2025 OPAL

8th International Conference on Optics, Photonics and Lasers

Conference Programme

14-16 May 2025

Rhodes, Greece

IFSA

Message from Chairman

It is with great pleasure and pride that I welcome you to the *8th International Conference on Optics, Photonics and Lasers (OPAL' 2025)*, held from 14 to 16 May 2025 in the beautiful Sheraton Rhodes Resort Hotel, Greece.

Over the years, OPAL has grown into an important international platform for researchers, scientists, and professionals working across diverse fields of optics, photonics, and laser technologies. This year's edition continues this tradition with a robust and high-quality scientific programme that includes three keynote speeches, multiple technical sessions, a virtual track, poster presentations, and networking opportunities, all designed to foster interdisciplinary collaboration and innovation.

We are honoured to feature world-renowned experts presenting keynotes on frontier topics in hollow-core fiber design, optical systems, and smart optical sensors. The technical programme spans cutting-edge research in laser applications, quantum photonics, optical materials, and advanced imaging, reflecting the latest advancements and emerging trends in our field.

I would like to extend my sincere appreciation to our distinguished advisory chairmen, session chairs, and authors for their contributions. My heartfelt thanks also go to the Organizing Committee, especially Mrs. Tetyana Zakharchenko, for her tireless efforts in bringing this event to life.

Special thanks to our sponsors and media partners, and to the journal editors supporting the post-conference publications in the *Sensors & Transducers* journal and the *'Advances in Optics'* Book Series.

Let us use these three days not only to exchange knowledge but also to build lasting collaborations and friendships. I encourage you to attend the Welcome Cocktail, the Gala Dinner, and the Farewell Poster Session — each a unique opportunity to connect and celebrate our shared passion for optics and photonics.

I wish you a fruitful, inspiring, and enjoyable conference experience on the magical island of Rhodes.

Prof., Dr. Sergey Y. Yurish
Chairman, OPAL' 2025

Conference Venue

The Conference will take place on 14-16 May 2025 in Sheraton Rhodes Resort Hotel, conference room *Lindos.* Address: Ialyssos Avenue, Rodos 851 00, Greece.

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 event Sheraton Rhodes Resort hotel:

- Tuesday, 13 May, 19:00-20:30 (in the Welcome Cocktail area - *Deck 6th floor*)
- Wednesday, 14 May, 9:45-17:00 (in foyer near the conference room *Lindos*)
- Thursday, 15 May, 9:45-17:00 (in foyer near the conference room *Lindos*)
- Friday, 16 May, from 9:45-13:00 (in foyer near the conference room *Lindos)*

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 in foyer near the Conference Room *Lindos* at the times indicated in the programme.

Welcome Cocktail

13 May 2025, Tuesday (19:00-20:30), The Welcome Cocktail will take place in the Sheraton Rhodes Resort hotel in *Deck 6th floor* with the most spectacular sunset over the Aegean. Do not miss this opportunity to say the first "hello" to attendees and committee members, and enjoy a magnificent sunset !

Gala Dinner

15 May 2024, Thursday (20:00-23:00). The Gala Dinner will take place in the Sheraton Rhodes Resort hotel in *Sunset Deck 7th floor.*

Farewell Cocktail

16 May 2025, Friday (14:30-15:30). The Farewell Cocktail will take place in the Sheraton Rhodes Resort hotel in foyer near the conference room *Lindos.* It will be combined with the Poster Session and followed by the Closing Session. Do not miss it to know about the post-conference publications and the next conference's venue !

Dress Code

The event dress code is smart casual for all conference sessions and social 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) published in both: print and electronic formats. The journal is indexed in SCOPUS.

'*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. 7/8. This open access book volume will be published at the end of 2025. The first six volumes published in 2018-2022 have been accepted by all Optical Community with a great enthusiasm, and some of these volumes are indexed in Book Citation Index, Web of Science.

Best Papers Award

In this year, the Best Paper award is established by the MDPI '*Metrology*' open access journal and co-sponsored by IFSA Publishing. It includes 500.00 EUR and Certificates. It will be given to the author at the Gala Dinner.

Organizing Committee

Chairman

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

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Dr. Qiang Wu *(Northumbria University, Newcastle Upon Tyne, UK)*
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Conference's web site:

http://www.opal-conference.com

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Keynote Speakers

Prof., Dr. Sergey Yurish
IFSA President,
Barcelona, Spain

Smart Optical Sensor Systems: Advancing Accuracy Through Frequency Measurement

Abstract: Smart optical sensors leveraging frequency output mechanisms are revolutionizing precision measurement in optics, photonics, and laser technologies. These sensors convert physical phenomena into frequency-modulated signals, offering superior immunity to noise and signal degradation compared to traditional analog outputs. Frequency-based outputs facilitate seamless integration with digital systems, enhancing real-time data acquisition and processing capabilities. This is particularly advantageous in applications requiring high-resolution and rapid measurements, such as in advanced manufacturing, biomedical diagnostics, and aerospace engineering. The adoption of frequency output in smart optical sensors and sensor systems underscores a significant shift towards more robust, accurate, and digitally compatible sensing solutions, aligning with the evolving demands of modern photonic and laser-based applications.

Short Biography: Prof., Dr. Sergey Y. Yurish is the president of *International Frequency Sensor Association (IFSA)* - one of the major professional associations serving the sensor industry and academia since 1999. He is an editor-in-chief of the international peer-reviewed journal *Sensors & Transducers* and editor of several open access multivolume Book Series. Dr. Yurish has obtained his PhD degree in 1996 from the National University Lviv Polytechnic (UA). He has published more than 180 articles and papers in international peer-reviewed estimated journals and conference proceedings. Dr. Yurish holds 9 patents and is the author and co-author of 12 books. He has delivered hundred speeches, tutorials and keynote presentations at industries, peer institutions, and professional conferences in 30 countries. Dr. Yurish was a Marie Curie Chairs Excellence Investigator at the Technical University of Catalonia (UPC, Barcelona, Spain) from 2006–2009, where he led and developed one of the most successful projects in the UPC on Smart Sensors Systems Design (SMARTSES). Dr. Yurish has over 40 years of research and academic experience, during which he has developed numerous international projects in frames of various programmers, including NATO, FP6 and FP7.

Prof., Dr. Walter Belardi
Department of Engineering and Architecture,
University of Parma,
Parma, Italy

Design Issues of Novel Hollow Core Optical Fibers for Optical Communications

Abstract: This keynote talk presents a comprehensive analysis of the design challenges in developing novel hollow core optical fibers (HCs) for optical communications, focusing on fibers with record-low loss. Using numerical simulations with COMSOL Multiphysics, the authors evaluate the sensitivity of fiber performance to geometric variations, specifically core diameter, cladding tube sizes, strut thickness, and inter-tube gaps. The study demonstrates that even slight deviations in these parameters significantly affect leakage loss and bandwidth. In particular, reductions in the main cladding tube diameter and core size, or inconsistencies in the thickness of antiresonant elements, lead to an increase in leakage losses by orders of magnitude. These findings explain the variations in bandwidth observed between different sections of a recently reported high-performance HC fiber, despite similar overall attenuation levels. The research highlights those technological imperfections during fiber fabrication, such as variations along the fiber length, critically limit the usable bandwidth, a major consideration for wavelength-division-multiplexed systems. The work underscores the importance of strict geometric control in the manufacturing process and suggests that minimizing the core size without degrading performance remains a significant challenge.

Short Biography: Prof Belardi obtained a PhD at the ORC, University of Southampton, United Kingdom. He held an Excellence Research Chair in Photonics at the University of Lille, France. He was also the General Coordinator of the European Project GADEIRE. He joined the University of Parma, Italy, in late 2023. Prof. Belardi is one of the main pioneers in the field of hollow core antiresonant optical fibers, particularly with the very first theoretical conception, proposal, and fabrication, in 2013, of a novel structure of hollow core optical fiber, that became later the most important candidate for high-capacity data transmission with low latency and loss. Moreover, he has given major contributions to the development of simplified hollow core optical fibers for practical use in the mid-infrared spectral range.

Prof., Dr. Menelaos K. Poutous
University of North Carolina at Charlotte
Charlotte, NC, USA

Monolithic Optical Components for Astronomical Spectrographs

Abstract: Earth-bound extremely large telescopes will require efficient transmissive and diffractive optical components to conduct spectral astronomical surveys. Currently used high-resolution spectrograph gratings have diffraction efficiency limitations, and antireflective thin film coatings have non-uniform broadband spectral signatures. This presentation reports results to improve astronomical instrumentation light-throughput efficiency by fabricating monolithic binary-phase gratings in quartz substrates, and by nano-texturing the surfaces of various optical elements to enhance their transmission. The performance of the fabricated devices are directly compared with commercially available components. The spectrograph gratings have 35-50% higher diffraction efficiency compared to volume phase holographic gratings, and the nanotextured components have broadband transmission efficiency greater than 98%, without interference oscillations or scatter. The transmission enhanced optics were tested as part of a light relay system, alongside conventional components, and showed better system performance as well.

Short Biography: Menelaos K. Poutous is an Associate Professor with the Department of Physics & Optical Science at the University of North Carolina – Charlotte, USA. He previously held a Principal Development Engineer's position at Digital Optics Corporation, and before that, he was Lecturer with the Department of Physics at Emory University. He received his Doctorate from the School of Physics at the Georgia Institute of Technology, Atlanta GA. He leads experimental research in micro- and nano-structured optical surfaces, with a number of collaborative projects funded by US National Laboratories, private industry partners, and research foundations. He is currently investigating fabrication of spectroscopic gratings and optical antireflective surfaces for future applications in Extremely Large Telescopes. His research interests are in spectroscopy, diffractive micro-optical elements, photolithographic fabrication processes, micro-optics in laser cavities and artificial optical surfaces. He is a senior member and course instructor of the International Society for Optics and Photonics (SPIE).

Programme at Glance

Time/Date (GMT+3)	14.05.2025 Wednesday	15.05.2025 Thursday	16.05.2025 Friday
	Conference Room Lindos		
9:45-10:00	Registration	Registration	Registration
10:00-10:15	* Opening Session **Sergey Y. Yurish**	* Daily announcements	* Daily announcements
10:15-11:00	Keynote Speaker I **Sergey Y. Yurish** *IFSA (Spain)*	Keynote Speaker II **Walter Belardi** *University of Parma, (Italy)*	Keynote Speaker III **Menelaos K. Poutous** *University of North Carolina (USA)*
11:00-11:30	*Coffee Break*	*Coffee Break*	*Coffee Break*
11:30-13:30	Regular Session: **Lasers & Applications I**	Regular Session: **Optics, Optical Systems & Materials**	Virtual Session in Zoom: **Optics & Lasers**
13:30-14:00	*Coffee & Sandwiches*	*Coffee & Sandwiches*	*Poster Session & Farewell Cocktail*
14:00-15:00	*Lunch on your own*	*Lunch on your own*	
15:00–15:30	Regular Session: **Lasers & Applications II**	Regular Session: **Photonics & Quantum Information**	
15:30-16:00			* Closing Session **Sergey Y. Yurish**
16:00-17:00			-
17-00-20:00	-	-	-
20:00-23:00	-	*Gala Dinner (Deck 7th floor)*	-

* The must attend sessions.

Technical Conference Programme

Day 1
14 May 2025, Wednesday

Regular Session: Lasers & Applications I

Chairman: Prof., Dr. Walter Belardi
Università Degli Studi di Parma
(Italy)

1. **Precision Laser Interferometry for Inertial Sensing**
   Felipe Guzman
   (USA)

2. **738 nm Fiber Gas Raman Laser**
   Luohao Lei, Wenxi Pei, Xuanxi Li, Qi Chen, Jing Shi, Guorui Lv, Tianyu Li, Hao Li, Zhiyue Zhou, Zhixian Li, Meng Wang, Zefeng Wang and Jinbao Chen
   (China)

3. **Laser-Induced Damage Threshold (LIDT) Testing of High-Reflective Mirrors for DUV Lasers**
   Jan Vanda, Mihai-George Muresan, Martin Mydlar, Priyadarshani Narayanasamy and Hana Turcicova
   (Czech Republic)

4. **Broadband Cascaded Chirped Tilted Fiber Bragg Gratings Inscribed by Femtosecond Laser for Enhanced SRS Suppression**
   Hao Li, Rong Zhao, Xinyu Ye, Binyu Rao, Xinda Lu, Baiyi Wu, Meng Wang, Zhixian Li, Zilun Chen and Zefeng Wang
   (China)

5. **Ultrafast Relativistic Laser Pulse Interaction With Foil Targets and Ion Acceleration**
   Sargis Ter-Avetisyan
   (Romania)

6. **Asymmetric Four-Parametric Generalization of the Second Demkov-Kunike Model**
   Meri Margaryan, Astghik Ghazaryan and Artur Ishkhanyan
   (Armenia)

Regular Session:
Lasers & Applications II

Chairman: Prof., Dr. Felipe Guzman
University of Arizona
(USA)

1. **Ablative and Coagulative Tm:Yap Laser for Dermatology Treatments**
   Salman Noach, Rotem Nahear, Neria Suliman and David Friedman
   (Israel)

2. **Design of a Tunable Range Zero-Order Bessel Beam System**
   Mouna Haouas and Brahim Chebbi
   (Canada)

3. **Methane Clumped Isotopologue Detection Using Cavity-Ring-Down Spectroscopy**
   Mehr Fatima, Ville Ulvila, Ivan Prokhorov, Joachim Mohn, Gang Li and Thomas Hausmaninger
   (Finland, Switzerland and Germany)

4. **Transverse Mode Control and Synchronization in Coupled Broad-area VCSELs**
   Jules Mercadier, Stefan Bittner and Marc Sciamanna
   (France)

5. **Specifications of the Space-Born Astronomical Laser Frequency Comb for the vANCESTOR Mission**
   Atul Deep
   (The Netherlands)

6. **Comparison of CO_2 laser-Pumped GaAs and ZnTe Terahertz Pulse Sourses.**
   Gabit Nazymbekov, Gergő Illés, János Hebling and György Tóth
   (Hungary)

Day 2
15 May 2025, Wednesday

Regular Session:
Optics, Optical Systems and Materials

Chairman: Prof., Dr. Menelaos K. Poutous
University of North Carolina at Charlotte (USA)

1. **Development and Optimization of a Dynamic All-Optical Beam Steering System Based on a Risley Prism**
   Aurélie Hentz, Jean-Louis Gutzwiller, Michel Alassir and Marc Sciamanna
   (France)

2. **A Broadband Static Fourier Transform Spectrometer Based on a Modified Sagnac Interferometer**
   Ali Hussain and Ben Lane
   (UK)

3. **Tuning Trap Depths in ZnGa2O4: Cr3+ Persistent Luminescence Nanoparticles for Low-Temperature Applications**
   Celina Matuszewska, Bruno Viana and Corinne Chaneac
   (France)

4. **Investigation of Physical Aspects of Perovskite Hydrides $NaXH_3$ (X = Be, Mg, Ca, Sr) for Hydrogen Storage Applications**
   Taharh Zelai
   (Saudi Arabia)

5. **Form Measurements Based on Speckle Contrast in Lensless Holographic Imaging**
   Mostafa Agour, Claas Falldorf and Ralf B. Bergmann
   (Germany)

6. **Band-limited Orthogonal Functional Systems for Finite Fresnel Transform**
   Tomohiro Aoyagi and Kouichi Ohtsubo
   (Japan)

7. **Pin-holes Based Description of the PANCAM, a Hyper-Hemispherical Lens**
   Emanuele Simioni, Claudio Pernechele, Paolo Martini, Giovanni Costa, et al. *(Italy)*

Regular Session:
Photonics & Quantum Information

Chairman: Prof., Dr. Mostafa Agour
BIAS - Bremen Institute for Applied Beam Technology
(Germany)

1. **Spintronic Sensing Through Frequency Conversion of THz and XUV Light**
   Igor Ilyakov, Sergey Kovalev, Ruslan Salikhov and Michael Gensch
   (Germany)

2. **Parameters for Photon Pressure Propulsion to Obtain Relativistic Speeds**
   Claude Phipps
   (USA)

3. **Polarization Control and Maintenance of Electro-optic Probes**
   Dong Joon Lee and Young Pyo Hong
   (South Korea)

4. **Feasibility of Entanglement-Based Secure Quantum Communication with Practical Sources**
   Mariia Gumberidze and Vladyslav Usenko
   (Czech Republic)

5. **Cooled Organic Substances Long-term Phosphorescence Spectra Dependence from Exciting Radiation Wavelength**
   (pre-recorded video presentation)
   Dmitry Tsipenyuk, Valery Slobodyanin and Andrey Voropinov
   (Russia)

6. **Two and Three Slits Model Interference Experiments for Analog Optical Computing**
   (pre-recorded video presentation)
   Dmitry Tsipenyuk, Valery Slobodyanin and Andrey Voropinov
   (Russia)

Day 3
16 May 2025, Friday

Virtual Session in Zoom: Optics & Lasers

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

1. **Linearly and Circularly Polarized Terahertz Gaussian Beam Translation with 3-D Negative Index Metamaterial**
   Marishwari Muthusamy, Madhavamoorthi Suresh, Suling Shen, Qiang Liu and Zhengbiao Ouyang
   (China)

2. **Experimental Investigation of the Accuracy of Profilometry with Laser Projector**
   Burak Özbay and Zehra Saraç
   (Turkey)

3. **Broadband Protective Screens for Microwave Radiation**
   Anastasiia Natarova and Nikolay Kokodii
   (Ukraine)

4. **Extension of SWIR OPCPA Spectrum to Mid-IR Using Transient Rotational SRS in Hydrogen**
   Augustė Černeckytė, Paulius Mackonis and Aleksej Rodin
   (Lithuania)

5. **Demodulation Enhancement of Low-Resolution DACs OFDM VLC System Using Random Forest Regression**
   Zixuan Liu
   (USA)

6. **High-Intensity vs. Low-Level Laser Therapy for Musculoskeletal Disorders: A Preliminary Systematic Review with Network Meta-Analysis**
   Hernán Andrés de la Barra
   (Chile)

Poster Session

(Conference Room *Lyndos*):
16 May 2025 (13:30-15:30)

1. **Soft X-Ray Ar+8 Lasers Pumped by Inductance-free Capillary Z-pinch Discharges Based on the Bifilar Effect**
   Matyas Kiss, Balazs Fekete, Sandor Szatmari and Sergei Kukhlevsky
   (Hungary)

2. **Investigation of High-Power Laser-Driven X-Ray Radiation Effects on Live Cells**
   Viorel Nastasa, Angela Staicu, Mihaela Balas, Ana Maria Udrea, Diana Naum, Liviu Neagu, Andi Cucoanes, Mihaela Bacalum, Petru Ghenuche and Domenico Doria
   (*Romania)*

3. **Concave Grating-Based POF Demultiplexer Transmission Properties**
   Ulrich Fischer, Matthias Haupt and Mladen Joncic
   (Germany)

4. **Classification of Rice Grains Through Elemental Distribution in Depth Measured by Laser Induced Breakdown Spectroscopy (LIBS)**
   Salvatore Almaviva, Violeta Lazic, Claudia Zoani and Antonia Lai
   (Italy)

5. **Influence of ZnO/ZnS on the Photoinduced Response of Heavy-metal Sb_2O_3-based Glasses**
   Jan Smolík, Petr Knotek, Jiří Schwarz, Petr Kostka, Rosen Todorov, Petr Kutálek and Eva Černošková
   (Czech Republic, Bulgaria)
6. **A Crucial Basis for Accurate Optical Characterisation of Thin Films: Determination of Optical Properties for Glass, SiO_2 Layer, and ITO**
   Aivars Vembris, Ilze Aulika, Paptricija Paulsone, Elina Laizane and Jelena Butikova
   (Latvia)

7. **Ellipsometric Mapping of Optical Properties and Thickness Fluctuations in ITO**
   Jelena Butikova, Ilze Aulika, Patricija Paulsone, Elina Laizane and Aivars Vembris
   (Latvia)

8. **Precision Optical Analysis of Organic Thin Films for OLED Devices**
   Patricija Paulsone, Ilze Aulika, Jelena Butikova and Aivars Vembris
   (Latvia)

9. **Interfacial Dynamics, Surface Effects, and Thermal-Induced Phase Transitions in OLED Multilayers: Insights from Spectroscopic Ellipsometry**
   Ilze Aulika, Patricija Paulsone, Sven Oras, Jelena Butikova, Elina Laizane and Aivars Vembris
   (Latvia, Estonia)

10. **Express Simultaneous Multi-Sample Fluorescence Measurements of Oil Mixures Using UV LEDs and Smartphone Spectrometers**
    K. Nikolova, T. A. Eftimov, M. Marudova, L. Makedonski and N. Panova
    (Bulgaria)

11. **The Smartphone as an Affordable 2D Spectrometer for Parallel Spectral and Time-Dependent Measurements**
    Krastena Nikolova, Tinko Eftimov and Natalina Panova
    (Bulgaria)

12. **Watt-Level Tunable Acetylene-Filled Hollow-core Fiber Light Source at 3.1 μm**
    Guorui Lv, Xuanxi Li, Wenxi Pei, Qi Chen, Luohao Lei, Tianyu Li, Jing Shi, Hao Li, Zhiyue Zhou, Zhixian Li, Meng Wang and Zefeng Wang
    (China)

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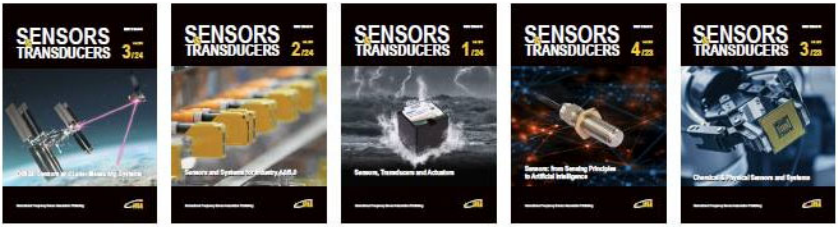

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