



6th International Conference on Optics,
Photonics and Lasers

Conference Programme

17-19 May 2023

Funchal (Madeira Island), Portugal



Advanced Laser Technologies

/ Tunable Wavelength
from 192 nm to 18 000 nm

/ High Intensity

/ Ultrafast Industrial

/ Spectroscopy

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Message from Chairman

On behalf of Organizing Committee, I would like to welcome you to the 5th International Conference on Optics, Photonics and Lasers (OPAL' 2023), which will take place on 17-19 May 2023 in Funchal (Madeira Island), Portugal. The Series of annual OPAL conferences is a forum for presentation, discussion, exchange of information and latest research and development results in both theoretical and experimental research in optics, photonics and lasers, and their related fields. It brings together researchers, developers, and practitioners from diverse fields including international scientists and engineers from academia, research institutes and companies to present and discuss the latest results in the mentioned field. The first OPAL' 2018 conference was held in Barcelona, Spain, the second OPAL' 2019 – in Amsterdam, The Netherlands, the third OPAL' 2020 conference – online, the fourth OPAL' 2021 – in Corfu, Greece, and the fifth OPAL' 2022 – in Adeje, Tenerife (Canary Islands), Spain.

The conference is organized by the *International Frequency Sensor Association (IFSA)* – one of the major professional, non-profit association serving for industry and academy since 1999, with media partners: *Institute of Physics (IOP)*, (UK), *PhysicsWorld* (UK), *MDPI Sensos*, and *MDPI Photonics* open access journals (Switzerland), in technical cooperation with *IFSA Publishing S. L.* (Spain).

The previous OPAL conferences have attracted researchers and practitioners in the related fields, from around the world. The events are focusing any significant breakthrough and innovation in Optics, Photonics and Lasers, and its applications with broadest concept.

We trust that you will find OPAL' 2023 conference professionally rewarding and stimulating as well as enjoyable. Welcome to OPAL' 2023 !

Prof., Dr. Sergey Y. Yurish
OPAL' 2023 Conference Chairman

Conference Venue

The Conference will take place on 17-19 May 2023 in the Pestana Casino Park Hotel, conference room *Caracas*.

Insurance and Liability

The conference organizers do not accept responsibility for any individual, medical, travel or personal insurance policies as necessary.

Registration

The Registration Desk is open in the Pestana Casino Park Hotel:

- Tuesday, 16 May, 20:00-21:30 (in the Welcome Cocktail area)
- Wednesday, 17 May, 8:45-18:00 (near the conference room *Caracas*)
- Thursday, 18 May, 8:45-18:00 (near the conference room *Caracas*)
- Friday, 19 May, from 8:45-12:00 (near the conference room *Caracas*)

Language

The official language of the Conference is English. There will be no simultaneous interpretation.

Conference Identification Tag

The Organizing Committee request that you wear your identification tag (badge) at all times during the conference. Your conference identification tag will serve as your admission to all conference paper presentation sessions and social events.

Coffee/Tea Refreshment

Coffee/tea will be served near the Conference Room *Caracas* at the times indicated in the programme.

Special Issues of journals

Selected and extended papers from the conference will be published in the special issue on 'Optic, Photonics & Lasers' of open access *Sensors & Transducers* journal (ISSN: 2306-8515, e-ISSN 1726-5479) in both: print and electronic formats, or in the special issue on '*Optical Sensors and Measuring Systems: Design and Applications*' of MDPI *Sensors* open access journal (ISSN: 1424-8220), or in the special issue on '*Photonics: Theory, Technologies and Applications*' of MDPI *Photonics* open access journal (ISSN 2304-6732). Both MDPI open access journals are in electronic format. All authors of selected papers will be invited to submit their extended papers into the appropriate journals.

'Advances in Optics' Book Series

The limited number of papers will be selected by the journal's Editorial Board to extend into book chapters for the 'Advances in Optics', Book Series, Vol. 6. This open access book volume will be published at the end of 2023 beginning of 2024. The first five volumes published in 2018-2021 have been accepted by all Optical Community with a great enthusiasm.

Organizing Committee

Chairman

Prof., Dr. Sergey Y. Yurish (*IFSA, Spain*)

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Dr. Qiang Wu (*Northumbria University, Newcastle Upon Tyne, UK*)

Prof. Claude Phipps (*Photonic Associates, USA*)

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Prof. George Semouchkin (*Michigan Technological University, USA*)

Prof. Sandeep Singh Sengar (*Cardiff Metropolitan University, UK*)

Dr. Aleksej Rodin (*State Research Institute Center for Physical Sciences and Technology, Lithuania*)

Dr. Vladyslav Usenko (*Palacky University Olomouc, Czech Republic*)

Conference and Publication Manager

Mrs. Tetyana Zakharchenko (*IFSA Publishing, S.L., Spain*)

Welcome Cocktail

16 May 2023, Tuesday (20:00-21:30), Pestana Casino Park Hotel, in the Sunset outside bar. Do not miss this opportunity to say the first "hello" to attendees and committee members.

Gala Dinner

18 May 2023, Thursday (20:00-23:30). The Gala Dinner will take place in the Pestana Casino Park Hotel, *Sunset* restaurant.

Best Paper Award

MDPI Photonics Open Access journal has announced the Best Paper Award (400.00 EUR), which will be given to the authors of the best paper devoted to photonics and presented at the OPAL' 2023 conference.

Conference's web site:

<http://www.opal-conference.com>

Sponsors and Media Partners:



Keynote Speakers



Prof., Dr. Mário F. S. Ferreira
*13N – Institute of Nanostructures,
Nanomodelling and Nanofabrication,
Department of Physics, University of Aveiro,
Portugal*

Highly Nonlinear Optical Fibers for Supercontinuum Generation

Abstract: Nonlinear effects in optical fibers impose different limitations on the communications link, and an understanding of such effects is almost a prerequisite for actual lightwave-system designers. On the other hand, they offer a variety of possibilities for all-optical signal processing. Using conventional optical fibers, a length of several kilometres is usually required for these applications, due to their relatively small nonlinear parameter. The required fiber length is reduced to about 1km using highly nonlinear silica fibers with a smaller effective mode area, and hence, a larger nonlinear parameter. A further reduction in fiber length by one order of magnitude has been achieved in recent years using photonic crystal fibers with an extremely small effective mode area and significantly enhanced nonlinear characteristics.

Another main advance was the production of highly nonlinear fibers using materials with a nonlinear refractive index higher than that of the silica glass, namely lead silicate, tellurite, bismuth glasses and chalcogenide glasses. Using such highly nonlinear optical fibers, the required fiber length for all-optical signal processing can be dramatically reduced to the order of centimetres. This talk provides an overview of such kind of optical fibers, as well as of some novel dispersive and nonlinear effects exhibited by them.

A special attention will be paid to supercontinuum generation, which is one of the most impressive nonlinear phenomena that can be observed in highly nonlinear fibers. It results generally from the synergy between several fundamental nonlinear processes. Soliton related effects play also a significant role whenever light with sufficient power propagates in the anomalous dispersion regime.

Short Biography: Mário F. S. Ferreira graduated in Physics from the University of Porto, Portugal, and received the Ph.D. degree in Physics in 1992 from the University of Aveiro, Portugal, where he is now a Professor at the Physics Department. Between 1990 and 1991 he was at the University of Essex, UK, performing experimental work on external cavity semiconductor lasers and nonlinear optical fiber amplifiers. His research interests have been concerned with the modelling and characterization of multi-section semiconductor lasers for coherent systems, quantum well lasers, optical fiber amplifiers and lasers, soliton propagation, polarization and nonlinear effects in optical fibers.

He has written about 400 scientific journal and conference publications, and several books, namely: “Optics and Photonics” (Lidel, 2003, in Portuguese), “Topics of Mathematical Physics” (Editora Ciência Moderna, 2018, Brazil, in Portuguese), “Optical Fibers: Technology, Communications and recent Advances” (Ed., NOVA Science Publishers, 2017), “Advances in Optoelectronic Technology and Industry Development” (CRC Press, 2019), “Nonlinear Effects in Optical Fibers” (John Wiley & Sons, OSA, 2011), “Optical Signal Processing in Highly Nonlinear Fibers” (CRC Press, 2020), “Optical Fiber Technology and Applications – Recent Advances” (IOP Publishing, 2021), “Solitons in Optical Fiber Systems” (John Wiley & Sons, 2022), and “Dissipative Optical Solitons” (Springer, 2022).

Prof. Ferreira was the Guest Editor of five Special Issues of “Fiber and Integrated Optics” (Taylor & Francis): “Fiber Optics in Portugal” (2005), “Nonlinear Fiber Optics” (2015), “Optical Fiber Sources and Amplifiers” (2020) and “Quantum Communications” (2020), a joint Special Issue of “Optics Express” and “Applied Optics” (OSA) on “Optical Sensors and Sensing 2019”, and two Special Issues of “Fibers” (MDPI) on “Optical Fiber Communications” and “Specialty Optical Fibers – Material, Fabrication and Applications” (2022), and and a Special Issue of “Fibers” (MDPI) on “Optical Fiber Communications” (2020). He is Member of IEEE, a Senior Member and a Travelling Lecturer of both OPTICA (Optical Society of America) and SPIE - The International Society for Optics and Photonics, He served in various committees of OSA and of SPIE, as well as in the organizing and scientific committees of various international conferences. Actually, he serves also as an Associate Editor or as an Advisor Board Member of several international journals in the area of optics and photonics.



Dr. Vladyslav C. Usenko
*Department of Optics, Palacky University,
Czech Republic*

Nonclassicality in Quantum Communication

Abstract: Nonclassicality, being an essentially quantum behavior of physical systems, can be used in various modern quantum technologies. We will address the nonclassicality of photonic systems and review its role in quantum communication, covering both discrete-variable schemes, relying on strong nonclassicality of single-photon or non-Gaussian states of light, and continuous variables, where quadrature squeezing or entanglement can bring advantages compared to the use of semiclassical coherent states. In particular, we will show how non-Gaussianity of quantum states can be used as an indicator for security of quantum key distribution. We will further benchmark the performance of entanglement-based discrete-variable quantum communication by the ultimate bounds set by continuous-variable protocols, and discuss the possibility for the practical sources to overcome those bounds. Finally, we will discuss advantages of quadrature squeezing in continuous-variable protocols, showing the possibility to fully block the information leakage from lossy quantum channels, or demonstrating advantage of squeezed states in conditions of channel transmittance fluctuations, but will also reveal practical limitations imposed on secure quantum communication by the presence of intrinsic anti-squeezing noise.

Short Biography: Vladyslav C. Usenko obtained his Ph.D. at the Institute of Physics of the National Academy of Sciences in Kyiv, Ukraine, with a thesis on secure quantum communication using strongly correlated two-mode coherent states of light. He then worked as a post-doc at the University of Milan, Italy, supported by Landau Network – Centro Volta fellowship, studying photon-number encoding in entanglement-based quantum communication. In 2009 he joined Palacky University in Olomouc, Czech Republic, where he is now a senior researcher, working on the theory of quantum communication, particularly focusing on development of new protocols, analysis of the effects of noise and practical device imperfections as well as on the role of nonclassicality in the efficiency and robustness of the protocols, and proposing new techniques, such as multiplexing, for improving those. He is a principal or a co-investigator in numerous domestic and international research projects and maintains fruitful collaboration with several experimental groups.



Dr. Youxin Mao

*Advanced Elect. and Photonics Research
Centre, National Research Council,
Ottawa, ON, Canada*

Quantum-Dot/Dash Semiconductor Multi-Wavelength Lasers for State-of-the-Art Optical and Wireless Networks

Abstract: The presentation is devoted to the high performance semiconductor quantum dot (Qdot) or dash (Qdash) passively mode-locked based multi-wavelength lasers (ML-MWL) fabricated in NRC Canada. The characterizations from C-band InAs/InP Fabry-Pérot Qdot and Qdash ML-MWLs are demonstrated with different repetition rates (10 to 90 GHz) and laser structures (buried hetero- and surface ridge). The results of phase noise and timing jitter from these lasers are discussed and compared in details by theoretical analysis and experimental measurements. The performances of the lasers are also evaluated in an over ten-Terabit/s aggregate data transmission system and a Millimeter-Wave-over-Fiber fronthaul wireless link at 5G New Radio with high order QAM data formats.

Short Biography: Youxin Mao completed her PhD and postdoctoral studies from Lancaster University, UK, in 1995 and 1997. Before her PhD, she was a Lecturer in Electronics Engineer Department, Tianjin University, China. From 1997 to 1999, she was a NSERC visiting fellowship with National Research Council in Canada. As a Research Scientist, she worked in JDS Uniphase from 1999 to 2003 and University of Toronto from 2003 to 2006. Since 2006, she has been a senior Research Officer with National Research Council Canada. She is the author of over 180 peer reviewed articles. Her research interests include ultra-low timing jitter quantum-dot mode-locked semiconductor lasers, coherent optical and wireless networks, high speed and high power wavelength swept source, semiconductor laser package, fiber optics, ultra-small optical fiber probes, and optical coherence tomography.



Dr. Kanwarpal Singh

*Max Planck institute for the Science of Light,
Germany*

Extended Depth Chromatic Confocal Tomography

Abstract: To study the internal luminal organs such as the GI tract, a flexible endoscope with a few millimeters diameter is required. Several flexible endoscopic confocal imaging systems have been demonstrated. Unfortunately, such images are restricted to a single plane. A mechanism for depth scanning (z-scan) is required to achieve three-dimensional images of the tissue. Recently, endoscopic z-scanning was achieved using variable focus lenses. Incorporating a mechanism for z-scanning into an endoscope increases the size and complexity of the endoscope. Using the chromatic dispersion property of light, one may achieve a multifocal confocal microscopy system. Chromatic confocal microscopy has been achieved using chromatic dispersion of refractive and diffractive optical elements. A maximum imaging range of 250 μm has been achieved using chromatic aberration of multiple achromatic and diffractive lenses. The GI tract tissue is very irregular however and thus requires an imaging range of much more than 250 μm . In this project, we have developed an ultralong imaging range (2 cm) chromatic confocal microscopy system with cellular-level spatial resolution. We used the exceptional chromatic dispersion properties of Zinc Selenide material to achieve the extension in the imaging range.

Short Biography: Kanwarpal Singh received his Ph.D. degree from INRS, Canada, in 2013. He was a Postdoctoral Fellow at Harvard Medical School, USA, until 2018, where he worked on the development of high-resolution optical coherence tomography systems. He is a Group Leader leading an independent research group (Microendoscopy), at the Max Planck Institute for the Science of Light, Germany. His research interest includes the development of miniaturized flexible endoscopic devices for imaging inside the body.

Programme at Glance

Time/Date (GMT+1)	17.05.2023 Wednesday	18.05.2023 Thursday	19.05.2022 Friday
	<i>Conference Room Caracas</i>		
8:45-9:00	Registration	Registration	Registration
9:00-9:15	* Opening Session	* Daily announcements	* Daily announcements
9:15-10:00	Keynote Speaker I Mário F. S. Ferreira, <i>University of Aveiro (Portugal)</i>	Keynote Speaker II Youxin Mao <i>National Research Council (Canada)</i>	Keynote Speaker IV <i>Kanwarpal Singh Max Planck institute for the Science of Light (Germany)</i>
10:00-10:30	<i>Coffee Break</i>	<i>Coffee Break</i>	<i>Coffee Break</i>
10:30-11:15	Plenary, Special Session: <i>High Intensity Lasers: From Design to Emerging Applications</i>	Keynote Speaker III Vladyslav C. Usenko <i>Palacky University, (Czech Republic)</i>	Virtual Session in Zoom (Live streams): <i>Lasers, Optoelectronic Devices and Optical Sensors</i>
11:15-13:30		Plenary, Special Session: <i>Quantum Optics and Quantum Information</i>	
13:30-14:30	<i>Lunch on your own</i>		<i>Lunch on your own</i>
14:30-16:30	Regular Session: <i>Lasers and Their Applications</i>	Regular Session: <i>Optical Devices, Sensors & Measurements</i>	<i>Poster Session & Farewell Cocktail (Conference Room Rio de Janeiro)</i>
16:30-17:00	<i>Coffee Break</i>	<i>Coffee Break</i>	* Closing Session Conference Room Caracas
17:00-19:00	Regular Session: <i>Photonics, Nanophotonics and Optical Materials</i>	<i>From 17:00 to 17:30 Invited Speaker Etienne Brauns (Belgium)</i>	-
19:00-20:00	-	-	
20:00-23:00	-	<i>Gala Dinner</i>	

* The must attend sessions.

Technical Conference Programme

Day 1

17 May 2022, Wednesday

Special, Plenary Session: High Intensity Lasers: From Design to Applications (Conference Room *Caracas*):

Chairman: Dr. Aleksej Rodin

*State Research Institute Center for Physical Sciences and Technology,
(Lithuania)*

- 1. High-energy few-optical-cycle Multispectral NIR-SWIR-MIR laser based on OPCPA and stimulated Raman scattering (Invited)**
Augustinas Petrulėnas, Paulius Mackonis, Augustė Černeckytė and Aleksej Rodin (*Lithuania*)
- 2. Advanced laser systems at ELI Beamlines (Invited)**
Roman Antipenkov, Jakub Novak, Tyler Green, Josef Cupal, Pavel Trojek, Birgit Plötzeneder, Pavel Bakule, Daniel Kramer, Daniele Margaroni, Jakob Andreasson and Bedrich Rus (*Czech Republic*)
- 3. Compression of femtosecond laser pulses using self-phase modulation: from Kilowatts to Petawatts over 40 years (Invited)**
Efim Khazanov (*Russia*)
- 4. Diverging beam amplifier geometry for scaling-up the average and peak power of Yb:YAG rod lasers (Invited)**
Ivan Kuznetsov, Sergey Chizhov and Oleg Palashov (*Russia*)
- 5. Ultrafast thulium-doped fiber laser with nonlinear optical loop mirror (Invited)**
Maria Michalska, Pawel Grzes and Jacek Swiderski (*Poland*)
- 6. Dissimilar laser beam welding of Titanium to stainless steel using pure Niobium as filler material in lap joint configuration (Invited)**
M. Wiegand, A. Kimm, N. Sommer, L. Marks and S. Böhm (*Germany*)

7. All-silica optics with extreme resistivity to laser radiation

Tomas Tolenis, Lukas Ramalis, Gusté Dolmantaitė and Rytis Buzelis
(*Lithuania*)

Regular Session: Lasers and Their Applications (Conference Room *Caracas*):

Chairman: Dr. Roman Antipenkov

The Extreme Light Infrastructure ERIC, ELI Beamlines facility
(*Czech Republic*)

- 1. Detecting and deflercting the death asteroid**
Claude Phipps (*USA*)
- 2. Semiconductor laser driver based on step recovery diode for gain switching operation**
Pawel Grzes, Maria Michalska and Jacek Swiderski (*Poland*)
- 3. Current dependent emission properties of random laser diodes**
Antonio Consoli, Pedro David Garcia and Cefe López (*Spain*)
- 4. Photobiomodulation in dentistry (Invited)**
Arasappan Rajakumaran and Lakshmi Balaji (*India*)
- 5. Spectroscopic characterization of laser-induced fluorescence for environmental thermometry**
Hasib Mustafa, Harm Bartholomeus and Lammert Kooistra,
(*The Netherlands*)
- 6. Sensitive photothermal gas detection using a mode-locked laser and self-heterodyne harmonic amplification**
Karol Krzempek and Piotr Jaworski (*Poland*)
- 7. Infrared Spectroscopy of Leukocytes for Rapid Diagnosis of the Etiology of Patients' Infections as Bacterial or Viral (Invited)**
Shaul Mordechai, Guy Beck, U. Sharaha, Y. D. Eshel, G. Cohen-Logasi, J. Kapelushnick, A.H. Agbaria, L. Lapidot, H. Huliehel and A. Salman (*Israel*)

Regular Session:
Photonics, Nanophotonics & Optical Materials
(Conference Room *Caracas*)

Chairman: Dr. Claude Phipps
Photonic Associates (USA)

1. Adjustable refractive index materials for precision optical filters fabrication

Vicente Torres-Costa, Elena Perez-Picazo, Inmaculada Sardaña-Ortega and Raúl J. Martín-Palma (*Spain*)

2. Integration of the three dimensional GaP nanocone onto single mode optical fibre.

Jozef Novák, Alica Rosová, Dušan Pudiš, Stanislav Hasenohrl, Peter Eliáš and Ivana Lettrichová (*Slovakia*)

3. Topological phase transition in c6 photonic crystals

Daniel Silva, Claudionor Bezerra and Carlos Humberto Costa (*Brazil*)

4. Structural mapping of mechanically flexible photoluminescent and photodynamic molecular crystals

Subhrajyoti Bhandary, Anna M. Kaczmarek and Kristof Van Hecke (*Belgium*)

5. Building homogenous and heterogenous shells around LiLuF₄:Ln₃₊ Nanothermometers – Problems, benefits, and lessons learned

Mirijam Lederer, Hannes Rijckaert and Anna Kaczmarek (*Belgium*)

6. Silica based optical fibers with record attenuation in the mid-infrared

W. Belardi, A. Pastre, L. Bigot, G. Bouwmans, P. Jaworski and K. Krzempek (*France*)

7. A multiwavelength vacuum environment laser calorimetry system

Can Gözönünde, Semih Yurtseven, Damla Şendoğdu, Humbat Nasibov and Ramiz Hamid (*Turkey*)

Day 2
18 May 2023, Thursday

**Special, Plenary Session:
Quantum Optics & Quantum Information**

(Conference Room Caracas):

Chairman: Dr. Vladyslav C. Usenko

Department of Optics, Palacky University (Czech Republic)

- 1. Digital continuous-variable quantum key distribution (Invited)**
Tobias Gehring (*Denmark*)
- 2. Entanglement-based quantum key distribution using photons from quantum dots (Invited)**
Francesco Basso Basset (*Italy*)
- 3. High-gain and low-noise-figure quantum-dash semiconductor optical amplifier over wide temperature range (Invited)**
Youxin Mao, Chun-Ying Song, Zhenguo Lu, Philip J. Poole, Jiaren Liu, Guocheng Liu, Pedro Barrios, Daniel Poitras, John Weber, Ping Zhao, Martin Vachon, Xiaoran Xie and Ahmad Atieh (*Canada*)
- 4. Time-to-space ghost imaging with classical and quantum correlated light beams (Invited)**
Dmitri Horoshko and Mikhail Kolobov (*France*)
- 5. From quantum reading to pattern recognition with entangled beams (Invited)**
Ivano Ruo-Berchera (*Italy*)
- 6. Continuous variable networks (Invited)**
Valentina Parigi (*France*)

Regular Session:
Optical Devices, Sensors & Measurements
(Conference Room *Caracas*):

Chairman: Dr. Youxin Mao
National Research Council (Canada)

- 1. Smart composite material microphone using a grating fiber optic sensor**
Madalin Rusu, Dan Savastru, Roxana Savastru, Marina Tautan, Ion Lancranjan and Valeriu Savu (*Romania*)
- 2. Grating optic fiber sensors detection of smart polymer composite delamination**
Roxana Savastru, Dan Savastru, Madalin Rusu, Marina Tautan, Ion Lancranjan and Valeriu Savu (*Romania*)
- 3. Type-II GaInAsSb based UTC-PDs with AlGaInAs/InP Bragg reflectors for improved 1.55 μm responsivity**
Rimjhim Chaudhary, Akshay Mahadev Arabhavi, Olivier Ostinelli, Martin Leich and Colombo R. Bolognesi (*Switzerland*)
- 4. Optical sensing of cerebral hemodynamics from within the skull**
Michal Balberg, Netaniel Rein, Yael Avni, Revital Shechter and Mordekhay Medvedovsky (*Israel*)
- 5. Optimization of multiplexed wide-angle solar concentrators with high diffraction efficiency**
Tomás Lloret, Marta Morales-Vidal, Belén Nieto-Rodríguez, José Carlos García-Vázquez, Manuel G. Ramírez, Sergi Gallego and Inmaculada Pascual (*Spain, USA*)
- 6. Fabrication of bioinspired surface structures using the oblique-angle deposition technique for applications in the field of optics**
Raúl J. Martín-Palma, Akhlesh Lakhtakia and Vicente Torres-Costa (*Spain, USA*)
- 7. Simultaneous multipoint guided elastic wave measurements using FBG based multi-channel dynamic interrogation system**
Aananth K., Kishore Kumar S and Balaji Srinivasan (*India*)

Day 3
19 May 2023, Friday


Virtual Session:
Lasers, Optoelectronic Devices and Optical Sensors
(Live streams in Zoom):

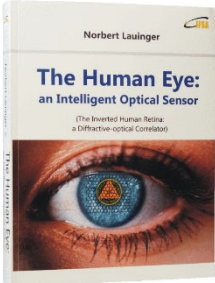
Chairman: Prof., Dr. Sergey Y. Yurish
International Frequency Sensor Association (IFSA), Barcelona, Spain

- 1. The effect of skull thickness on acousto-optic sensing**
Mor Wainberg, Revital Shechter and Michal Balberg, *(Israel)*
- 2. Brain tumor segmentation by generalized optical scanning holography (gosh) based active contour (AC)**
Anass Cherkaoui, Abdennacer El-Ouarzadi, Abdelaziz Essadike, Younes Achaoui and Abdenbi Bouzid *(Germany, Morocco)*
- 3. On the possibility of efficient energy transfer of electromagnetic radiation to very thin wires**
N. Kokodii, V. Maslov, D. Gurina, V. Timaniuk, S. Pogorelov, I. Garyachevskaya, M. Dubinin, I. Priz *(Ukraine)*
- 4. Optical characteristics of very diluted aqueous solutions of sucrose**
Dilbar Bozorova, Shukur Gofurov, Abdumutallib Kokhkharov and Oksana Ismailova *(Uzbekistan, Japan)*
- 5. Hydrogen bonding in diluted solutions of tetrahydrofuran+water and tetrahydrofuran+ethanol: an experimental FTIR and molecular dynamics study**
Dilbar Bozorova, Shukur Gofurov and Oksana Ismailova *(Uzbekistan, Japan)*
- 6. Synthesis, optical properties and effect of heat treatment on ZnSe quantum dots in borosilicate glass**
Nilanjana Shasmal *(Brazil)*

7. **Speckle-learned orbital angular momentum de-multiplexing**
Trishita Das, Manas Ranjan Pandit, Purnesh Singh Badavath
and Vijay Kumar (India)

Norbert Lauinger

 **The Human Eye:**
an Intelligent Optical Sensor
(The Inverted Human Retina: a Diffractive-optical Correlator)

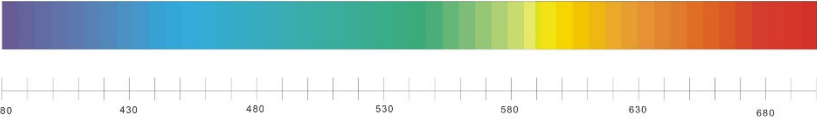


Hardcover: ISBN 978-84-617-2934-0
e-Book: ISBN 978-84-617-2955-5

The Human Eye: an intelligent optical sensor (The inverted retina: a diffractive - optical correlator) shows that the human eye from the prenatal structuring of the inverted retina hardware on up to the design of the central cortical visual pathway is not only different from but also radically more intelligent than a camera.

Many paradoxes in color vision (RGB peak positioning in the visible spectrum, overlapping of the RGB channels, relating local color to the whole scene, paradoxically colored shadows, Purkinje phenomenon etc.) are becoming intelligent solutions.

A fascinating book for all those wondering that the brightness of a scene is not cut in half and that the visible world doesn't collapse into a flat 2D-image when closing one eye. It should be a great of interest for students, scientists and engineers in eye-, vision- and brain-research, neuroscience, psychophysics, ophthalmology, psychology, optical sensor and diffractive optical engineering. Practical applications are the search for a retinal implant of the next generation and a helpful strategy against myopia in early childhood.



Order: http://www.sensorsportal.com/HTML/BOOKSTORE/Human_Eye.htm

Poster Session

(Conference Room *Rio de Janeiro*):
19 May 2022 (14:30-16:30)

- 1. Terahertz four-wave mixing in fluorides**
Dusan Lorenc, Eva Noskovicova and Monika Jerigova
(*Slovakia*)
- 2. 3DTIPs based on IP-dip polymer for scanning probe microscopy**
Dusan Pudis, Peter Gaso, Sergii Bulatov and Daniel Jandura
(*Slovakia*)
- 3. UV Stability of femtosecond laser textured stainless steel surfaces**
Aleksej Rodin, Oleksiy Myronyuk and Denys Baklan
(*Lithuania, Ukraine*)
- 4. Laser with SBS-compression and phase-conjugation in perfluorooctane for interference patterning**
Augustė Černeckytė, Paulius Mackonis, Aleksej Rodin and Oleksiy Myronyuk (*Lithuania*)
- 5. EKSPLA tunable 1 kHz OPO systems and their application examples for the multimodal photoacoustic microscopy**
Giedrius Kudaba (*Lithuania*)
- 6. Structure and luminescent properties of niobium modified ZnO-B₂O₃:Eu³⁺ glass**
Margarita Milanova, Aneliya Yordanova, Lyubomir Aleksandrov, Reni Iordanova and Petia Petrova (*Bulgaria*)
- 7. Adding twist to polymer optical fibers**
João Preizal, Lucia Bilro and Ricardo Oliveira (*Portugal*)
- 8. Radially polarized electromagnetic waves focused by a segment of a parabolic mirror**
Zerihun T. Godana, János Hebling and László Pálfalvi
(*Ethiopia, Hungary*)

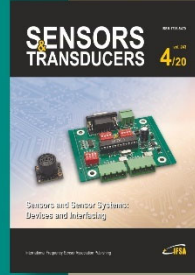
- 9. A facile route of manufacturing and improvement of plasmonic nanostructures towards magnetic resonance applications**
Miroslava Flímelová, Yury V. Ryabchikov, Nadezhda M. Bulgakova and Jan Behrends (*Czech Republic, Germany*)
- 10. Wavelength modulated interferometer without inter-axis dependency**
Willem P.C. van de Sande, Lennino A. Cacace, Pieter Kappelhof, Ron Hendrix and Maarten Steinbuch (*The Netherlands*)
- 11. 1D V- and U-shaped IP-Dip structures for SERS**
Ivana Lettrichova, Dusan Pudis, Daniel Jandura and Peter Gaso (*Slovakia*)
- 12. NSOM characterization of polymer ICG prepared by laser lithography on Si substrate**
Daniel Jandura, Jan Suffczyński, Tomasz Czyszanski and Dusan Pudis (*Slovakia*)
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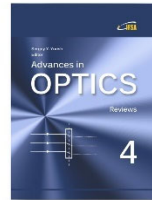
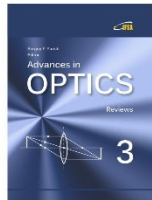
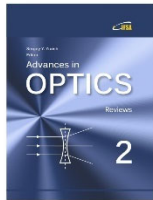
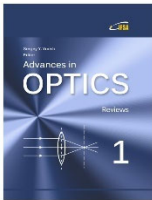
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