European Optical Society

Coherence for Europe ®

EOS Topical Meeting on Diffractive Optics

14 - 18 February 2010 Sokos Hotel, Koli, Finland

ON-SITE PROGRAMME

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Recognizing laser's 50th anniversary

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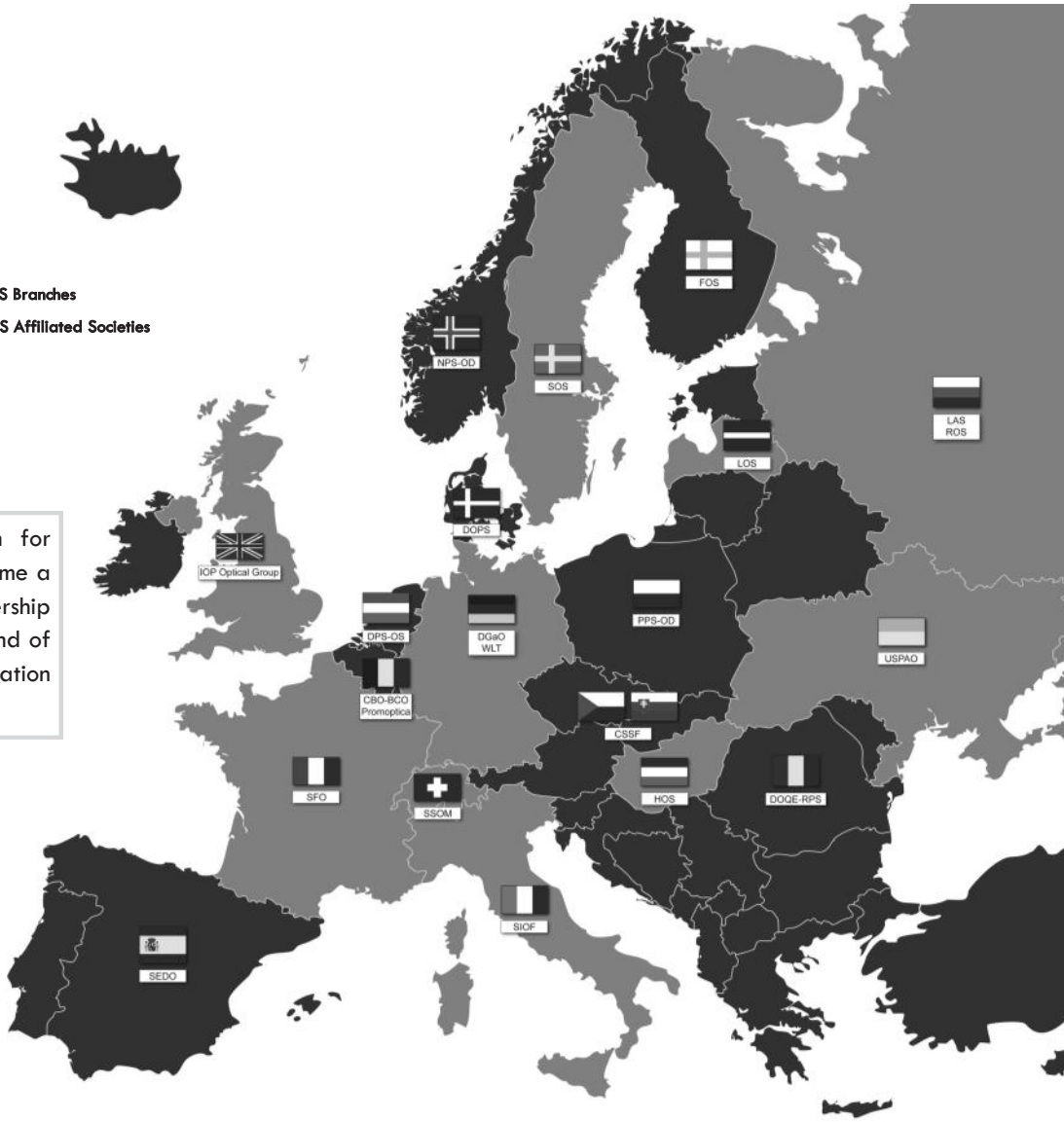
Contents

Contact: European Optical Society (EOS) · Judith Herzog · Hollerithallee 8 · 30419 Hannover, Germany
Phone: +49 (0)511 2788 159 · Fax: +49 (0)511 2788 119 · Email: **koli@myeos.org** · URL: **www.myeos.org/koli**

General information

EOS membership



Note: Through your registration for Diffractive Optics 2010 you became a member of the EOS. This membership terminates automatically by the end of the year 2010. There is no obligation to renew it.

MEMBERSHIP MODES AND FEES 2010

Individual membership
Annual fee: 50 €

Individual membership through an EOS Branch
Every member of an EOS Branch is automatically an individual member of the EOS, too, with all benefits.
Annual fee: 18 € (included in the Branch membership fee)
www.myeos.org/members/societies

Student membership
Annual fee: 10 €

Associate membership through an EOS Affiliated Society
Every member of an EOS Affiliated Society is automatically an associate member of the EOS, too, but with limited benefits.
Annual fee: 8 € (included in the Affiliated Society membership fee)
www.myeos.org/members/societies

Upgrade for associate members
Upgrade to an individual EOS membership with full benefits:
12.50 €/year **www.myeos.org/shop**

Corporate membership through an EOS Branch or Affiliated Society
Annual fee: 200 €

Direct corporate membership
Annual fee: 300 €

EOS BRANCHES AND AFFILIATED SOCIETIES

Currently, 22 national optical societies in Europe are members of the European Optical Society. There are two groups of EOS societal members:

EOS Branches
(see light grey countries on the map above):

DGaO (Germany)
HOS (Hungary)
LOS (Latvia)
SIOF (Italy)
SSOM (Switzerland)
IOP Optical Group (UK and Ireland)
LAS (Russian Federation)
SFO (France)
SOS (Sweden)
USPAO (Ukraine)

EOS Affiliated Societies
(see dark grey countries on the map above):

CBO-BCO (Belgium)
DOPS (Denmark)
FOS (Finland)
Promoptica (Belgium)
DOQE-RPS (Romania)
SEDOPTICA (Spain)
CSSF (Czech and Slovak Republic).
DPS-OS (The Netherlands)
NPS-OD (Norway)
PPS-OD (Poland)
ROS (Russian Federation)
WLT (Germany)

www.myeos.org/members/societies

Membership benefits

Associate members (through an Affiliated Society)

- Free subscription to the Optics & Laser Europe magazine (OLE) published by IOPP
- Reduced subscription rates for the EOS Journal of Optics A published by IOPP
- Special rates for the Journal of Modern Optics and Waves in Random and Complex Media published by Taylor & Francis
- 20% discount on all IOPP-books
- 20% discount on all Taylor & Francis books
- Electronic EOS member newsletter (includes a special member section giving EOS members the opportunity to publish short articles about latest research results, short descriptions of new EU projects, information on prize awards for outstanding works etc.)
- Printed EOS member newsletter (published in the Optics&Laser Europe magazine)
- Membership in one or more EOS Focus Group(s)
- EOS email alias (to receive your email alias, please contact emailalias@myeos.org)
- German-speaking EOS members from outside Germany are entitled to a 50% discount on subscriptions to the 'Photonik' magazine published by AT-Fachverlag
- Full voting rights
- EOS Member Directory
- Member account at www.myeos.org

www.myeos.org/members/associate

Individual members, individual members through EOS Branches and student members

All benefits of an associate membership plus:

- Reduced publication rates for JEOS:RP - the online Journal of the European Optical Society
- Reduced registration fees for EOS-organised events
- Reduced registration fees for EOS co-sponsored events
- Postal communication from EOS

www.myeos.org/members/individual
www.myeos.org/members/student

Corporate members

All benefits of an associate and individual membership plus:

- Presence on the EOS Homepage (logo, profile, hyperlink)
- Presence in the EOS Directory (logo and profile)
- Reduced rates for EOS sponsorship packages
- Free-of-charge publication of job offers at www.myeos.org

www.myeos.org/members/corporate

How to join the EOS through an EOS Branch or Affiliated Society?

Every member of an EOS Branch is automatically an individual member of the EOS, too, with all benefits. **www.myeos.org/members/howtojoin**

How to renew your membership?

To renew your individual, student or direct corporate membership or your associate member upgrade, please either send us the filled in membership fax form (see below) or purchase your membership via our secure online shop.

Fax form:
www.myeos.org/members/individual

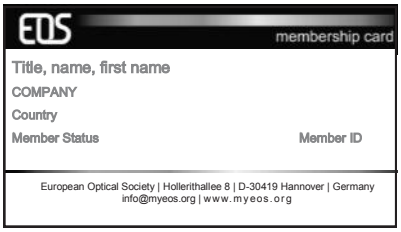
Online shop:
www.myeos.org/shop

To renew your membership through an EOS Branch or Affiliated Society (individual through Branch, associate or corporate membership), please contact your national optical society first.

Your EOS membership card

Download your EOS membership card at
www.myeos.org

Unsure about your login data? Then please contact **info@myeos.org** to receive more information.



Information for authors and attendees

EOS REGISTRATION DESK

Opening times

Sunday, 14 February	15:00 - 19:00
Monday, 15 February	08:00 - 18:00
Tuesday, 16 February	08:00 - 18:00
Wednesday, 17 February	14:00 - 18:00
Thursday, 18 February	08:15 - 17:30

INFORMATION / RECEIPTS / CONFIRMATION OF ATTENDANCE / CASH PAYMENT

Payment receipts and confirmation of attendance will be available on-site at the registration desk.

Attendees paying by cash are requested to have the exact change in Euro.

ORAL PRESENTATION

- Time slots: authors are allotted 20 minutes (15 minutes presentation plus 5 minutes for discussion). Please plan your presentation accordingly to meet the 20 minute maximum.
- Technical equipment: All technical equipment (presentation laptop, video projector, sound system, laser pointer, microphone) will be provided on-site.
- Authors are requested to **upload their presentation well in advance** to their talk. It will also be possible to use your own laptop.

POSTER PRESENTATIONS

Poster authors are requested to be present at their posters during the official poster session. Poster set-up and removal is in the responsibility of the authors. Poster session I will be taking place on Monday, 15 February, 18:20 - 19:20. Poster session II will be taking place on Tuesday, 16 February, 18:20 - 19:20. Please verify the session of your poster presentation (see pages 20-23). Poster strips will be provided at the EOS registration desk.

EOS TOPICAL MEETING DIGEST

Your abstract will be published in the EOS topical meeting digest (CD-ROM; ISBN numbered) that is handed out on-site. The digest contains a complete volume of all accepted abstracts (invited and contributed).

The EOS does not publish proceedings with extensive papers. Authors wishing to publish in-depth papers are welcome to take advantage of the special publication offer for JEOS:RP (see paragraph “Special Publication Offer”). This publication offer is an option but no obligation.

JEOS:RP - SPECIAL ISSUE ON DIFFRACTIVE OPTICS

JEOS:RP - the e-journal of the European Optical Society: Rapid Publications (JEOS:RP, www.jeos.org) will have a **special issue** on **diffractive optics**. Contributions from DO 2010 are very welcome. Submission deadline is 19 April 2010.

All attendees of the EOS Topical Meeting on Diffractive Optics receive a **20% discount** on the publication rate for the e-journal of the European Optical Society: Rapid Publications (JEOS:RP, www.jeos.org). The paper submitted to JEOS:RP must be an original contribution that is connected to one of the conference topics and must be submitted no later than 19 April 2010.

Special publication fee for attendees
280 € (instead of 350 €) for EOS members
320 € (instead of 400 €) for non EOS members

BEST STUDENT PRESENTATION AWARD

The two best student presentations (oral and poster) at this EOS Topical Meeting will be awarded a diploma, an EOS student membership for 2011 and a prize sponsored by the publisher Springer. All student presenters are eligible to the prize. The winners will be announced at the end of the last session on Thursday morning.

The Best Student Presentation Award is sponsord by

Springer
science+business media

W-LAN

W-LAN is available in the auditory and is free of charge. Access keys will be provided on-site.

CONFERENCE DINNER

The conference dinner will be taking place on Wednesday, 17 February 2010, 19:30, at the slope restaurant Rinnetupa. Transportation to the restaurant is organised by EOS. Participation in the conference dinner requires extra registration (on-site).

SURROUNDING PROGRAMME

On Wednesday morning there will be time for outdoor activities giving attendees a good opportunity to network in an unique atmosphere and discover the beautiful and exceptional landscape around the Koli region in the winter season. Ice fishing, snow shoe hiking, cross country skiing, dog sledge or snow mobile safari...Choose your preferred outdoor activity! You will receive detailed information on all offered activities and prices in advance to the meeting and at the EOS registration desk. Please register for your preferred activity until Tuesday morning at the latest (several activities require registration **by e-mail before** the meeting! Contact koli@myeos.org)

TRAVEL INFORMATION

The transportation between Joensuu and Koli is arranged by the organisers. Important: Please inform us about your arrival time well in advance to the meeting. Only then can we ensure a smooth transportation to the venue. Thank you.

The transfer for attendees is free of charge and is sponsored by the University of Eastern Finland.

UNIVERSITY OF EASTERN FINLAND

Welcome message

Dear attendees of Diffractive Optics 2010,

On behalf of the Programme and Organising Committees, it is my pleasure to welcome you to the EOS Topical Meeting on Diffractive Optics 2010 in Koli, Finland. I would like to thank you for your participation, and I hope that you will enjoy the conference as well as the social events and outdoor activities. The scientific program of the conference looks extremely interesting with one keynote, six invited and 44 contributed talks as well as about 40 poster presentations, and a half-day workshop *Unified Optical Modeling with VirtualLab ™*. I am sure the high scientific quality of the presentations will create a lively atmosphere and active discussions during the sessions as well as at our social events.

This year's conference is the seventh EOS Diffractive Optics meeting – previous meetings took place in Savonlinna (1997), Jena (1999), Budapest (2001), Oxford (2003), Warsaw (2005), and Barcelona (2007). The foundations for the series were laid by two workshops in Prague (1992 and 1995). It is obvious that such a long tradition would not have been possible without an extremely active community and excellent organisation of past meetings.

Finally, I once more thank all the participants for their attendance – it might require some bravery to attend a meeting in quite an isolated location in Finland in February! Let us hope the weather will favour us, and sun and snow together will make the days of February as bright as in Midsummer.

I look forward to seeing you in Koli.

Jani Tervo
Chair of Diffracttive Optics 2010
University of Eastern Finland

Programme committee

Juan Campos Coloma
Universidad Autònoma de Barcelona
Spain

Zbigniew Jaroszewicz
Institute of Applied Optics
Poland

Hagen Schweitzer
LightTrans GmbH
Germany

Jari Turunen
University of Eastern Finland
Finland

Santiago Vallmitjana Rico
Universitat de Barcelona
Spain

Tuomas Vallius
EpiCrystals Inc.
Finland

Invited talks

Monday, 15 February 2010

KEYNOTE TALK
08:35 - 09:20, Auditorium, Heritage Centre Ukko
Spinoptics: Spin symmetry breaking in nanostructures
Erez Hasman, Technion - Israel Institute of Technology (IS)
Spin-symmetry breaking in nanoscale structures caused by spin-orbit interaction, leading to a new branch in optics – spinoptics is presented. The spin-based effects offer an unprecedented ability to control light and its polarization state in nanometer-scale optical devices, thereby facilitating a variety of applications related to nano-photonics. The direct observation of optical spin-Hall effect that appears when a wave carrying spin angular momentum (AM) interacts with plasmonic nanostructures is introduced. Moreover, a plasmonic nanostructure which exhibits a crucial role of an AM selection rule in a light-surface plasmon scattering process is presented. The observed effects inspire one to investigate other spin-based plasmonic effects and to propose a new generation of optical elements for nano-photonic applications.

14:00 - 14:30, Auditorium, Heritage Centre Ukko
Diffractive optics in unified optical modeling
Frank Wyrowski, University of Jena (DE)
The smooth combination of different simulation techniques is the task of unified optical modeling. Modeling methods range from geometrical optics to electromagnetic approaches. This concept is ideal for the use of diffractive optics in more complex systems including lenses and mirrors. Basic principles of unified optical modeling are presented and applied to applications of diffractive optics.

Tuesday, 16 February 2010

08:30 - 09:00, Auditorium, Heritage Centre Ukko
Adaptive optics to study and simulate human vision
Pablo Artal, Universidad de Murcia (ES)
Summary: The use of adaptive optics allows the simultaneous measurement and manipulation of ocular aberrations in the eye of a subject while he or she is performing any type of specific visual task. This concept, that we first called adaptive optics visual simulator, has been used in different experiments in visual science in recent years. I will revise the basic concepts of this type of system, including several of the used corrector devices, and some of the results obtained. In particular, a practical application I will describe is the search and evaluation of phase profiles to extend depth of focus to correct presbyopia. I will also review the current status of binocular adaptive optics visual simulators that extend the range of studies to the conditions of natural binocular vision.

14:00 - 14:30, Auditorium, Heritage Centre Ukko
Opportunities in microstructured photonics
Hans Peter Herzig, Ecole Polytechnique Fédérale de Lausanne - EPFL (CH)
The progress in novel light sources, detectors, materials and technology enable new opportunities and challenges for diffractive optics and nanoscale photonics. Important are also analysis tools, such as near-field imaging. Only structures that can be characterized can also be fabricated.

Wednesday, 17 February 2010

14:30 - 15:00, Auditorium, Heritage Centre Ukko
Frequency-stabilized visible laser light sources
Janne Konttinen, EpiCrystals, Inc. (FI)
Low-cost and compact RGB light sources with high beam quality are essential components for emerging laser display applications. Single-pass frequency doubling of self-pulsating Q-switched laser diode emission is an attractive solution for producing light at any visible wavelength. This talk will cover the latest progress in development of an ultra-compact laser light engine based on self-pulsating laser diode and waveguide-type nonlinear crystal with frequency-stabilizing Bragg-grating.

16:30 - 17:00, Auditorium, Heritage Centre Ukko
Speckle suppression in laser projection
Peter Janssens, Barco (BE)
Using lasers instead of the traditional short arc lamps in projectors offers important advantages (e.g. longer light sources lifetime). However, one of the main drawbacks is laser speckle which deteriorates the image quality. Several speckle reduction techniques exist, but none of them is sufficient. Therefore it is necessary to combine several speckle reduction strategies.

Thursday, 18 February 2010

08:30 - 09:00, Auditorium, Heritage Centre Ukko
Progress in multilayer XUV reflecting elements; a building block for Bragg-Fresnell optics
Fred Bijkerk, FOM Institute for Plasma Physics Rijnhuizen and University of Twente, MESA⁺ (NL).
Reported is a summary of the physics and technological progress on multilayer Bragg-reflective XUV optics, resulting from a concerted research effort on Extreme UV photolithography. An outlook is given for the spin-off of this know-how for various new diffractive systems in the XUV range.

Daily overview

SUNDAY, 14 FEBRURAY 2010

15:00 - 19:00
BADGE AND PROGRAMME PICK-UP FOR PRE-REGISTERED ATTENDEES, REGISTRATION FOR NON-REGISTERED ATTENDEES

19:00
WELCOME RECEPTION

Auditorium, Heritage Center Ukko

MONDAY, 15 FEBRUARY 2010

08:30 - 09:20
OPENING by the Chair Jani Tervo, University of Eastern Finland (FI)

Keynote talk
Spinoptics: Spin symmetry breaking in nanostructures
Erez Hasman, Technion - Israel Institute of Technology (IS)

09:20 - 10:40 **PHYSICAL OPTICS**

10:40 - 11:00 coffee break

11:00 - 12:00 **SCATTERING**

12:00 - 14:00 lunch break (Sokos Hotel)

14:00 - 15:50 **MODELLING AND DESIGN I**

Invited talk
Diffractive optics in unified optical modeling
Frank Wyrowski, University of Jena (DE)

15:50 - 16:20 coffee break

16:20 - 18:00 **FABRICATION AND CHARACTERIZATION**

18:20 - 19:20 **POSTER SESSION I** **room change**
Rooms Kinolainen and Mustarintanen, Sokos Hotel

Auditorium, Heritage Center Ukko

TUESDAY, 16 FEBRUARY 2010

08:30 - 10:00 **VISION AND IMAGING**

Invited talk
Adaptive optics to study and simulate human vision
Pablo Artal, Universidad de Murcia (ES)

10:00 - 10:30 coffee break

10:30 - 11:50 **POLARIZATION**

11:50 - 14:00 lunch break (Sokos Hotel)

14:00 - 15:50 **APPLICATIONS I**

Invited talk
Opportunities in microstructured photonics
Hans Peter Herzig, Ecole Polytechnique Fédérale de Lausanne - EPFL (CH)

15:50 - 16:20 coffee break

16:20 - 18:00 **MODELLING AND DESIGN II**

18:20 - 19:20 **POSTER SESSION II** **room change**
Rooms Kinolainen and Mustarintanen, Sokos Hotel

Auditorium, Heritage Center Ukko

WEDNESDAY, 17 FEBRUARY 2010

09:00 - 12:30 **OUTDOOR ACTIVITIES**

13:00 - 14:30 lunch break (Sokos Hotel)

14:30 - 16:00 **APPLICATIONS II**

Invited talk
Frequency-stabilized visible laser light sources
Janne Konttinen, EpiCrystals, Inc. (FI)

16:00 - 16:30 coffee break

16:30 - 18:20 **APPLICATIONS III**

Invited talk
Speckle suppression in laser projection
Peter Janssens, Barco (BE)

19:30 **CONFERENCE DINNER**

Auditorium, Heritage Center Ukko

THURSDAY, 18 FEBRUARY 2010

08:30 - 09:40 **APPLICATIONS IV**

Invited talk
Progress in multilayer XUV reflecting elements; a building block for Bragg-Fresnell optics
Fred Bijkerk, FOM Institute for Plasma Physics Rijnhuizen and University of Twente, MESA⁺ (NL).

09:40 - 10:00 coffee break

10:00 - 11:00 **APPLICATIONS IV** (cont.)

11:00 - 11:10 Best Student Presentation Award

room change

11:20 - 17:30 **SEMINAR „UNIFIED OPTICAL MODELING WITH VIRTUALLAB™“**
Room Panu (Sokos Hotel)

12:30 - 14:30 lunch break (Sokos Hotel)

15:50 - 16:10 coffee break (Sokos Hotel)

Auditorium, Heritage Centre Ukko

08:30 - 08:35

OPENING BY THE CHAIR

Jani Tervo, University of Eastern Finland (FI)

08:35 - 09:20 **Keynote talk**

Spinoptics: Spin symmetry breaking in nanostructures

E. Hasman, Y. Gorodetski, N. Dahan, N. Shitrit, I. Bretner, V. Kleiner; Micro and Nanooptics Laboratory, Faculty of Mechanical Engineering, and Russell Berrie Nanotechnology Institute, Technion - Israel Institute of Technology (IS).

Spin-symmetry breaking in nanoscale structures caused by spin-orbit interaction, leading to a new branch in optics – spinoptics is presented. The spin-based effects offer an unprecedented ability to control light and its polarization state in nanometer-scale optical devices, thereby facilitating a variety of applications related to nano-photonics. The direct observation of optical spin-Hall effect that appears when a wave carrying spin angular momentum (AM) interacts with plasmonic nanostructures is introduced. Moreover, a plasmonic nanostructure which exhibits a crucial role of an AM selection rule in a light-surface plasmon scattering process is presented. The observed effects inspire one to investigate other spin-based plasmonic effects and to propose a new generation of optical elements for nano-photonic applications. [KTDO1508]

09:20 - 10:40 **PHYSICAL OPTICS**

09:20 - 09:40

Diffraction symmetries of optical beams with orbital angular momentum

S. Chávez-Cerda[1], W. Soares[2], I. Vidal[2], D. Caetano[2], E. Fonseca[2], J. Hickmann[2]; [1]Instituto Nacional de Astrofisica, Optica y Electronica (MX), [2]Optics and Materials Group – OPTMA, Instituto de Física, Universidade Federal de Alagoas (BR).

We demonstrate that the orbital angular momentum of beams, either Laguerre-Gaussian or Bessel beams, is intrinsically related to the symmetries of the diffraction aperture providing information of their amount of topological charge they carry. [2470]

09:40 - 10:00

Enhancement of the resonance shift in an array of double hole nanocavities

S. Iyer[1], S Popov[1], A. T. Friberg[1,2,3]; [1]Royal Institute of Technology, Department of Microelectronics and Applied Physics (SE), [2]Helsinki University of Technology, Department of Applied Physics (FI), [3]University of Joensuu, Department of Physics and Mathematics (FI).

The transmission of light through metallic films with periodic double nanoholes is studied using vectorial three-dimensional finite element method. The presence of sharp apexes within the double nanoholes improves the resonance sensitivity as compared to rectangular holes of equal area. [2504]

10:00 - 10:20

Object-dependent cloaking in the first-order Born approximation

T. Setälä[1], T. Hakkarainen[1], A. Friberg[1,2,3], B. Hoenders[4]; [1]Department of Applied Physics, Helsinki University of Technology (FI), [2]Department of Physics and Mathematics, University of Joensuu (FI), [3]Department of Microelectronics and Information Technology, Royal Institute of Technology (SE), [4]Centre for Theoretical Physics and Zernike Institute for Advanced Materials, University of Groningen (NL).

We consider cloaking of a slab object in scalar wave theory within the first-order Born approximation. We show that in the forward direction cloaking is achieved for any object slab and incident field, whereas in the backward direction cloaking is possible at least for self-imaging fields. In both cases the scattering potential of the cloak slab depends on that of the object slab. The method of object-dependent cloaking using weak slab scatterers can be a useful addition to existing cloaking methods. [2506]

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Monday, 15 February

Auditorium, Heritage Centre Ukko

10:20 - 10:40

Inelastic quantum diffraction of matter-waves induced by a nanoslit and sub-nametric schlieren imaging by an interferometric method

M. Hamamda[1], F. Perales, J. Baudon, G. Dutier, M. Ducloy, V. Bocvarski[2]; [1]Laboratoire de Physique des Lasers – Université Paris 13 (FR), [2]Institute of Physics Belgrade (RS).

A novel type device based on slowed-down atomic nozzle beam and quantum diffraction is used to study sub-nanometric features of a complex inelastic scattering amplitude produced by atom-surface interaction. [2457]

10:40 - 11:00 coffee break

11:00 - 12:00	SCATTERING

11:00 - 11:20

Exact scattering theory for objects with non-mode matching boundaries

B.J. Hoenders, Zernike Institute for Advanced Materials, University of Groningen (NL).

The exact theory for scattering of waves by objects with *Non-Mode Matching Boundaries* (NMMB), is developed. A NMMB is a boundary such that a mode of the field outside the object does not "match" with a mode of the field inside the scattering object. "Matching" means that field modes outside- and inside the object have the same values at the boundary of the scatterer. This property e.g. is valid in the case of scattering by a dielectric slab with constant refractive index. An example of a NMMB object is a *halve* infinite horizontal stack of N dielectric layers in free space. The theory is based on a new set of modes into which the fields inside and outside the boundary are expanded. Each field mode of this set outside the object couples to only *one* field mode of this set inside the medium. [2493]

11:20 - 11:40

Surface enhanced Raman scattering by applying resonant waveguide gratings

B. Päivänranta[1,2], T. Nuutinen [3], A. Koistinen[4,5], P. Vahimaa [1]; [1]Department of Physics and Mathematics, University of Joensuu (FI), [2]Laboratory for Micro- and Nanotechnology, Paul Scherrer Institut (CH), [3]Faculty of Biosciences, University of Joensuu (FI), [4]Department of Physics, University of Kuopio (FI), [5]BioMater Center, University of Kuopio (FI).

In conventional surface enhanced Raman spectroscopy metallic nanoparticles are introduced to a surface thus resulting gain in the inherently weak Raman spectra. We apply resonant waveguide gratings and show a remarkable enhancement from thin dielectric titanium dioxide layer to be more than 103 higher compared to a flat thin film. [2499]

11:40 - 12:00

Investigations on model-based uncertainties for the reconstruction of 2D periodic surface profiles in scatterometry

H. Gross[1], M. Henn[1], A. Rathsfeld[2], F. Scholze[1], B. Bodermann[3] and M. Bär[1]; [1]Physikalisch-Technische Bundesanstalt (PTB) Berlin(DE), [2]Weierstrass Institute for Applied Analysis and Stochastics (DE), [3]Physikalisch-Technische Bundesanstalt (PTB) Braunschweig (DE).

We report on modeling and uncertainty estimates for the evaluation of measurements in scatterometry, i.e., the determination of periodic surface structures from light diffraction patterns. [2483]

12:00 - 14:00 lunch break

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Auditorium, Heritage Centre Ukko

14:00 - 15:50	MODELLING AND DESIGN I

Invited talk

14:00 - 14:30

Diffractive optics in unified optical modeling

F. Wyrowski[1], M. Kuhn[2], H. Schweitzer[2]; [1]University of Jena, Physics Department; [2]LightTrans GmbH (DE).

The smooth combination of different simulation techniques is the task of unified optical modeling. Modeling methods range from geometrical optics to electromagnetic approaches. This concept is ideal for the use of diffractive optics in more complex systems including lenses and mirrors. Basic principles of unified optical modeling are presented and applied to applications of diffractive optics. [ISDO1514]

14:30 - 14:50

Diffraction efficiency achromatization of blazed gratings

E. Czech[1], Z. Jaroszewicz[2], G. Mínguez-Vega[3], H. Lajunen[4]; [1]Institute of Physics, Białystok University of Technology (PL), [2]Institute of Applied Optics and National Institute of Telecommunications (PL), [3]Departament de Física, Universitat Jaume I (ES), [4]Departamento de Óptica, Universidad de Valencia (ES).

Diffraction efficiency of blazed diffraction gratings is made almost constant within a wide spectral range by a proper choice of different values for the blaze angle. A grating with only two different values turns out to possess satisfying characteristics. [2491]

14:50 - 15:10

LED radiation simulations and optimization using reciprocity

O. Janssen[1], H. Urbach[1]; [1]Delft University of Technology (NL).

Using the reciprocity principle, we simulate the incoherent emission of a periodically structured LED. In addition, the gradient of the radiated intensity with respect to the periodic surface is efficiently obtained. This simplifies the task of optimizing designs of LEDs and related geometries. [2458]

15:10 - 15:30

Local thin optics model in wavefront transformation by nonsymmetrical and nonparaxial diffractive optical elements

M. A. Golub; Department of Electrical Engineering, Tel Aviv University (IL).

Generalized Coddington equations for diffractive, refractive and reflective surfaces are developed in this paper via a local thin optical element approximation. Design method based on finding a local focus position by direct calculation of local wavefront curvatures in addition to ray slope is developed for diffractive optical elements. [2480]

15:30 - 15:50

Realistic modeling of diffractive optical elements

C. Pruss, R. Reichle, W. Osten; Institut für Technische Optik (ITO), Universität Stuttgart (DE).

The mixture of large area and micro- to nanoscaled structures makes modeling of diffractive structures difficult, especially when regarding a realistic, spatially varying power distribution into multiple orders. We present a model based local grating approximation approach and its integration into a commercial raytracing software. [2444]

15:50 - 16:20 coffee break

NOTES - NOTES - NOTES - NOTES - NOTES - NOTES - NOTES

Monday, 15 February

Auditorium, Heritage Centre Ukko

16:20 - 18:00	FABRICATION AND CHARACTERIZATION

16:20 - 16:40
A direct laser writing system for the fabrication of diffractive structures on curved substrates
M. Häfner, R. Reichle, C. Pruss, W. Osten; Institut für Technische Optik, Universität Stuttgart (DE).
We present a novel direct laser writing system for the fabrication of high resolution, high accuracy structures on aspheric surfaces. In addition to the system design we will present first binary and grey scale structures that have been produced with our novel system and deliver insight into our future investigations, implementations and applications. [2452]

16:40 - 17:00
Three-grating monolithic phase-mask for the single-order writing of large-period gratings
Y. Bourgin[1], Y. Jourlin[1], M. Kuittinen[2], O. Parriaux[1]; [1]Laboratoire H. Curien UMR CNRS 5516, University of Lyon (FR), [2]Dep. of Physics, University of Joensuu (FI).
A new type of high-efficiency monolithic phase mask comprising three diffraction gratings creates a purely single spatial frequency interferogram of large period that can be used to print large gratings. The fabrication of a long, 2 μm-period grating according to the write-on-the-fly scheme is given as an example. [2424]

17:00 - 17:20
Modeling of the optical behavior of diamond turned holograms
C. Dankwart, C. Falldorf, C. von Kopylow, R.B. Bergmann; Bremer Institut für angewandte Strahltechnik (DE).
We propose a model, which describes the optical behavior of diamond turned holograms (DTH). Our model enables the calculation of the far field generated by a DTH. We present experimental results demonstrating a good qualitative agreement with those obtained from simulations based on our model. [2488]

17:20 - 17:40
Lamellar multilayer amplitude gratings for the XUV wavelength region: design and fabrication by UV-NIL
R. van der Meer[1], I.V. Kozhevnikov[2], B. Vratzov[1,3], H. Bastiaens[1], K. Boller[1], F. Bijkerk[1,4]; [1]MESA+ Inst. for Nanotechnology, Faculty of Science and Technology, University of Twente (NL), [2]Inst. of Crystallography, Russian Academy of Sciences (RU), [3]NT&D - Nanotechnology and Devices (DE), [4]FOM-Inst. Rijnhuizen (NL).
Progress on lamellar multilayer amplitude gratings (LMAG) is reported. The design is based on a new coupled-wave method generally valid for XUV diffraction gratings and here used to optimize LMAG reflectivity and resolution. First steps of a novel fabrication process using UV-nanoimprint lithography (UV-NIL) are reported. [2434]

17:40 - 18:00
Photochromic computer generated holograms for optical testing of aspheres
G. Pariani[1,3], A. Bianco[2,3], P. Spanó[1], C. Bertarelli[3], E. Molinari[1]; [1]INAF - Osservatorio Astronomico di Brera (IT), [2]INAF – IASF (IT), [3]Politecnico di Milano, Dipartimento di Chimica, Materiali ed Ingegneria Chimica (IT).
Computer Generated Holograms (CGHs) which exploit the transmission change of photochromic polyurethane films in the visible region are obtained. CGHs are applied for the optical testing of aspheric optics. The self-developing and the possibility to be rewritten are the main advantages of these photochromic devices. [2439]

18:20 - 19:20	**POSTER SESSION I** [please see pages 20 & 21] Rooms Kinolainen and Mustarintanen, Sokos Hotel

NOTES - NOTES - NOTES - NOTES - NOTES - NOTES - NOTES

Auditorium, Heritage Centre Ukko

08:30 - 10:00 **VISION AND IMAGING**

08:30 - 09:00 **Invited talk**

Adaptive optics to study and simulate human vision

P. Artal, Universidad de Murcia (ES).

The use of adaptive optics allows the simultaneous measurement and manipulation of ocular aberrations in the eye of a subject while he or she is performing any type of specific visual task. This concept, that we first called adaptive optics visual simulator, has been used in different experiments in visual science in recent years. I will revise the basic concepts of this type of system, including several of the used corrector devices, and some of the results obtained. In particular, a practical application I will describe is the search and evaluation of phase profiles to extend depth of focus to correct presbyopia. I will also review the current status of binocular adaptive optics visual simulators that extend the range of studies to the conditions of natural binocular vision. [ISDO1608]

09:00 - 09:20

Pupil fields with maximum linear polarized electric field amplitude in the focal point of a lens

H.P. Urbach, R. de Bruin, S.F. Pereira; Optics Research Group, Dept. of Imaging Science, Delft University of Technology (NL).

We determine field distributions in the pupil of a high NA lens, that give, for a given power incident on the lens, the maximum electric field amplitude in focus in a specific direction and that linear polarized in the focal point. We consider in particular the cases of maximum longitudinal and maximum transverse components. The distribution of the maximum longitudinal component in the focal plane is narrower than that of the focused Airy spot and hence can give higher resolution in imaging. We shall also explain the relationship with the pupil field that gives maximum electric energy density in the focal point. [2484]

09:20 - 09:40

The discrete Zernike transform and its applications

R. Navarro[1], J. Arines[2], R. Rivera[1]; [1]Consejo Superior de Investigaciones Científicas and Universidad de Zaragoza, ICMA (ES), [2]Universidad de Zaragoza, Física Aplicada (ES).

Zernike polynomials (ZP) are widely used in optics because they form a complete orthogonal basis able to represent any function on a circular support of unit radius. In particular the ZP expansion is the standard way to represent wavefronts propagating through circular apertures. We propose and implement a method to obtain invertible (complete and orthonormal) discrete Zernike transform, DZT. [2418]

09:40 - 10:00

Experimental simulation of presbyopia compensation by means of the light sword optical element

K. Petelczyc[1], Z. Jaroszewicz[2,3], A. Kołodziejczyk[1,] M. Sypek[1]; [1]Warsaw Univers. of Technology, Faculty of Physics (PL), [2,3]Institute of Applied Optics & National Institute of Telecommunications (PL).

The contribution presents a real scene imaging by a lens coupled with the light sword optical element. The experiments give evidence that the light sword optical element is a very promising device for compensation of presbyopia of the human eye. [2417]

10:00 - 10:30 coffee break

NOTES - NOTES - NOTES - NOTES - NOTES - NOTES - NOTES

Tuesday, 16 February 2010

Auditorium, Heritage Centre Ukko

10:30 - 11:50 POLARIZATION

10:30 - 10:50
Active spatial polarization control induced by diffractive optical illumination
F. Schaal, C. Pruss, W. Osten; Institut für Technische Optik, Universität Stuttgart (DE).
We show the system design of a micro optical device for non-pixelated active spatial polarization control. One key component is the switchable illumination unit based on an ensemble of red VCSEL with diffractive beamshaping optics. [2455]

10:50 - 11:10
Depolarization of quasi-monochromatic light by thin resonant gratings
I. Vartiainen, J. Tervo, M. Kuittinen; University of Joensuu, Department of Physics and Mathematics (FI).
We propose a method to depolarize quasi-monochromatic light by using thin optical elements. The suggested method is based on resonant gratings in total-internalreflection condition, and numerical design is performed by Fourier Modal Method (FMM). We give designs and show tolerance analysis for two narrow wavelength bands. [2435]

11:10 - 11:30
Design and fabrication of nanowire metal grating polarizers for a shearing interferometer using polarization marking
Z. Ghadyani[1,2], I. Harder[1], O. Rusina[1], W. Iff[2], V. Nercissian[2], K. Mantel[1], N. Lindlein[2], G. Leuchs[1,2]; [1]Max-Planck Institute for the Science of Light (DE), [2]Institute for Optics, Information and Photonics, Friedrich-Alexander-University Erlangen-Nuremberg (DE).
An Al wire-grating polarizer array is designed and fabricated for a lateral shearing interferometer in which the shears in two orthogonal directions are to be detected simultaneously. The design utilizes the differential method of rigorous grating diffraction theory. The polarizer is fabricated by electron beam lithography and dry etching. [2441]

11:30 - 11:50
Polarization-sensitive resonance in subwavelength gold inductive grids
J. Laukkanen, B. Bai, A. Lehmuskero, J. Turunen; University of Joensuu, Department of physics and mathematics (FI).
We have studied both theoretically and experimentally the distinct resonance behavior of TE and TM waves, manifested as a resonance peak and dip, respectively, in a subwavelength gold inductive grid at an incident mounting slightly deviated from normal direction. [2476]

11:50 - 14:00 lunch break

14:00 - 15:50 APPLICATIONS I

Invited talk

14:00 - 14:30
Opportunities in microstructured photonics
H. P. Herzig, T. Sfez, T. Scharf; Ecole Polytechnique Fédérale de Lausanne - EPFL (CH).
The progress in novel light sources, detectors, materials and technology enable new opportunities and challenges for diffractive optics and nanoscale photonics. Important are also analysis tools, such as near-field imaging. Only structures that can be characterized can also be fabricated. [ISDO1614]

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Auditorium, Heritage Centre Ukko

14:30 - 14:50

The contribution of glancing illumination to optical triangulation measurements for paper surface topography characterization

A. Manuilskiy, J. Thim, M. O´Nils; Mid Sweden University, Department of Information Technology and Media (SE).

The possibility of reconstructing surface topography by using glancing light imaging has been shown. In special conditions of illumination and geometry, the image intensity of the illuminated area is proportional to the derivative of the surface profile, which allows for the reconstruction of part of the information concerning paper surface topography. [2462]

14:50 - 15:10

Analysis of the performance of a parallel aligned LCoS display for diffractive optical elements as a function of the addressing electrical sequences

L. Lobato[1], A. Lizana[1], A. Márquez[2], I. Moreno[3], C. Iemmi[4], J. Campos[1]; [1]Univ. Autónoma de Barcelona, Dept. Física (ES); [2]Univ. Alicante, Dept. Física, Ing. Sistemas y T. Señal (ES); [3]Univ. M. Hernández, Dept. C. Materiales, Óptica y T. Electrónica (ES); [4]Univ. Buenos Aires, Dept. Física, (AR).

We study the performance of a Parallel Aligned LCoS display as a function of different electrical signal addressed to it. In particular, the global retardance and time-fluctuations in phase are dependent on the electrical signal chosen. The one providing a suitable balance between these two parameters leads to the best efficiency for the diffractive elements addressed to the device. [2430]

15:10 - 15:30

Characterisation of DOEs with DUV-Scatterometry

B. Bodermann, M. Wurm; Physikalisch-Technische Bundesanstalt (DE).

At PTB, the national metrology institute of Germany, a new type of DUV scatterometer has been developed and set up recently. The concept of the system is very variable and versatile, so that many different types of measurements like e. g. classical scatterometry, ellipsometric scatterometry, polarisation dependent reflectometry and ellipsometry can be performed. Different operation wavelengths between 840 nm and 193 nm, provided by an all-solid-state laser system, can be used, giving also access to a variety of different at-wavelength metrology connected with state-of-the-art photolithography. Until now the main applications are linewidth, grating period and edge profile characterisation of periodically nano-structured surfaces mainly on photomasks. [2490]

15:30 - 15:50

Nanometrology of aspherical surfaces

A.G. Poleshchuk, E.G. Churin, R.K. Nasyrov, A.V. Matochkin; Institute of Automation & Electrometry SB RAS (RU).

Methods of contactless test of aspherical surface shape with nanometer precision based on application of computer-generated holograms (CGH) are presented. [2464]

15:50 - 16:20 coffee break

NOTES - NOTES - NOTES - NOTES - NOTES - NOTES - NOTES

Tuesday, 16 February 2010

Auditorium, Heritage Centre Ukko

16:20 - 18:00	MODELLING AND DESIGN II

16:20 - 16:40

Fourier modal method with complex polarization basis and adaptive spatial resolution for modeling crossed gratings of circular holes or pillars

L. Li[1], G.Granet[2]; [1]Tsinghua University, Dept of Precision Instruments (CN), [2]Université Blaise-Pascal, LASMEA (FR).

We present the theory and numerical results of combining the concept of adaptive spatial resolution with the complex polarization basis approach recently proposed by Antos to improve the convergence of the Fourier modal method for modeling highly conducting gratings of circular holes or pillars. [2474]

16:40 - 17:00

The lamellar diffraction grating problem: a spectral method based on subsectionnal basis and adpative spatial resolution

G. Granet[1], A.M. Armeanu[1,2], K. Edee[1]; [1]Clermont Uninivérsités, Université Blaise Pascal, Lasmea (FR), [1]CNRS UMR 6602 (FR), [2]CNRS LTM UMR 5129 (FR).

The Adaptive Spatial Resolution Modal Method as applied to lamellar 1D Grating is implemented with the help of subsectionnal basis. We use the Moment Method with triangle functions as expansion functions and pulses as test functions. In the case of metallic structures this approach outperforms the Fourier Modal Method. [2465]

17:00 - 17:20

The Fourier-Modal Method for Aperiodic Structures

M. Pisarenco[1], J.M.L. Maubach[1], I. Setija[2], R.M.M. Mattheij[1]; [1]Eindhoven University of Technology, Department of Mathematics and Computer Science (NL), [2]ASML Netherlands B.V., Department of Research (NL).

This paper extends the area of application of the Fourier-modal method (FMM) from periodic structures to non-periodic ones illuminated under arbitrary angles. This is achieved by placing perfectly matched layers at the lateral boundaries and reformulating the problem in terms of a contrast field. [2471]

17:20 - 17:40

Effects of surface relief structure on performance of subwavelength grating waveplates

H. Ichikawa, K. Katada; Ehime Univers., Faculty of Engineering (JP).

Effects of surface relief structural parameters on performance of a quarter-wave plate based on a one-dimensional subwavelength grating fabricated by nano-imprinting optical glass are numerically investigated. [2416]

17:40 - 18:00

Design and optimization strategies for diffractive optical elements (DOE)

M. Hagemann[1], M. Kluge[2], E. Pawlowski[2], S. Reichel[2], M. Brinkmann[1]; [1]University of Applied Sciences Darmstadt (DE), [2]Schott AG (DE).

For a desired laser output field of 19 horizontally aligned straight lines we present and discuss three DOE design strategies which aim on the optimization of different optical performance key figures. This contribution intends to give the reader some guidance for the choice of an appropriate DOE layout. [2419]

18:20 - 19:20	**POSTER SESSION II** [please see pages 22 & 23] Rooms Kinolainen and Mustarintanen, Sokos Hotel

NOTES - NOTES - NOTES - NOTES - NOTES - NOTES - NOTES

Auditorium, Heritage Centre Ukko

09:00 - 12:30

OUTDOOR ACTIVITIES

13:00 - 14:30 lunch

14:30 - 16:00 **APPLICATIONS II**

Invited talk

14:30 - 15:00

Frequency-stabilized visible laser light sources

J. Konttinen, P. Tuomisto, T. Vallius; EpiCrystals, Inc. (FI).

Low-cost and compact RGB light sources with high beam quality are essential components for emerging laser display applications. Single-pass frequency doubling of self-pulsating Q-switched laser diode emission is an attractive solution for producing light at any visible wavelength. This talk will cover the latest progress in development of an ultra-compact laser light engine based on self-pulsating laser diode and waveguide-type nonlinear crystal with frequency-stabilizing Bragg-grating. [ISDO1714]

15:00 -15:20

Diffractive shaping of excimer-laser beams for pulsed laser deposition

A. Hakola, V. Kekkonen, T. Kajava; Helsinki University of Technology, Department of Applied Physics (FI).

We present a beam-shaping system for a pulsed laser deposition setup. This system is based on two diffractive beam-splitter gratings, and it is able to produce 2x2-mm^2 flat-top distributions with a fluence of 3 J/cm^2 on the target some 30 cm behind the system. We have applied the setup to deposit ferromagnetic Ni-Mn-Ga films. [2497]

15:20 - 15:40

Dewar integration of diffractive functions for infrared imagery

G. Druart[1], N. Guérineau[1], M. Piponnier[1], J. Primot[1], J. Deschamps[1], J. Taboury[2], M. Fendler[3]; [1]ONERA (FR); [2]Institut d'Optique (FR); [3]CEA-LETI/MINATEC (FR).

An imagery property can be added to a dewar by simply integrating a diffractive function on the cold diaphragm in front of the infrared detector. This optical device is compact and compatible with the cryogenic constraints of the dewar and could be used for security applications. [2408]

15:40 - 16:00

Laser shaping into deformed Laguerre-Gaussian beams - case of polygons and opened rings

B. Viaris de Lesegno, F. Diry, Ch. Hazera, L. Pruvost; Laboratoire Aimé Cotton, CNRS (FR).

Using a phase-only spatial light modulator (SLM) addressed by deformed helical phase patterns, we have shaped a laser beam into Laguerre-Gaussian modes deformed into polygons or opened with a controlled aperture. We have studied the modes propagation and shown that the Rayleigh zone is shorter but allows many applications. We have compared the experimental patterns to calculated ones using the mode decomposition over the basis of the Laguerre-Gaussian modes. Both shape and propagation are well reproduced with this approach. [2467]

16:00 - 16:30 coffee break

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Wednesday, 17 February 2010

Auditorium, Heritage Centre Ukko

16:30 - 18:20	APPLICATIONS III

Invited talk

16:30 - 17:00

Speckle suppression in laser projection

P. Janssens, Barco (BE).

Using lasers instead of the traditional short arc lamps in projectors offers important advantages (e.g. longer light sources lifetime). However, one of the main drawbacks is laser speckle which deteriorates the image quality. Several speckle reduction techniques exist, but none of them is sufficient. Therefore it is necessary to combine several speckle reduction strategies. [ISDO1716]

17:00 - 17:20

Enhancement of Photo-Detector Responsivity in Standard SOI CMOS Processes by Introducing Resonant Grating Structures

M. Auer[1], K.-H. Brenner[1], N. Moll[2], T. Morf[2], M. Fertig[3], T. Stöferle[2], R. F. Mahrt[2], J. Weiss[2], T. Pflüger[3]; [1]University of Heidelberg, ziti, chair of optoelectronics (DE), [2]IBM Research, Zurich Research Laboratory (CH), [3]IBM Research & Development Böblingen (DE).

By the introduction of resonant structures in CMOS (complementary metal-oxide semiconductor) technology a photo detector concept with enhanced efficiency is presented, which is fully compatible with the standard silicon-on-insulator (SOI) CMOS process without any process modification or post-processing steps. [2461]

17:20 - 17:40

Surface relief and polarization gratings for solar concentrators

T.M. de Jong[1], D.K.G. de Boer[2], C.W.M. Bastiaansen[1,3]; [1]Eindhoven University of Technology, Department of Chemical Engineering and Chemistry (NL), [2]Philips Research Laboratory (NL), [3]Queen Mary University of London, Department of Materials (UK).

Transmission gratings that combine a large diffraction angle with a high diffraction efficiency and low angular and wavelength dispersion could be used to couple sun light into a light guide. We study the possible use of surface relief and polarization gratings in such a solar concentrator system. [2445]

17:40 - 18:00

Diffractive complete lateral shearing interferometer with reduced coherence

I. Harder[1], V. Nercissian[2], J. Schwider[2] , A. Berger[2] , K. Mantel[1], N. Lindlein[2]; [1]Max Planck Institute for the Science of Light (DE), [2]University of Erlangen, Institute of Optics (DE).

A lateral shearing interferometer based on Ronchi type phase gratings is presented which allows the simultaneous detection of both orthogonal gradient fields. To reduce the influence of dust diffraction and interference effects of higher diffraction orders the system setup is designed to cope with reduced coherence. [2451]

18:00 - 18:20

Advanced synthetic diffractive elements for security purposes

L. Kotačka[1], P. Vízdal[1], T. Běhounek[1,2]; [1]Optaglio s.r.o. (CZ), [2]Inst. of Mathematics, FME TU Brno (CZ).

The paper deals with the synthesized holographic and diffractive security elements. They are recorded by means of the electron beam lithography with the resolution 500.000 dpi. We especially pay attention to such holographic features being impossible to originate through conventional optical holography of matrix based devices. [2425]

19:30	CONFERENCE DINNER

NOTES - NOTES - NOTES - NOTES - NOTES - NOTES - NOTES

Auditorium, Heritage Centre Ukko

08:30 - 11:00	APPLICATIONS IV

08:30 - 09:00 **Invited talk**

Progress in multilayer XUV reflecting elements; a building block for Bragg-Fresnell optics

F. Bijkerk[1,2]; Eric Louis[1]; [1]FOM Institute for Plasma Physics; [2]University of Twente, MESA+ Institute for Nanotechnology (NL).

Reported is a summary of the physics and technological progress on multilayer Bragg-reflective XUV optics, resulting from a concerted research effort on Extreme UV photolithography. An outlook is given for the spin-off of this know-how for various new diffractive systems in the XUV range.

09:00 - 09:20

Fresnel optics for an RFID portal (915 MHz)

M. A. Ponce, B. Valadéz; Centro de Enseñanza Técnica y Superior, CETYS Universidad (MX).

RFID equipment of 915 MHz was arranged to build a portal for access control purposes. To cover a larger area and gain greater control of access variables, we propose the design of Fresnel mirrors to help make more efficient the signal emitted by the RFID antenna. [2492]

09:20 - 09:40

Generating function approach for creation of multimodal coherent beams by diffractive optics

M. A. Golub, S. Shwartz, S. Ruschin; Tel Aviv University, Department of Electrical Engineering (IL).

Natural compositions of several modes provided by a mathematical generating functions concept are exploited for the synthesis of multimodal beams.Design issues for phase diffractive optical elements matched to coherent beams of generating functions are solved. Experimental and computer simulated results are compared. [2460]

09:40 -10:00 coffee break

10:00 - 10:20

Nanoslits in metallic membranes: nearly perfect transmission for multispectral imaging

G. Vincent[1], S. Collin[2], R. Haïdar[1], N. Bardou[2], S. Rommeluère[1], J.-L. Pelouard[2], [1]Office National d'Etudes et de Recherches Aerospatiales (FR), [2]Laboratoire de Photonique et de Nanostructures (FR).

We present a snapshot multispectral micro-camera composed of a multichannel optical system associated with a mosaic of spectral filters, operating in the 2.5-5µm wavelength range. Each filter consists in a free-standing metallic grating with very narrow slits; their optical characterization exhibits strong Fano resonances. [2420]

10:20 - 10:40

Heuristic description of diffraction by a glass corner

D. Kuang[1, 2], P. Chavel[1], J.-P. Hugonin[1]; [1]Laboratoire Charles Fabry de l'Institut d'Optique, CNRS, Université Paris-Sud (FR), [2]Key Laboratory of Opto-Electronic Information Science and Technology (Min-istry of Education), Institute of Modern Optics, Nankai University (CN).

A heuristic model to describe the electric field diffracted by a 90° glass corner with combination of reflection, refraction, total internal reflection, evanescent wave and Fresnel diffraction by a knife edge is presented. Electric fields maps obtained by the method for moderate incidence angles agree well with rigorous diffraction algorithms. [2427]

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Thursday, 18 February 2010

Auditorium, Heritage Centre Ukko

10:40 -11:00
Pseudo discrete diffraction: Modes of virtual waveguide arrays
S. Chávez-Cerda, D. L. Romero-Antequera, H. M. Moya-Cessa; Instituto Nacional de Astrofísica, Óptica y Electrónica (MX).
We demonstrate discrete diffraction features, a property of fields propagating in waveguide arrays, in one dimensional Bessel beams propagating in free space. The zeros of the zero-order Bessel beam act as free space virtual waveguides. [2459]

11:00 -11:10
Best Student Presentation Award
Announcement of the winners

Sponsored by Springer science+business media

Room Panu, Sokos Hotel — room change

11:20 - 17:30

UNIFIED OPTICAL MODELING WITH VIRTUALLAB™

Frank Wyrowski, University Jena (DE)

Investigation of optical systems demands for different modeling in lens and micro-structured regions.
Propagation techniques ranging from geometrical optics to rigorous techniques must work on one platform. That is what we call unified optical modeling. It also includes system simulation for different types of sources including coherent, incoherent and partially coherent light fields. VirtualLab™ has been developed to fulfill these demands.

The following topics will be discussed:

- Fundamentals of unified optical modeling and its implementation in VirtualLab™
- Selection of different modeling techniques to different regions of the system
- Ray tracing in unified optical modeling
- Source models in VirtualLab™
- Design and analysis of diffractive optics
- Analysis of micro-optical systems including lens arrays
- LED modeling
- Ultras-short pulse propagation
- Partially temporal source modeling
- Laser resonator analysis including diffractive optics
- Fourier modal method analysis
- Polarization effect analysis
- Non-paraxial modeling
- Presentation of various simulations on the basis of VirtualLab™ 4

All seminar participants may receive an evaluation license of VirtualLab™ together with all sample files presented at the seminar. The evaluation license is valid till the end of March 2010.

Sponsored by LIGHTTRANS

12:30 - 14:30 lunch break

15:50 - 16:10 coffee break

NOTES - NOTES - NOTES - NOTES - NOTES - NOTES - NOTES

Monday, 15 February, 18:20 - 19:20 - Rooms Kinolainen and Mustarintanen, Sokos Hotel

DO2010_2421_01

Nonlinear responses and quantum yield measurements of MDJ dye under CW laser illumination

A. Granmayeh Rad[1], A. Koohian[3], S. Saghafi [4,2], M.F. Habibi[3];[1] Islamic Azad University Rudehen Branch (IR), [2]Plasma-Physics Research Center, Science and Research branch - Islamic-Azad University (IR), [3]Department of physics, Tehran University, Tehran (IR), [4]Technical University of Vienna, Institute of Solid State, Department of Bioelectronics (AT).

We report the nonlinear optical properties of a red light emitting; MDJ; derivate from KDM. In this paper by using single beam Z-scan technique under a CW He-Ne laser beam (λ=632.8nm) the magnitude and sign of nonlinear refractive index (n2) and absorption coefficient (β) of MDJ were calculated. In addition, we have measured the quantum yield of this material by two methods.

DO2010_2507_02

Wideband resonance reflectors in the visible domain

T. Saastamoinen, M. Kuittinen, University of Joensuu, Department of Physics and Mathematics (FI).

In this work we present wideband resonance reflectors in the visible domain. The main idea is to use materials with relative high refractive index. Wider bandwidth gives some advantages over the conventional resonance reflectors such as better fabrication tolerances.

DO2010_2503_03

External resonance modes and wavefront detection in coupled polymer microcavities

S. Popov[1], S. Sergeyev[2], N. Innocenti[1], A. T. Friberg[1,3,4]; [1]Royal Institute of Technology, Department of Microelectronics and Applied Physics (SE), [2]Waterford Institute of Technology, Optics Research Group (IE), [3]Helsinki University of Technology, Department of Applied Physics (FI), [4]University of Joensuu, Department of Physics and Mathematics (FI).

Enhancement of electric field outside a cavity is demonstrated in coupled polymeric microcavities at resonance frequencies in visible range. Simulation of the cavity modes shows high stability with different excitation design. Coupled microcavities can be also used to precisely detect the direction of incident wavefront.

DO2010_2501_04

Study of optical modes in silicon based 2-D slot waveguides

A. Khanna, T. Alasaarela, A. Säynätjoki, A. Tervonen, S. Honkanen; Photonics Group, Department of Micro and Nanosciences, Micronova (FI).

A slot waveguide has been proposed for various applications in integrated optics. This geometry can be useful for integrating non-Si materials with Si-based waveguides. However, slot waveguides are polarization sensitive and difficult to fabricate. To overcome these issues we propose 2-D slot waveguides.

DO2010_2422_05

Designing of hybrid diffractive optical systems using the aplanatic condition

J. Hopp, P. Fiala; Czech Technical University, Faculty of Nuclear Sciences and Physical Engineering, Department of Physical Electronics (CZ).

A method of optical design of hybrid optical systems by utilization the aplanatic condition is introduced here. The aplanatic condition was taken as a main optimizing criterion for the design of phase functions of diffractive optical elements during the optimization procedure. The phase function of the diffractive element can be arbitrary. Several hybrid optical systems, in particular hybrid doublets and hybrid triplets, consisting of one diffractive element and one or two refractive lenses, were designed and analyzed by this method.

DO2010_2495_06

Design of the efficiency achromatized grating's period profile

E. Czech[1], Z. Jaroszewicz[2], G. Mínguez-Vega[3], H. Lajunen[4]; [1]Institute of Physics, Białystok University of Technology (PL), [2]Institute of Applied Optics (PL) and National Institute of Telecommunications (PL), [3]Departament de Física, Universitat Jaume I (ES), [4]Departamento de Óptica, Universidad de Valencia (ES).

The period's profile of the phase grating is optimized in order to make its diffractive efficiency constant within a wide spectral range. The optimization procedure leads to new shapes of the profile, different from the blazed ones.

DO2010_2472_07

Shape of diffraction orders in pixelated lenses

M. Peloux, P. Chavel, F. Goudail, J. Taboury; Laboratoire Charles Fabry de l'Institut d'Optique, CNRS, Université Paris-Sud (DE).

Experimenting on diffraction by a pixelated lens in its focal plane, we observed diffraction order shapes that clearly departed from the intuitively expected sinc (or Airy pattern) shape. In this presentation, we analyse the phenomenon and provide an analytical explanation.

DO2010_2489_08

Spectrally partially coherent propagation-invariant fields

K. Saastamoinen[1], J. Turunen[1], P. Vahimaa[1], A. T. Friberg[1,2,3]; [1]University of Joensuu, Department of Physics and Mathematics (FI), [2]Helsinki University of Technology, Department of Engineering Physics (FI), [3]Royal Institute of Technology, Department of Microelectronics and Applied Physics (SE).

In this work we provide a connection between coherent propagation-invariant pulses and stationary polychromatic propagation-invariant fields. A smooth transition between these limits is considered and we explore partially coherent polychromatic propagationinvariant fields.

DO2010_2487_09

Spatial coherence enhancement of fluorescence by nanostructures

J. Rahomäki[1], T. Nuutinen[2], P. Karvinen[1], O. Hyvärinen[3], P. Vahimaa[1], J. Turunen[1]; [1]University of Joensuu, Department of Physics and Mathematics (FI), [2]University of Joensuu, Faculty of Biosciences (FI), [3]ORC, Tampere University of Technology (FI).

Recently we achieved a great enhancement in intensity and spatial coherence by a resonant waveguide grating (RWG) structure at well defined direction compared to the free space emission. Now we have analyzed near field spatial coherence and fluorescent emission coupling properties numerically to improve these enhances further.

DO2010_2486_10

Diffractive paraxial-domain polarizing beam splitter with high efficiency operating in transmission geometry

P. Stenberg, J. Tervo, M. Kuittinen; University of Joensuu, Department of Physics and Mathematics (FI).

We present functional principle and fabrication aspects of diffractive polarizing beam splitters operating in transmission mode in paraxial domain. Theoretical upper limit of efficiency for the considered class of structures is full 100%. Design consist depth modulated sub wavelength binary grating structures on silicon substrate.

DO2010_2482_11

Improving laser-induced fluorescence signal with single excitation enhancing and emission directing diffraction grating

P. Karvinen[1], T. Nuutinen[2], J. Rahomäki[1], O. Hyvärinen[3], P. Vahimaa[1]; [1]University of Joensuu, Department of Physics and Mathematics (FI), [2]University of Joensuu, Faculty of Biosciences (FI), [3]ORC, Tampere University of Technology (FI).

A dielectric subwavelength grating was designed and fabricated in order to enhance fluorescence based detection of biomolecules. The structure was optimized to enhance the local energy densities of the excitation illumination and to direct the emitted fluorescence towards the detector. More than 530 times higher fluorescence yield was observed from enhanced green fluorescence protein on the structure when compared to same material on a flat surface.

Poster session I

Monday, 15 February, 18:20 - 19:20 - Rooms Kinolainen and Mustarintanen, Sokos Hotel

DO2010_2479_12
Distinguishing between deterministic and stochastic mechanisms in temporal pulse broadening
M. Surakka[1], A. T. Friberg[1,2,3], J. Turunen[1], P. Vahimaa[1]; [1]University of Joensuu, Department of Physics and Mathematics (FI),Helsinki University of Technology, Department of Applied Physics (FI), [3]Royal Institute of Technology, Department of Microelectronics and Applied Physics (SE).
Temporal pulse broading in a pulse train can arise from two phenomena, namely frequency chirping and partial spectral coherence. The first of these effects is of deterministic nature, whereas the second is random. We demonstrate a simple method to distinguish these two effects from a train of Gaussian Schell-model pulses.

DO2010_2477_13
Analysis of spatial hole burning effect in square lattice photonic crystal laser
M. Koba, P. Szczepański; Institute of Microelectronics and Optoelectronics, Warsaw University of Technology, National Institute of Telecommunications (PL).
In this paper, we introduce an approximate method of analysis of the operation of the 2D photonic crystal laser above the lasing threshold. We derived an approximate formula for the normalized small-signal gain coefficient $\alpha 0L$ taking into account gain saturation and spatial hole burning effects.

DO2010_2473_14
Calculations of PSF functions for X-ray zone plates with high number of zones
M. Sypek[1], M. Makowski[1], A. Kolodziejczyk[1], R. Navarro[2]; [1]Warsaw University of Technology, Faculty of Physics (PL), [2]ICMA, Consejo Superior de Investigaciones Científicas & Universidad de Zaragoza, Facultad de Ciencias (ES).
The point spread functions of imaging setup for the X-Ray microscopy utilizing amplitude zone plates were numerically calculated. Large calculation matrices of 32768^2 points were used to analyze zone plates with high number of zones. The PSFs will be used for the deconvolution of defocusing blur from images of samples obtained on the CCD matrix of the microscope.

DO2010_2449_15
Iterative synthetic Fresnel holograms with opacity effect for security purposes
K. Kakarenko, M. Sypek, M. Makowski, D. Wojnowski, A. Kolodziejczyk; Warsaw University of Technology, Faculty of Physics (PL).
The application of a parallax effect in security holograms has been recently proposed but in the case of thick, volume media, which are problematic in mass production. Here we present a method of utilizing the opacity effect in easy-to-replicate surface holograms which ensure an easy detection of fakes at a glance.

DO2010_2463_16
Effects of combinations of optical illumination and exposures on thermoluminescence crystals in LiF:Mg,Ti
M. Hassanpour, University of Technology, Atomic Institute of Austrian Universities (AT).
The effects of the combination of gamma ray and visible illumination (blue, green and red) on LiF:Mg,Ti are investigated. Light emitted diodes (LEDs) are used as the source of illumination. Our results demonstrate that blue and green lights have detectable effects on LiF:Mg,Ti crystals. Furthermore, red light shows some effects on crystals with low amount of Mg defect concentration.

DO2010_2456_17
Non-dissipative meta-medium for atom optics
M. Hamamda[1], F. Perales[2], J. Baudon[2], G. Dutier[2], M. Ducloy[2], V. Bocvarski[2]; [1]Laboratoire de Physique des Lasers - Université Paris 13 (FR), [2]Institute of Physics Belgrade (RS).
We present here the extension of so-called "left-handed" optical meta-materials to negative-index media (NIM) for matter waves. This recent field introduces novel possibilities in terms of spherical meta-lenses, micrometric focalisation and wave-packet narrowing.

DO2010_2453_18
Structuring of diffractive optical master elements in sapphire based on chlorine-free dry etching processes
M. Ferstl, S. Merz; Fraunhofer Institute for Telecommunications, Heinrich-Hertz-Institut (DE).
Chlorine-free, purely fluorine-based reactive ion etching processes were developed that allow sub-micrometer structuring of sapphire which is the material of choice for the fabrication of replication masters designated for the precise molding of glass.

DO2010_2500_19
Multi-level Flat-tops for pocket-projectors
M. Ferstl[1], S. Merz[1], E. Pawlowski[2], U. Petzold[2,3], S. Reichel[2], R. Steingrüber[1]; [1]Fraunhofer Institute for Telecommunications, Heinrich-Hertz-Institut (DE), [2]SCHOTT AG, Advanced Optics (DE), [3]Technical University of Darmstadt, Dept. of Physics (DE).
Various flat-tops, designated to generate a homogeneous rectangular light distribution from a Gaussian input beam, were fabricated in quartz glass in the form of diffractive phase elements. Three flat top elements based on different designs were manufactured by direct e-beam writing and anisotropic RIE, tested, and compared.

DO2010_2454_20
Generation of vortices with an uniaxial holographic element recorded in dichromated gelatine emulsions
A. Villamarín[1], M. V. Collados[1], I. J. Sola[2], L. Plaja[2], C. Méndez[3], J. San Román[2], C. Ruiz[2], J. Rodríguez[2], I. Arias[2], J. Atencia[1], M. Quint-anilla[1], L. Roso[3]; [1]Universidad de Zaragoza, Dep. Física Aplicada (ES), [2]Universidad de Salamanca, Dep. Física Aplicada (ES), [3]Centro de Láseres Pulsados Ultracortos y Ultraintensos (ES).
A vortex beam is generated with a uniaxial element composed of two holographic elements recorded in dichromated gelatine emulsions. The main purpose of the element is to be used to obtain high energy vortices from femtosecond laser pulses.

DO2010_2450_21
Temporal effects in ultrashort pulses due to diffraction by Cantor zone plates
M. Fernández-Alonso[1], G. Mínguez-Vega[1], O. Mendoza-Yero[1], J. Lancis[1], E. Tajahuerce[1], P. Andrés[2], V. Climent[1]; [1]Universitat Jaume I, GROC, Departament de Física, Castelló (ES), [2]Departament d'Òptica, Universitat de València (ES).
The temporal behavior of ultrashort pulses focused by Cantor zone plates is investigated from a theoretical point of view. The shape of the output temporal profile originated by diffraction-induced effects depends on several variables, such that: the fractal level, the opening ratio and the selected focal position. Some numerical simulations were done in order to show some modifications in such effects.

DO2010_2448_22
Spatially segmented Fourier hologram for head-up display
J. Suszek, M. Sypek, M. Makowski, A. Siemion, A. Kolodziejczyk, Warsaw University of Technology, Faculty of Physics (PL).
A spatially segmented Fourier hologram capable of angle-dependent reconstruction of images at the infinity is presented. It can be used in quasi-dynamic Head-Up Displays for automotive industry. We propose a randomized segmentation function which eliminates ghost images and LED illumination which eliminates speckles.

Tuesday, 16 February, 18:20 - 19:20 - Rooms Kinolainen and Mustarintanen, Sokos Hotel

DO2010_2447_23
Towards a high-quality lensless holographic projection
M. Makowski, I. Ducin, M. Sypek, A. Kołodziejczyk, Warsaw University of Technology, Faculty of Physics (PL).
We present an experimental evaluation of two alternative methods of a lensless holographic projection of flat color images, suitable for illumination with divergent and convergent laser and LED beams. We utilize three-plane iterated Fresnel holograms and off-axis Fourier IFTA-iterated holograms with speckle averaging technique.

DO2010_2446_24
Numerical method for partially-coherent pulse propagation in nonlinear media
H. Lajunen[1], V. Torres-Company[2], E. Silvestre[1], J. Lancis[3], P. Andres[1]; [1]Departamento de Óptica, Universidad de Valencia (ES), [2]Department of Electrical and Computer Engineering, McGill University (CA), [3]Departament de Fisica, Universitat Jaume I (ES).
We present a numerical method for modeling the propagation of very general partially coherent pulses in nonlinear media. The key idea involves the simulation of the coherence functions by ensembles of random pulses that are individually propagated using any standard coherent technique.

DO2010_2443_25
Enhanced optical activity and transmission in chiral grating
A. Lehmuskero, B. Bai, L. Laukkanen, J. Turunen; University of Joensuu, Department of Physics and Mathematics (FI).
We present a grating that has both enhanced transmission and optical activity at the same time. The behavior of the grating has been examined both theoretically and experimentally. As linearly polarized light is transmitted though the grating, the polarization rotation is 4 in measurements and 8 in theory. The transmission is 53 % at the same wavelength.

DO2010_2442_26
Photochromic polymers for making volume phase holographic gratings
G. Pariani[1,3], A. Bianco[2,3], C. Bertarelli[3], F. M. Zerbi[1], [1]INAF - Osservatorio Astronomico di Brera (IT), [2]INAF – IASF (IT), [3]Politecnico di Milano, Dipartimento di Chimica, Materiali ed Ingegneria Chimica (IT).
Diarylethene-based photochromic polymers have been developed in order to manufacture rewritable Volume Phase Holographic Gratings (VPHGs), obtained by means of a holographic set-up. A theoretical model to predict the experimental conditions for the optical writing and the efficiency of the grating was developed.

DO2010_2440_27
Zone plates generated with the Fibonacci sequence
J.A. Monsoriu[1], A. Calatayud[1], L. Remón[1], W.D. Furlan[2], G. Saavedra[2], P. Andrés[2]; [1]Centro de Tecnologías Físicas, Univ. Politec. Valencia (ES), [2]Departamento de Óptica, Univers. de Valencia (ES).
Fibonacci Zone Plates (FIZPs), i.e. zone plates generated with the Fibonacci sequence, are described. It is shown that FIZP present a periodic axial irradiance with two foci replicated along the optical axis. The location of these foci can be correlated to the Fibonacci sequence involved in the diffracting aperture.

DO2010_2438_28
Rigorous FEM calculations of broadband antireflection sub-wavelength structures on silicon
G. Ehret, E. Buhr; Physikalisch-Technische Bundesanstalt (DE).
The optical reflectance of solid state surfaces can be reduced by deterministic ("moth-eye") and by stochastic structuring of the surface. We calculated the reflectance of different structures on silicon with rigorous finite-element modelling (FEM). Structured surfaces are used, e.g. in solar cells, to improve efficiency.

DO2010_2437_29
System of vision on the basis of laser active-pulse gating
V.A. Gorobets, V.V. Kabanov, B.F. Kuntsevich, V.O. Petukhov; B.I. Stepanov Institute of Physics of NASB (BY).
The results of researches of some important features of the developed vision system on the basis of laser active–pulse gating (LAPG) are submitted and new opportunities of their application are discussed.

DO2010_2436_30
Dielectric surface relief polarization gratings with 100% diffraction efficiency for visible wavelength
I. Vartiainen, J. Tervo, M. Kuittinen; University of Joensuu, Dep. of Physics and Mathematics (FI).
Polarization gratings are specific type of diffraction gratings that take advantage of the electromagnetic nature of light in contrast to scalar case. In this paper we demonstrate the design, fabrication and characterization of such surface relief gratings for visible wavelength. We show that the diffraction efficiency experimentally reaches almost 100%.

DO2010_2433_31
High performance of Polyadic Devil's lenses under polychromatic illumination
W.D. Furlan[1], O. Mendoza-Yero[2], A. Calatayud[3], L. Remón[3], J. A. Monsoriu[3]; [1]Dep. de Óptica, Universidad de Valencia (ES), [2]Dep. de Física, GROC-UJI, Universitat Jaume I (ES), [3]Centro de Tecnologías Físicas, Univ. Politécnica de Valencia (ES).
We propose a generalization of the concept of devil´s lenses by the inclusion of polyadic Cantor distributions in their design. The result is thus a Polyadic devil´s lens (PDLs). The lacunarity of the selected polyadic fractal distribution is proposed as an additional design parameter. The axial irradiance originated by PDLs based on regular polyadic fractals are numerically evaluated and compared with the response of equivalent kinoform lenses. The effect of lacunarity on the axial irradiance of a PDL is investigated. We show how to use this parameter to improve the response of conventional DLs under polychromatic illumination.

DO2010_2432_32
Diffractive optics-based filters with spectrum scalability
O. Mendoza-Yero[1], G. Mínguez-Vega[1], M. Fernández-Alonso[1], J. Lan-cis[1], E. Tajahuerce[1], V. Climent[1], J. A. Monsoriu[2]; [1]University Jaume I, Dep. of Physics (ES), [2]Dept. de Física Aplicada, Universidad Politécnica de Valencia (ES).
We design optical filters with fractal transmission spectra. These filters are based on the duality between the axial irradiance distribution originated by any circularly symmetric hard aperture under monochromatic illumination and its spectral irradiance at a fixed on-axis point under broadband illumination.

DO2010_2428_33
PSF analysis of nanometric Fresnel zone plates
O. Mendoza-Yero[1], G. Mínguez-Vega[1], R. Navarro[2], J. Lancis[1], V. Climent[1]; [1]Universitat Jaume I, Department of Physics (ES), [2]ICMA, CSIC-University of Zaragoza, Faculty of Sciences (ES).
We propose a novel analytical method for the calculus of the on-axis, out-of-focus point spread function (PSF) of a Fresnel zone plate (FZP). Numerical computations carried out for X-ray applications of FZP with nanometric outermost zone width demonstrate isoplanatism over an axial range of several microns.

DO2010_2429_34
Second harmonic generation with ultrashort pulses using a kinoform diffractive lens
G. Mínguez-Vega[1], J.R. Vázquez de Aldana[2], O. Mendoza-Yero[1], C. Méndez[3], C. Romero[2], P. Andrés[4], J. Lancis[1], V. Climent[1], L. Roso[3]; [1]Dep. de Física, Universitat Jaume I (ES), [2]Dept. de Física Aplicada, Universidad de Salamanca (ES), [3]Centro de Láseres Pulsados Ultracortos Ultraintensos (ES), [4]Dep. d'Òptica, Universitat de València (ES).
We use a kinoform diffractive lens (DL) to focus a 120 fs pulse from a Ti:Sapphire laser over a b-BaB2O4 (BBO) crystal in a second harmonic (SH) generation experiment. We observe that the on-axis displacement of the nonlinear crystal in the vicinity of the focal position allows us to tune the central wavelength of SH signal.

Poster session II

Tuesday, 16 February, 18:20 - 19:20 - Rooms Kinolainen and Mustarintanen, Sokos Hotel

DO2010_2423_35
Fabrication of a 2D thermally tunable grating light valve for fabricating CO2 laser beam analyzer
M. Riahi, H. Latifi, Laser and plasma research institute, Shahid Beheshti University (IR).
The grooves of a 2D grating is filled with a temperature dependent refractive index liquid. Irradiating a CO2 laser on the grating produce a thermal distribution the same as it's beam profile and cause the same distribution for 1st order diffraction efficiency. This distribution is imaged by visible light on a CCD camera in a 4f imaging system.

DO2010_2415_36
Semi-derivative real filter for quality measurement of microlenses array – experimental realization
R. Kasztelani, University of Warsaw, Department of Physics (PL).
Results presentation of an experimental realization of a new kind of optical setup for a simple and fast control of the quality of microlens array. The method is based on a 4f correlator setup with a semiderivative real filter placed in the Fourier plane.

DO2010_2414_37
Characterisation of apodized diffractive optical elements by means of Fresnel images measurement method
T. Osuch[1], Z. Jaroszewicz[1,2], A. Kowalik[3]; [1]National Institute of Telecommunications (PL), [2]Institute of Applied Optics (PL), [3]Institute of Electronics Materials Technology (PL).
In this paper the method for estimating the quality of apodization profile in the phase mask with variable diffraction efficiency is shown. The technique relies on Fresnel images contrast measurement, which allows determining the phase step heights of the apodized mask. The limitation of this approach is indicated and the method of its overcoming is proposed.

DO2010_2413_38
Phantom validation for depth assessment in laser Doppler flowmetry technique
E. Figueiras[1], L. F. Requicha Ferreira[1], A. Humeau[2]; [1]Faculty of Sciences and Technology of Coimbra University, Physics Department, Instrumentation Center (GEI-CI) (PT), [2] Université d'Angers, Laboratoire d'Ingénierie des Systèmes Automatisés (LISA) (FR).
Laser Doppler flowmeters (LDFs) are widely-used tools to monitor microvascular blood flow. However, they cannot give any skin depth discrimination information. A new LDF enabling depth assessment is therefore under construction. To evaluate its performances, a phantom mimicking skin tissues is herein described and validated.

DO2010_2403_39
Use of optical measurements in composite manufacturing process
R. Brault[1,2], T. Djilali[1,2], S. Mistou[2], M. Niquet[1]; [1]CRC Composites (FR), [2]ENIT-LGP (FR).
The optical shape measurements allow us to make a correlation between different steps of composite part manufacturing. The gap analysis between master, mould, part and CAD is a good feedback in relation with the process development. The second part deals with the error estimation in stereo-correlation measurements.

DO2010_2505_40
Optical transmission through subwavelength hole-particle arrays
A. Mustonen, H. Lipsanen; Department of Micro and Nanosciences, Helsinki University of Technology (FI).
We present measurements of transmission through subwavelength hole-particle coupled arrays. The arrays combine semishell particles and circular holes simultane-ously. These complex arrays exhibit extraordinary optical transmission in visible and near-infrared regions.

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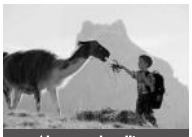

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