Technologies, Inc. (United States); Todd Rutherford, Greenlight Optics, LLC (United States); Darcy Hart, Rudolph Technologies, Inc. (United States) . . . . . [8550-114]

12:00: **Optimization of light output efficiency of LED drivers and optics**, Omer F. Farsakoglu, Ipek Inal, Kilis 7 Aralik Üniv. (Turkey). . . . . [8550-115]

Lunch/Exhibition Break . . . . . Tue 12:20 to 13:20

Session 18

Room: 130 . . . . . Tue 13:20 to 15:30

Design of Freeform Surfaces

Session Chair: **Pablo Benítez,** Univ. Politécnica de Madrid (Spain)

13:20: **Tailoring illumination optics for real sources,** Harald Ries, OEC AG (Germany) . . . . . [8550-153]

13:40: **Irradiance tailoring for extended sources using a point-source freeform design algorithm** *(Invited Paper)*, Rolf Wester, Fraunhofer-Institut für Lasertechnik (Germany); Adrien Bruneton, RWTH Aachen (Germany); Axel Bäuerle, Jochen Stollenwerk, Peter Loosen, Fraunhofer-Institut für Lasertechnik (Germany) and RWTH Aachen (Germany) . . . . . [8550-116]

14:10: **Optimizing nonimaging free-form optics using free-form deformation**, Simon Wendel, Julian Kurz, Cornelius Neumann, Karlsruher Institut für Technologie (Germany) . . . . . [8550-117]

14:30: **Aplanatic thin TIR lens**, Pablo Zamora, Juan Carlos Miñano, Univ. Politécnica de Madrid (Spain) . . . . . [8550-118]

14:50: **Strategy to obtain initial configurations for free form reflectors design**, Núria Tomás, Josep Arasa, Univ. Politècnica de Catalunya (Spain). . . [8550-119]

15:10: **Quasi-aplanatic free form V-groove collimators for LED color mixing**, Marina Buljan, Univ. Politécnica de Madrid (Spain); Pablo Benítez, Juan Carlos Miñano, Light Prescriptions Innovators, LLC (United States) . . . . . [8550-120]

Coffee Break . . . . . Tue 15:30 to 16:00

Conference 8550C

Session 19

Room: 130 . . . . . .Tue 16:00 to 17:30

Optical Modelling

Session Chair: **Teresa Molina-Jiménez,**
AIDO Instituto Tecnológico de Óptica, Color e Imagen (Spain)

16:00: **Inhomogeneous source uniformization using a shell mixer Köhler integrator** *(Invited Paper)*, Julio Chaves, Light Prescriptions Innovators, LLC (Spain); Aleksandra Cvetkovic, Ruben Mohedano, Oliver Dross, Maikel Hernandez, Light Prescriptions Innovators, LLC (United States); Pablo Benítez, Juan Carlos Miñano, Univ. Politécnica de Madrid (Spain); Juan F. Vilaplana, Light Prescriptions Innovators, LLC (United States) . . . . . [8550-121]

16:30: **Time-space conversion for short pulse generation with a long lifetime phosphor**, Mitsunori Saito, Shingo Nakamura, Ryukoku Univ. (Japan) [8550-122]

16:50: **Light output losses of prism light guides**, Berta Garcia-Fernandez, Daniel Vazquez-Molini, Antonio Alvarez Fernandez-Balbuena, Eusebio Bernabeu Martinez, Univ. Complutense de Madrid (Spain). . . . . [8550-123]

17:10: **Method for design of axis-symmetrical TIR-optics with use of special quick raytracing technique**, Mikhail A. Moiseev, Image Processing Systems Institute (Russian Federation) and LED Optics Design, LLC (Russian Federation) and Samara State Aerospace Univ. (Russian Federation); Egor V. Byzov, Leonid L. Doskolovich, Image Processing Systems Institute (Russian Federation) and Samara State Aerospace Univ. (Russian Federation) and LED Optics Design, LLC (Russian Federation) . . . . . [8550-124]

Posters-Tuesday . . . . . .Tue 17:30 to 18:30

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Model-based validation and development of LED-systems: MValEnt, Serge Stephan, Roland Lachmayer, Leibniz Univ. Hannover (Germany) . . . . [8550-125]

Detailed illuminator design for full-field ArF lithography system with a method based on the fly's eye, Lidong Wei, Yanqiu Li, Lihui Liu, Beijing Institute of Technology (China) . . . . . [8550-126]

Controlling daylight illumination in cultural heritage buildings by using thin-film and thermographic technologies, Daniel Vázquez-Molini, Univ. Complutense de Madrid (Spain); Javier Muñoz de Luna, Univ. Complutense de Madrid (Spain) and Univ. Politécnica de Madrid (Spain) and Instituto del Patrimonio Cultural de España (Spain); Antonio Álvarez Fernandez-Balbuena, Univ. Complutense de Madrid (Spain); Angel Garcia-Botella, Univ. Politécnica de Madrid (Spain); Ana Laborde, Juan Antonio Herráez, Instituto del Patrimonio Cultural de España (Spain) [8550-127]

Design of blue LEDs arrays with high optical power, Pengzhi Lu, Bin Xue, Hua Yang, Huaiwen Zheng, Xiaoyan Yi, Jing Li, Junxi Wang, Guohong Wang, Institute of Semiconductors (China) . . . . . [8550-128]

Study of chromatic variations between metameres by varying the lighting in the painting "Boy in a turban holding a nosegay" by Michiel Sweerts, Daniel Vázquez-Molini, Javier Muñoz de Luna, Antonio Álvarez Fernandez-Balbuena, Univ. Complutense de Madrid (Spain); Andrés Sánchez, Arte-Lab S.L. (Spain); Ubaldo Sedano, Museo Thyssen-Bornemisza (Spain) . . . . . [8550-129]

Conference 8550D

Wednesday 28–28 November 2012 • Proceedings of SPIE Vol. 8550

Physical Optics II

Conference Chairs: **Daniel G. Smith,** Nikon Research Corp. of America (United States); **Frank Wyrowski,** Friedrich-Schiller-Univ. Jena (Germany); **Andreas Erdmann,** Fraunhofer-Institut für Integrierte Systeme und Bauelementetechnologie (Germany)

Programme Committee: **Donis G. Flagello,** Nikon Research Corp. of America (United States); **Ari T. Friberg,** Royal Institute of Technology (Sweden); **Hans Peter Herzig ,** Ecole Polytechnique Fédérale de Lausanne (Switzerland); **Jani Tervo,** Univ. of Eastern Finland (Finland); **Peter Török,** Imperial College London (United Kingdom); **Michael Totzeck,** Carl Zeiss SMT GmbH (Germany); **H. Paul Urbach,** Technische Univ. Delft (Netherlands); **Wei Wang,** Heriot-Watt Univ. (United Kingdom); **Juan Campos,** Univ. Autònoma de Barcelona (Spain)

Posters—Wednesday . . . . . Wed 17:30 to 18:30

In situ aberration measurement technique based on aerial image with optimized source, Guanyong Yan, Shanghai Institute of Optics and Fine Mechanics (China) and Graduate Univ. of the Chinese Academy of Sciences (China); Xiangzhao Wang, Shanghai Institute of Optics and Fine Mechanics (China); Jishuo Yang, Dongbo Xu, Shanghai Institute of Optics and Fine Mechanics (China) and Graduate Univ. of the Chinese Academy of Sciences (China); Sikun Li, Shanghai Institute of Optics and Fine Mechanics (China); Lifeng Duan, Shanghai Micro Electronics Equipment Co., Ltd. (China) and Graduate Univ. of the Chinese Academy of Sciences (China) and Shanghai Institute of Optics and Fine Mechanics (China); Anatoly Y. Bourov, Shanghai Micro Electronics Equipment Co., Ltd. (China); Andreas Erdmann, Fraunhofer-Institut für Integrierte System und Bauelementetechnologie (Germany) . . . . . [8550-146]

In situ aberration measurement technique based on quadratic Zernike model, Jishuo Yang, Shanghai Institute of Optics and Fine Mechanics (China) and Graduate Univ. of the Chinese Academy of Sciences (China); Xiangzhao Wang, Shanghai Institute of Optics and Fine Mechanics (China); Lifeng Duan, Shanghai Institute of Optics and Fine Mechanics (China) and Graduate Univ. of the Chinese Academy of Sciences (China) and Shanghai Microelectronics Equipment Co. (China); Guanyong Yan, Dongbo Xu, Shanghai Institute of Optics and Fine Mechanics (China) and Graduate Univ. of the Chinese Academy of Sciences (China); Anatoly Y. Bourov, Shanghai Micro Electronics Equipment Co., Ltd. (China); Sikun Li, Shanghai Institute of Optics and Fine Mechanics (China); Andreas Erdmann, Fraunhofer-Institut für Integrierte Systeme und Bauelementetechnologie (Germany) . . . . . [8550-148]

A ridge waveguide quantum well AlGaAs/GaAs laser design, Marziyeh Nazari, Islamic Azad Univ. (Iran, Islamic Republic of) . . . . . [8550-149]

A digital holography technique for generating beams with arbitrary polarization and shape, Artur Carnicer, David Maluenda, Univ. de Barcelona (Spain); Rosario Martinez-Herrero, Univ. Complutense de Madrid (Spain); Ignasi Juvells, Univ. de Barcelona (Spain) . . . . . [8550-150]

Impact of line edge and line width roughness on diffraction intensities in scatterometry, Hermann A. Gross, Mark-Alexander Henn, Sebastian Heidenreich, Physikalisch-Technische Bundesanstalt (Germany); Andreas Rathsfeld, Weierstrass-Institut für Angewandte Analysis und Stochastik (Germany); Markus Bär, Physikalisch-Technische Bundesanstalt (Germany) . . . . . [8550-151]

Precise control of the light-induced deformation of azobenzene polymers: new insight and ideas, Vladimir P. Toshchevikov, Marina Saphiannikova Grenzer, Gert Heinrich, Leibniz-Institut für Polymerforschung Dresdene e.V. (Germany) . . . . . [8550-154]

Wednesday 28 November

Welcome and Introduction . . . . . 8:25 to 8:30

Session 20

Room: 130 . . . . . Wed 8:30 to 10:00

Physical Optics I

Session Chair: **Daniel G. Smith,**
Nikon Research Corp. of America (United States)

8:30: **3D modeling of metamaterials at oblique incidence and effective analysis**, Loic Le Cunff, Alexandre Vial, Sylvain Blaize, Univ. de Technologie Troyes (France); Stéphane Collin, Lab. de Photonique et de Nanostructures (France); Anatole Lupu, Institut d'Électronique Fondamentale (France); Gilles Lerondel, Univ. de Technologie Troyes (France). . . . . [8550-130]

9:00: **Stochastic physical optics and Bell's theorem**, Han Geurdes, Consultant (Netherlands) . . . . . [8550-131]

9:20: **Vector Slepian fields and the inverse problem of high numerical aperture focusing**, Kornél Jahn, Nándor Bokor, Budapest Univ. of Technology and Economics (Hungary) . . . . . [8550-132]

9:40: **Optical characterisation of polymeric nanocomposites using tomographic, spectroscopic and fraunhofer wavefront assessment**, Triantafillos Koukoulas, William R. Broughton, National Physical Lab. (United Kingdom); John Williams, Sameer Rahatekar, Univ. of Bristol (United Kingdom) . . . . . [8550-133]

Coffee Break . . . . . Wed 10:00 to 10:30

Session 21

Room: 130 . . . . . Wed 10:30 to 12:10

Physical Optics II

Session Chair: **Daniel G. Smith,**
Nikon Research Corp. of America (United States)

10:30: **Scalar wave solution for the scattering of a partially coherent beam from a statistically rough metallic surface**, Milo W. Hyde IV, Santasri Basu, Salvatore J. Cusumano, Mark F. Spencer, Air Force Institute of Technology (United States) . . . . . [8550-134]

10:50: **Optical vortex scanning microscopy with new scanning technique**, Jan Masajada, Ireneusz Augustyniak, Agnieszka Popiolek-Masajada, Wroclaw Univ. of Technology (Poland) . . . . . [8550-135]

11:10: **Diffraction efficiency considerations and experimental realization for adaptive phase gratings with liquid crystal panels**, Ignacio Moreno, Univ. Miguel Hernández de Elche (Spain); Jorge Albero, Univ. Miguel Hernández de Elche (United States); Pascuala Garcia-Martínez, Univ. de València (Spain) . [8550-136]

11:30: **Application of extraordinary transmission effects for contrast enhancement in optical lithography**, Sabine Dobmann, Peter Banzer, Max Planck Institute for the Science of Light (Germany) and Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany); Andreas Erdmann, Fraunhofer-Institut für Integrierte System und Bauelementetechnologie (Germany); Ulf Peschel, Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany) . . . . . [8550-137]

11:50: **Intensity fluctuations of scattered light caused by acoustic phonons in H-bonded liquids**, Nataliia Kuzkova, Andrey Yakunov, National Taras Shevchenko Univ. of Kyiv (Ukraine) . . . . . [8550-138]

Lunch break. . . . . Wed 12:10 to 13:30

Session 22

Room: 130 . . . . . Wed 13:30 to 15:20

Physical Optics: Modeling Techniques

Session Chair: **Andreas Erdmann,** Fraunhofer-Institut für Integrierte Systeme und Bauelementetechnologie (Germany)

13:30: **Parabasal field decomposition and its application to non-paraxial field propagation**, Daniel Asoubar, Friedrich-Schiller-Univ. Jena (Germany); S. Zhang, Friedrich Schiller Univ. (Germany); Frank Wyrowski, Friedrich-Schiller-Univ. Jena (Germany); Michael Kuhn, LightTrans VirtualLab UG (Germany) . . . . . [8550-139]

14:00: **Gaussian beam Z-scan analysis for nonlinear optical materials possessing simultaneous third- and fifth-order nonlinear refraction with saturable absorption: an application to semiconductor CdSe quantum dot-polymer nanocomposites**, Yasuo Tomita, Xiangming Liu, Yusuke Adachi, The Univ. of Electro-Communications (Japan). . . . . [8550-140]

14:20: **Numerical simulation of a tunable ultrashort laser pulses generation using a distributed feed-back LiF:F_2^- laser**, Ion I. Lancranjan, INCAS - National Institute for Aerospace Research Elie Carafoli (Romania); Sorin Miclos, Dan M. Savastru, Roxana S. Savastru, Ionut Feraru, National Institute of Research and Development for Optoelectronics (Romania) . . . . . [8550-141]

14:40: **Tilt operator for harmonic fields and its application to propagation through plane interfaces**, S. Zhang, Daniel Asoubar, Frank Wyrowski, Friedrich-Schiller-Univ. Jena (Germany); Michael Kuhn, LightTrans VirtualLab UG (Germany) . . . . . [8550-142]

15:00: **Investigation the effect of shapes, size, and orientation of dielectric rods on the photonic band gap for various lattices in 2D anisotropic photonic crystals**, Mahsa Hadadi Moghadam, Amir Foghani, Univ. of Tabriz (Iran, Islamic Republic of) . . . . . [8550-143]

Coffee Break . . . . . Wed 15:20 to 15:50

Session 23

Room: 130 . . . . . Wed 15:50 to 17:00

Physical Optics: Microlithography

Session Chair: **Frank Wyrowski,** Friedrich-Schiller-Univ. Jena (Germany)

15:50: **Imaging characteristics of binary and phase shift masks for EUV projection lithography**, Andreas Erdmann, Peter Evanschitzky, Fraunhofer-Institut für Integrierte Systeme und Bauelementetechnologie (Germany). . . . [8550-144]

16:20: **Wafer thin film effects in lithographic focus detection**, Daniel G. Smith, Nikon Research Corp. of America (United States) . . . . . [8550-145]

16:40: **High numerical aperture Hartmann wavefront sensor with pinhole array extended source**, Ke Liu, Meng Zheng, Yanqiu Li, Hai Wang, Bo Liu, Beijing Institute of Technology (China) . . . . . [8550-147]

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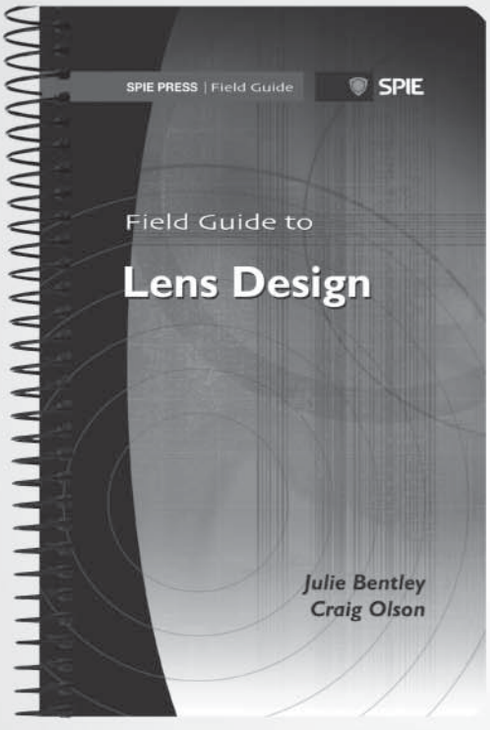

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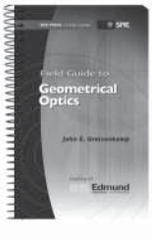

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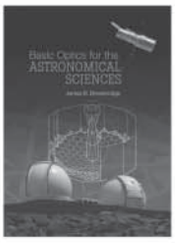

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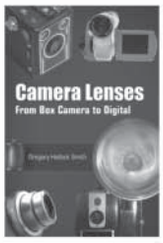

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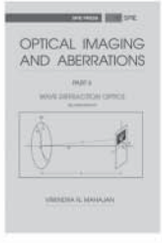

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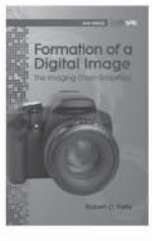

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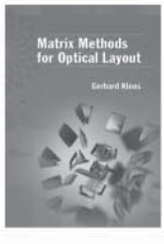

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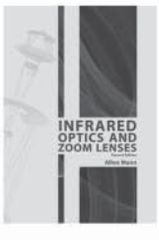

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Mobile phones, tablets, laptops, pagers, and any similar electronic devices should be silenced during conference sessions. Please exit the conference room before answering or beginning a phone conversation.

Smoking

For the health and consideration of all attendees, smoking is not permitted at any event elements, such as but not limited to: plenaries, conferences, workshops, courses, poster sessions, hosted meal functions, receptions, and in the exhibit hall. Most facilities also prohibit smoking in all or specific areas. Attendees should obey any signs preventing or authorizing smoking in specified locations.

Hold Harmless

Attendee agrees to release and hold harmless SPIE from any and all claims, demands, and causes of action arising out of or relating to your participation in the event you are registering to participate in and use of any associated facilities or hotels.

Event Cancellation

If for some unforeseen reason SPIE should have to cancel the event, registration fees processed will be refunded to registrants. Registrants will be responsible for cancellation of travel arrangements or housing reservations and the applicable fees.

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