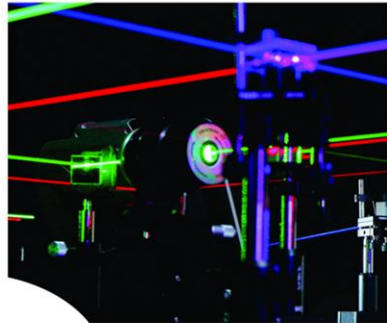
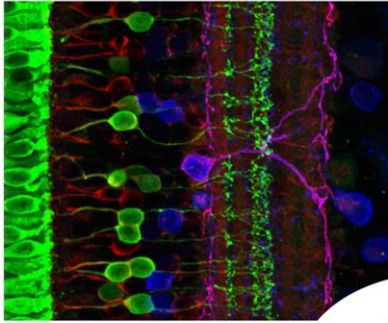


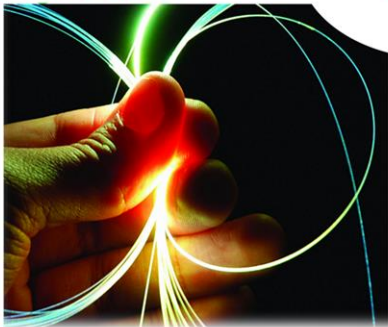
**ISLIST/ UIMP**  
Universidad Internacional  
Menéndez Pelayo



International  
School on

**Light**

Sciences and  
Technologies



**Core: Light in  
communications, sensing and Lighting**

*Santander 17-21 de junio de 2024*  
(Sala Riancho, Palacio de la Magdalena, Santander)

# PROGRAM



DIRECTOR:  
**José Miguel López Higuera**  
*Professor in Electronics and Photonics*  
*Head of the Photonics Engineering Group*  
*University of Cantabria*  
*e-mail: [lopezhjm@unican.es](mailto:lopezhjm@unican.es)*



SECRETARY:  
**María Angeles Quintela**  
*Associate Professor*  
*Photonics Engineering Group*  
*University of Cantabria*  
*e-mail: [angeles.quintela@unican.es](mailto:angeles.quintela@unican.es)*



VII-International School on Light  
Sciences and Technologies VII-ISLIST  
June 17-21, 2024, Santander, Spain

## SPONSOR



# GOBIERNO DE CANTABRIA

## COLLABORATORS

Gold

Gold



**prysmian**  
The planet's pathways

Silver

**ACORDE**  
Space & Defence  
RF EXPERTS

Silver

**AMBAR**  
TELECOMUNICACIONES



**UIMP**  
Universidad Internacional  
Menéndez Pelayo

VII-International School on Light  
Sciences and Technologies VII-ISLIST  
June 17-21, 2024, Santander, Spain

Bronze



**ERZIA**



Bronze





VII-International School on Light  
Sciences and Technologies VII-ISLIST  
June 17-21, 2024, Santander, Spain

## Summary

Photonics is the science and technique of generating, controlling, propagating, storing and detecting light waves and photons, which are particles of light. Photonics is the field of Light Sciences and Technologies.

Light plays a vital role in our daily lives and is being an imperative cross-cutting discipline of science in the 21<sup>st</sup> century. It has revolutionized medicine, made possible international communication via the internet, enabled sustainable development and provided solutions to global challenges in education, energy, environment and agriculture. It continues to be a key discipline to link cultural, economic and political aspects of the global society. Today, it is widely accepted that the present century will depend as much on Photonics as the 20<sup>th</sup> century depended on electronics.

The United Nations Organization (UN) has recognized the **key or essential** role of Light Sciences and Technologies to raise global awareness and proclaimed 2015 as the International Year of Light and Light-based Technologies (IYL 2015). Aware of the key role of Photonics in the economies and in the societies of the XXI century, the UIMP has decided to create the “**International School on light Sciences and Technologies (ISLIST)**”.

This International school is envisioned to be a worldwide top International forum (fourth week of every June) on *Light Sciences and Technologies* in the framework of a “*special top university*” that is recognized as the “*university of universities*” and in a privileged environment “the Royal Magdalena Palace” in Santander, Cantabria, Spain. Each edition of this international school will have an intensification or main core in a specific application area and additional current hot topics. **Light in communications, sensing and lighting** is the core of this 2024 edition: VII-ISLIST.

It must be noticed that by changing the consecutive core, students and professional have the opportunity to receive and share knowledge, technique, visions, experience etc. several times from about 40 different top international lecturers, along their career. It is envisioned as a key value of ISLIST and it was, certainly, corroborated objectively from answers, of the previous edition attendee’s surveys as you can observe on the final reports. <https://www.teisa.unican.es/ISLIST/index.php/final-report>

ISLIST has been conceived as a great opportunity to review, actualize and improve the knowledge of **scientists, professionals and technicians**; to contribute to the education and to enhance the motivation of **PhD students**; to offer an ideal frame for **networking** and also to contribute to the education of the **citizens**. It is also a great opportunity to ensure that **policymakers, entrepreneurs**, and other key “actors” will be aware of the problem-solving potential of Photonics.

Nobel laureates such **Andre Geim, Sujhi Nakamura, Donna Strickland** have participated in the previous editions. Top worldwide Scientists such as Philip Russel, Miles Padgett, X. C. Zhang, Bruce J. Tromberg, José Capmany, Maria Yzuel, Maria Luisa Calvo, JA Martín Pereda, Luis Roso, Aydogan Ozcan, Brian Pogue, Susana Marcos, Jüergen Pop, Vasilis Ntziachristos, Luis Bañares, Antonio Luque, Eli Yablonovitch, Eric Mazur, David Payne, Pablo Artal, John Pendry, Miguel Gonzalez, Hugo Thienpont, Rod Taylor, Katarina Svanberg, Laura Lechuga, Kishan Dolakia, Harald Haas, Christian Bressler, Christian Sattler, Michael Campbell, Martin Wegener, Beat Neuenschwander, Carlos Molpeceres, Angelos Karlas, Michael Schmitt, , Paola Taroni, Valentina Emiliani, Turgut Durduran, Tayyaba Hasan, Alessandro Corsi, Mark Rea, Mariana Figueiro, among others. Also, most renowned professionals and directors of organizations such as Jam Denneman, Peter Winzer, Peter Andrekson, Nikolaus Schmitt, Jeroni Nadal, Robert Lieberman, Dra. Kutner Mikel Bengoa y Fabien Guillemot, Alexis Mendez, have participated in previous editions.

Seventeen (17) **highly renowned** professors and researchers from the most prestigious worldwide institutions and, as well, responsables of most reputed international Photonic Scientific Organizations and some politicians will participate in this VII-ISLIST meeting.



VII-International School on Light  
Sciences and Technologies VII-ISLIST  
June 17-21, 2024, Santander, Spain

The **City Council of Santander** will offer to ISLIST attendees a **Reception** at the Royal Palace of Magdalena. This Santander Happy Hour (with snacks and drinks) will be an optimum time to networking.

To be able to reach this ambitious program this International School of UIMP is sponsored by **Gobierno de Cantabria** covering a very relevant part of the organization costs of VII-ISLIST edition.

The international grants and other additional costs are covered by the very generous and key contribution of our collaborators: **Gold (SPIE and Prysmian)**, **Silver (Ambar Telecommunications, Acorde)** and **Bronze (OZ Optics, ERZIA, Aragon Photonics, Copsesa, Celestia TTI, Semicrol, Ayuntamiento de Santander, the Photonics Engineering Group of the University of Cantabria, Optica and hotel Santemar.**

Without these Sponsor and Collaborators, this top-quality school and over 28 Student Grants (already allocated from over 17 different nationalities) would not have been possible. The UIMP, the direction of this event and the scientific community using Light are grateful with the generosity of all these Organizations and all the Invited Speakers. Thank you so much!

## Goals

**International School on light Sciences and Technologies (ISLIST)**, has been conceived as a great opportunity to: i) **review, actualize and improve** the knowledge of **scientists, professionals and technicians**; ii) **contribute** to the education and to **enhance** the motivation of students (specially of **PhD students**); iii) **offer** an ideal frame for **networking** and also to contribute to the education of the **citizens**; iv) **ensure** that **policymakers, entrepreneurs**, and other “key actors” will be aware of the problem-solving potential of Photonics.

## Overview

The event will take place from Monday (June 17, 2024) to Friday (June 21, 2024). During the week along seventeen outstanding lectures a wide set of key topics on light and light sciences and technologies useful for optical communications, sensing and lighting communities will be presented and discussed. In addition to the invited talks in very hot topic, lectures, concerning the currents state of the art, trends and challenges to be faced, will be commented and discussed along the 17 invited talks and the two round tables.

## General Schedule

Time	Monday 17 <sup>th</sup>	Tuesday 18 <sup>th</sup>	Wednesday 19 <sup>st</sup>	Thursday 20 <sup>nd</sup>	Friday 21 <sup>rd</sup>
9:30		<b>Prof. Francesco Poletti</b> Head of Group, Optoelectronic Research Centre, University of Southampton, UK <b>Hollow Core Optical fibres: a revolution-nary technology for optical communications, quantum applications and laser delivery</b>	<b>Prof. JM López-Higuera</b> Head, Photonic Engineering Group of University of Cantabria, Ciber-BBN and IDIVAL, Spain <b>Sensing Using Light: doctrinal conception, currents and trends</b>	<b>Prof. Kennet Grattan</b> OBE, FREng, Royal Academy of Engineering, Director of Instrumentation & Sensors Research Centre, City University of London, UK <b>Optical sensing technologies for key environmental measurands in the I4.0 era applications</b>	<b>Prof. Mark Rea</b> Icahn School of Medicine, at Mount of Sinai, New York NY; <b>Former Director</b> , LRC Rensselaer Poly. Institute, USA <b>Light's effects on human health, well-being, and behaviours</b>
10:15	<b>Opening Remarks</b>				
10:40	Coffee Break	Coffee Break	Coffee Break	Coffee Break	Coffee Break
11:00	<b>Opening talk/ Dr. Peter Winzer</b> Founder and Chief Technical Officer, CTO, Nubis Communications New Providence, NJ07974, USA <b>The Next Generation of Optical Communications: will be massively Parallel</b>	<b>Dra. Elisabeta Rugi Grond</b> CEO, Thales Alenia Space, Switzerland, Switzerland <b>Optical communications in space: Currents and trends</b>	<b>Prof. Siniad O'Keeffe</b> Head of Group, Optical Fibre Sensors Research Centre; Health Research Institute, University of Limerick, Ireland <b>Optical Fibre Sensors for Radiation Dosimetry: Challenges and Opportunities</b>	<b>Prof. Valerio Pruneri</b> Head, Optoelectronic Group, Instituto de Ciencias Fotónicas, ICFO, Barcelona, Spain. <b>Engineering surfaces and devices for the display and imaging industries</b>	<b>Closing talk /Prof. Mariana Figueiro</b> Director, Light and Health Research Center (LHRC), Icahn School of Medicine, Mount Sinai, NY, USA <b>Principles of Indoor and Outdoor Lighting for Healthy Environments</b>
12:10	<b>Prof. Michael Leeb</b> Chief Executive Officer, CEO, Lightwave Logic, San Francisco, USA <b>Next Generation of Photonics Integrated Circuits as key for communications and sensing.</b>	<b>Prof. Ton Koonen</b> Scientific Director, Institute for Photonic Integration, University of Technology, Eindhoven, Netherlands <b>Optical Wireless Communication – a green wireless communication technology with high potential and great prospects</b>	<b>Dr. Vincent Menoret</b> Head of Quantum Sensors R&D Exail Quantum Systems, Institut d'Optique d'Aquitaine, Talence, France <b>Cold atom quantum sensors for field applications</b>	<b>Prof. Sonia Martín López</b> Co-Head of Photonics Engineering Group, of Alcala de Henares, Spain <b>Distributed Acoustic Sensors (DAS) for Seafloor Seismic Monitoring: from earthquakes to tsunamis</b>	<b>12:30 Closing Remarks, ISLIST-2024 Announcement and Diploma Delivery</b>
13:30-15:0	Lunch	Lunch	Lunch	Lunch	
15:30	<b>Prof. José Capmany</b> Director, ITEAM Institute Technical University of Valencia, Valencia, Spain <b>Programable Integrated Photonic Circuits: what?, why? and when?</b>	<b>Round Table I /Challenges to reach next generation of Optical Communications.</b> <b>Prof. Leeb</b> , Challenges to face high Performance Polymer Photonics for Next Generation PICs <b>Dr. Winzer</b> , Challenges to face in massive integrated spatial parallelism in future Optical Communications	<b>Prof. Roberto Osellame</b> Director, Institute of Photonics and Nanotechnology-CNR, Milano Polytechnic, Italy <b>Advanced photonic and optofluidic devices fabricated in glass using femtosecond lasers for Lab-On Chip sensors</b>	<b>Round Table II /Challenges to reach next generation of Sensing and Lighting</b> <b>Prof. Grattan</b> , Challenges to face to reach real industrial application of Optical sensing technology <b>Prof. Osellame</b> , Challenges to face to reach useful Integrated advanced microscopy in optofluidic lab-on-a-chips. <b>Prof. Figueiro</b> , Challenges to be faced on next generation of human centred lighting <b>Prof. Rea</b> , Uniting the science of circadian rhythms with real lighting applications and especially with hospitals and nursing homes	
16:40	<b>Prof. José Capmany</b> Director, ITEAM Institute Technical University of Valencia, Valencia, Spain <b>Microwave Photonics</b>	<b>Dra. Rugi Grond</b> on laser-based communications in Space in the Era of 6G <b>Prof. Koonen</b> Challenges to face in indoor optical wireless Communications in the Era of 6G <b>Moderator: JM López-Higuera</b>	<b>Prof. Andrea Cusano</b> Head, Optoelectronic and Photonic Group Università degli Studi del Sannio, Benevento (UniSannio), Italy <b>Lab On Fiber: a key enabling technology for Precision Medicine</b>	<b>Moderator: JM López-Higuera</b>	
17:55			<b>Family Photo</b> <b>Santander</b> <b>City Council Reception</b>		



VII-International School on Light  
Sciences and Technologies VII-ISLIST  
June 17-21, 2024, Santander, Spain

## PROGRAM

---

### Monday, 17

Morning

10:15 h

**Opening Ceremony**

10:40 h / **Break**

11:00 h Opening Lecture

**The Next Generation of Optical Communications will be massively Parallel**

**Dr. Peter Winzer**

Founder and Chief Technical Officer, CTO, Nubis Communications, New Providence, NJ07974, USA

12:10 h / Invited Lecture

**Next Generation of Photonics Integrated Circuits as key for communications and sensing**

**Prof. Michael Leeb**

Chief Executive Officer, CEO, Lightwave Logic, CEO OIDA, San Francisco, USA

13:30-15:00 h / **Lunch Time**

Afternoon: **Light in Communications**

15:30 h / Invited Lecture

**Programmable integrated Photonic Circuits: what?, why? and when?**

**Prof. José Capmany**

Director, iTEAM Institute, Technical University of Valencia, Valencia, Spain.

16:40 h / Invited Lecture

**Microwave Photonics**

**Prof. José Capmany**

Director, iTEAM Institute, Technical University of Valencia, Valencia, Spain.

---



VII-International School on Light  
Sciences and Technologies VII-ISLiST  
June 17-21, 2024, Santander, Spain

## Tuesday, 18

### Morning: Light in Communications

9:30 h / Invited Lecture

**Hollow Core Optical fibres: a revolution-nary technology for optical commu-nications, quantum applications and laser delivery**

**Prof. Francesco Poletti**

Head of Hollow Core Fibres Group, Optoelectronic Research Centre, University of Southampton, UK

10:40 h / Break

11:00 h / Invited Lecture

**Optical communications in space: Currents and trends**

**Dra. Elizabeta Rugi Grond**

CEO, Thales Alenia Space, Switzerland, Switzerland

Director, LIFI Research Development Centre, University of Strachclyde, Scotland, UK

12:10 h / Invited Lecture

**Optical Wireless Communication – a green wireless communication technology with high potential and great prospects**

**Prof. Ton Koonen**

Emeritus professor, University of Technology, Eindhoven, Netherlands

13:30-15:00 h / Lunch Time

### Afternoon: Light in Communications

15:30 h- 17:35 / Round Table I

#### Light in Communications: Challenges to face on

**Prof. Leebby**, Chief Executive Officer, CEO, Lightwave Logic, San Francisco, USA

*high Performance Polymer Photonics for Next Generation PICs*

**Dr. Winzer**, Founder and Chief Technical Officer, CTO, Nubis Communications, New Providence, NJ07974, USA

*massive integrated spatial parallelism in future Optical Communications*

**Dra. Rugi Grond**, CEO, Thales Alenia Space, Switzerland, Switzerland

*Laser-based communications in Space in the Era of 6G*

**Prof. Koonen**, Emeritus professor, University of Technology, Eindhoven, Netherlands

*In indoor optical wireless communications in Space in the Era of 6G*

**Moderator: Prof. JM López-Higuera**, Director ISLiST





VII-International School on Light  
Sciences and Technologies VII-ISLIST  
June 17-21, 2024, Santander, Spain

## Wednesday, 19

### Morning: **Light in Sensing**

9:30 h / Invited Lecture

#### **Sensing Using Light: doctrinal conception, currents and trends**

**Prof. José Miguel López-Higuera**

Director, ISLIST and Head of Photonic Engineering Group of UC, CIBER-BBN and IDIVAL, Spain

### 10:40h / **Break**

11:00h / Invited Lecture

#### **Optical Fibre Sensors for Radiotherapy Dosimetry: Challenges and Opportunities**

**Prof. Siniad O'Keeffe**

University of Limerick, Ireland, Optical Fibre Sensors Research Institute, Ireland

12:10h / Invited Lecture

#### **Cold atom quantum sensors for field applications.**

**Dr. Vincent Menoret**

Head of Quantum Sensors R&D, Exail Quantum Systems, Institut d'Optique d'Aquitaine, Talence, France

### 13:30 -15:00h / **Lunch Time**

### Afternoon: **Light in Sensing: Laboratory On Site**

15:30-16:30 / Invited Lecture

#### **Advanced photonic and optofluidic devices fabricated in glass using femtosecond lasers for Lab-On Chip sensors**

**Prof. Roberto Osellame**

Director, Institute of Photonics and Nanotechnologie-CNR, Milano Polytechnic, Italy

16:40h / Invited Lecture

#### **Lab On Fiber: a key enabling technology for precision medicine**

**Prof. Andrea Cusano**

Head, Optoelectronic and Photonic Group, Università degli Studi del Sannio, Benevento (UniSannio), Italy

### 17:55 h **VII ISLIST Family Photo**

### 18:05 h / **Special Event**

#### **Santander Council Reception**

The Santander City Council will offer to ISLIST attendees a special reception that, in addition, will be an optimum time to share experiences and promote networking.



VII-International School on Light  
Sciences and Technologies VII-ISLIST  
June 17-21, 2024, Santander, Spain

## Thursday, 20

### Morning: **Light in Sensing**

9:30h / Invited Lecture

#### **Optical sensing technologies for key environmental measurands in the I4.0 era**

**Prof. Kenneth Grattan**

Director of Instrumentation & Sensors Research Centre, City-University of London, UK

10:40h / **Break**

11:00h / Invited Lecture

#### **Engineered surfaces and devices for the display and imaging industries**

**Prof. Valerio Pruneri**

Head, Optoelectronic Group, Instituto de Ciencias Fotónicas, ICFO, Barcelona, Spain.

12:10h / Invited talk

#### **Distributed Acoustic Senors (DAS) for Seafloor Seismic Monitoring: from earthquakes to tsunamis**

**Prof. Sonia Matín López**

Co-Head of Photonics Engineering Group, of Alcala de Henares, Spain

13:30 -15:00h / **Lunch Time**

### Afternoon: **Light in Sensing and Lighting**

15:30h- 17:35h / Round Table II:

#### **Challenges to face in optical sensing technologies and lighting**

##### **Challenges to face on**

**Kenneth Grattan**, Director of Instrumentation & Sensors Research Centre, City-University of London, UK

*Challenges to face in optical sensing technologies for real industrial applications.*

**Roberto Osellame**, Director, Institute of Photonics and Nanotechnologie-CNR,Milano Polytechnic, Italy.

*To reach useful integrated advanced microscopy in optofluidic Lab-on-Chip devices*

**Mariana Figueiro**, Director, Light and Research Center, (LHRC), Icahn School of Medicine, **Mount Sinai**, NY, USA

*challenges to be faced on next generation of human centred lighting*

**Mark Rea**, Former Director, Lighting Research Center Rensselaer Polytechnic Institute

*Uniting the science of circadian rhythms with real lighting applications and especially with hospitals and nursing homes*

**Moderator: Prof. JM López-Higuera**, Director ISLIST



VII-International School on Light  
Sciences and Technologies VII-ISLIST  
June 17-21, 2024, Santander, Spain

## Friday, 21

Morning/Special session: **Light in Lighting**

9:30-10:40h / Invited Lecture

### **Light's effects on human health, well-being, and behaviours**

**Prof. Mark Rea**

Former Director, Lighting Research Center Rensselaer Polytechnic Institute. Now at Icahn School of Medicine at Mount Sinai, New York, USA

10:40h / **Break**

11:00-12:10h / Invited Closing Lecture

### **Principles of Indoor and Outdoor Lighting for Healthy Environments**

**Prof. Mariana G. Figueiro**

Director, Light and Research Center, (LHRC), Icahn School of Medicine, Mount Sinai, NY, USA

12:15 h

### **Closing Remarks, Announcement of VIII-ISLIST, 2025, and Diploma Delivery**

The UIMP official diploma will be delivery to each attendee by ISLIST invited speakers.



VII-International School on Light Sciences and Technologies VII-ISLIST  
June 17-21, 2024, Santander, Spain

## Abstracts/Bios

Highly renowned Professionals and Scientists from the most prestigious Organizations will highlight the importance of Photonics for health and Medicine. Key trends and challenges will be identified in several areas of paramount importance.

Invited Speaker	Talk&Abstract	Biography
 <p><b>Dr. Peter J. Winzer</b> Founder and Chief Technical Officer, CTO</p> <p>Nubis Communications, New Providence, NJ 07974, USA</p> <p>Invited Opening Talk Monday 17/11:00 h</p> <p>Round table I June 18 /15:30 hours</p>	<p><b>The Next Generation of Optical Communications will be massively Parallel</b></p> <p>Over the past decade, high-speed communications technologies have reached severe scalability limits, from shortreach electrical chip-to-chip interconnects to ultra-long-haul subsea optical fiber cables. While these scalability limits have <b>different origins ranging from saturating</b> high-speed electronics bit rates, to systems approaching fiber.</p> <p>Shannon capacities, to energy density/distribution limits, there seems to be only a single long-term viable solution that is common to economically overcome all these limits: <i>massively integrated spatial parallelism</i>.</p>	<p><b>Dr. Winzer</b> received his Ph.D. in electrical engineering from the Technical University of Vienna, Austria, and from 2000 through 2019 worked at Bell Labs in NJ, where performed research on fiber-optic communication systems and networks, set multiple high-speed optical transmission records, and contributed to optical communications product developments. Following his involvement in estimating the optical fiber Shannon capacity, he investigated space-division multiplexing (SDM) to scale optical transport systems. In 2020 he founded the VC-funded start-up Nubis Communications, where is currently acts as the CTO. Dr. Winzer has widely published and patented and is actively involved with the IEEE and with Optica. He served as Editor-in-Chief of the Journal of Lightwave Technology (2013 to 2018), was Program Chair of ECOC 2009, and Program/General Chair of OFC 2015/2017. A Highly Cited Researcher, Bell Labs Fellow, Fellow of the IEEE, Optica, and the US National Academy of Inventors, and an elected member of the US National Academy of Engineering, he received multiple recognitions for his work, including the John Tyndall Award and an Honorary Doctorate from the Technical University of Eindhoven.</p>
 <p><b>Prof. Michael Leeb</b> Chief Executive Officer, CEO,</p> <p>Lightwave Logic, San Francisco, USA</p> <p>Invited Talk Monday 17/12:10 h</p>	<p><b>Next Generation of Photonic Integrated Circuits (PICs) for communications and sensing and associated PIC roadmap over the next decade.</b></p> <p>Electro-optic (EO) polymer modulators, and especially slot modulators are a hot topic in the industry today as the industry strives to increase modulation speed while reducing optical network equipment power consumption. Electro-optic polymers are applied to silicon photonics wafers to increase the performance of silicon photonics PICs. Results will be shown that enable 200Gbps lanes and the potential for 300G and 400G lanes in the near future.</p> <p>EO polymers offer key advantages:</p> <ol style="list-style-type: none"> <li>1) Exceptionally high EO bandwidth in excess of 110GHz, and with plasmonic devices over 250GHz</li> </ol>	<p><b>Prof. Leeb</b> is currently the Chairman and CEO of Lightwave Logic Inc., (NASDAQ:LWLG) as well as Chair of the Corporate Engagement Council and Board Member of Optica. Dr. Leeb has deep experience running and leading technology companies, especially those developing, manufacturing and productising new platform technologies. His experience includes research, development, volume scale, marketing, sales, finance, and corporate activities both with management as well as at a board director level. Prof. Leeb's technical acumen stems from his entrepreneurial and intrapreneurial skills working throughout his career in both large corporate organizations as well as venture backed start-ups and public companies.</p> <p>Dr. Leeb was voted PIC (Photonic Integrated Circuit) business leader of the</p>



## VII-International School on Light Sciences and Technologies VII-ISLIST

June 17-21, 2024, Santander, Spain

Round table I  
June 18 /15:30 hours

- 2) Low voltage drive of under 1V (which allows direct drive from ICs, DSPs etc., and offer innovative architecture to reduce power consumption further
- 3) Very small footprint and size, which allows simple integration with PICs and silicon photonics and are ideal for pluggable and Onboard-optic transceiver form-factors
- 4) EO polymers can be easily handled in standard silicon fabs using standard 200mm silicon wafers from foundries.

The talk will discuss the latest results with commercial grade electro-optic polymer materials that are being licensed for device applications for datacom at 1310 and 1550nm. As well as silicon foundry fabricated silicon slot modulator polymer PIC device designs for use with integrated photonics platforms. Material and device demonstration will show EO polymers exceeding electro-optical and electrical 3dB bandwidths of 110GHz, low voltage, and very small form factors. Reliability and stability results will be presented to show the robustness of the technology platform with respect to thermal and photostability. Plans and details for CSP – chip scale packaging for polymer PICs will be shown from the performance of dielectric sealants such as Atomic Layer Deposition at temperatures suitable for organic, polymer material.

Lastly, the talk will discuss Photonic PIC technology roadmaps for the next decade showing future technology advancement and expected customer performance.

year by the industry-based PIC International Conference in 2018. He is a technical expert to the European Commission, and a Fellow of NAI, IEEE and Optica. Dr. Lebbby is an inventor on over 220 issued USPTO patents.

Dr. Lebbby's career started with the British Government in 1977 in telecommunications and he did research at their prestigious research labs (RSRE Malvern) in the early 1980s and worked at AT&T Bell Labs (1985-1989) in photonics. At Motorola in the 1990s he drove the development, including the first patent co-authorship of the oxide VCSEL diode laser which is now used in laser mice, 3D sensing/FaceID in mobile phones and optical interconnects with volumes of over 1B units today. From 2005-2010 he led the USA trade association in optoelectronics (OIDA) and represented and petitioned on behalf of the optoelectronics industry on Capitol Hill for major multi-national corporations. Dr. Lebbby has run and led several technological start-ups such as Ignis Optics, One Chip Photonics, Translucent Photonics as well as groups in Motorola, Tyco Electronics, AT&T, Intel and others. Dr. Lebbby has nurtured innovative technology through building a range of customers from small business enterprises to multi-national corporations.



### Programmable integrated Photonic Circuits: what?, why? and when?

Photonic devices and systems embed the unique properties of light for the transmission and processing of information into a semiconductor chip. By incorporating photonic functions into integrated circuits and using light instead of electric current to transmit information and to take over some of the information processing operations, the speed and energy consumption limitations of conventional computing approaches can be overcome.

Photonic chip technology was introduced in the 1980s, but despite the considerable progress, such integrated photonic chips have been designed and fabricated separately for each different specialized task – so-called “application-specific” photonic chips. This approach increases engineering cost reduces possible economies of scale, and inhibits adaptability to different scenarios and changing requirements. Designed for a particular function, they can turn out to be suboptimal or even obsolete in applications where optical processing demands vary or evolve, as described above.

Programmable integrated photonics is emerging as a disruptive revolution in the traditional world of

**Prof. Capmany** holds Telecommunications Engineering (BSc+MSc +PhD) and Physics (BSc+MSc+PhD) degrees. Since 1996 he is a Full Professor in Photonics at the Universitat Politècnica de València, Spain. He has made seminal and world-leading contributions in the areas of microwave photonics, programmable integrated photonics, and more recently photonic computing. He is a Fellow of the Optical Society of America (OSA) and the Institute of Electrical and Electronics Engineers (IEEE).

He has received numerous distinctions including the Premio Rey Jaime I in Novel Technologies in 2012, the Spanish National Research Prize in Engineering in 2020, the IEEE Photonics Society Engineering Achievement Award in 2021 and the Spanish Royal Society of Physics Science and Technology Award in 2022.

He is also a co-founder of the spin-off companies VLC Photonics (acquired by Hitachi in 2020) and iPronics (www.ipronics.com)

Prof. Capmany is a double recipient of Advanced (2016 & 2022) and Proof of Concept (2019 & 2023) Grants from the European Research Council (ERC) and has played a leading role as principal investigator

**Prof. José Capmany**

**Head**  
Photonics Research Labs  
iTEAM Institute  
Technical University of  
Valencia,  
Valencia, Spain

Invited Talk  
Monday 17/15:30 h



## VII-International School on Light Sciences and Technologies VII-ISLIST

June 17-21, 2024, Santander, Spain

application-specific photonic circuits. While application-specific chips are designed for a fixed task and cannot adapt to changes in the operating conditions or system requirements, programmable integrated photonics offers a new paradigm of manipulating light with unprecedented versatility. This lecture will address the principles, fundamentals and applications of this emerging technology.



**Prof. José Capmany**

### Head

Photonics Research Labs  
iTEAM Institute  
Technical University of  
Valencia,  
Valencia, Spain

Invited Talk  
Monday 17/16:40 h

### Microwave Photonics

Microwave photonics, an interdisciplinary field that combines microwave engineering and photonic technology for the generation, transmission, processing, and control of microwave signals, to take advantage of the broad bandwidth, high frequency, and low loss offered by modern photonics, has been intensively researched for the last few decades, and numerous solutions have been proposed and demonstrated. In this talk, an overview about microwave photonics is provided which covers the basic concepts of microwave photonics, photonic-assisted microwave signal generation and analog to digital conversion, photonic-assisted microwave signal processing, and true time delay beamforming. The implementation of microwave photonic systems based on photonic integrated circuits is also reviewed, including the design, fabrication, and material platforms, application-specific photonic integrated circuits for microwave photonics, and, programmable integrated microwave photonics. The challenges and future applications of microwave photonics are also discussed.

in over one hundred research projects. He has been Associate Editor of IEEE Photonics Technology Letters (2010-2016) and the IEEE Journal of Lightwave Technology (2016-2018). He served as editor-in-chief of the IEEE Journal of Selected Topics in Quantum Electronics from 2018 to 2022.

**Prof. José Capmany** holds Telecommunications Engineering (BSc+MSc+PhD) and Physics (BSc+MSc+PhD) degrees. Since 1996 he is a Full Professor in Photonics at the Universitat Politècnica de València, Spain. He has made seminal and world-leading contributions in the areas of microwave photonics, programmable integrated photonics, and more recently photonic computing. He is a Fellow of the Optical Society of America (OSA) and the Institute of Electrical and Electronics Engineers (IEEE).

He has received numerous distinctions including the Premio Rey Jaime I in Novel Technologies in 2012, the Spanish National Research Prize in Engineering in 2020, the IEEE Photonics Society Engineering Achievement Award in 2021 and the Spanish Royal Society of Physics Science and Technology Award in 2022.

He is also a co-founder of the spin-off companies VLC Photonics (acquired by Hitachi in 2020) and iPronics (www.ipronics.com)

Prof. Capmany is a double recipient of Advanced (2016 & 2022) and Proof of Concept (2019 & 2023) Grants from the European Research Council (ERC) and has played a leading role as principal investigator in over one hundred research projects. He has been Associate Editor of IEEE Photonics Technology Letters (2010-2016) and the IEEE Journal of Lightwave Technology (2016-2018). He served as editor-in-chief of the IEEE Journal of Selected Topics in Quantum Electronics from 2018 to 2022. He is a coauthor of the book Microwave Photonics, published by IEEE & John Wiley in 2024.

**Prof Poletti** leads the Hollow Core Fibre (HCF) group at the Optoelectronic Research Centre, University of Southampton. In his research career, he has held a Royal Society Fellowship (URF) and a European Research Council (ERC) consolidator grant, both aimed at advancing the science and technology of hollow core fibres. He has co-authored more than 500 peer-reviewed publications, produced over 20 patents and delivered more than 50 invited, tutorial or keynote presentations. Over the years, he has been an investigator on grants totalling over ~£50M and covering many aspects of fibre fabrication technology. His pioneering work on HCF led to the creation of the ORC startup

### Hollow Core Optical fibres: a revolutionary technology for optical communications, quantum applications and laser delivery



**Prof. Francesco Poletti**

Hollow-core fibres have intrigued researchers for decades, evolving from scientific curiosities to practical innovations. A recent breakthrough design has recently transformed them from scientific tools to real-world products. These novel fibres outperform traditional glass-based optical fibres by guiding light through air,



VII-International School on Light Sciences and Technologies VII-ISLIST  
June 17-21, 2024, Santander, Spain

**Head of Hollow Core Fibres Group**  
Optoelectronics Research Centre, University of Southampton, UK  
Microsoft Azure Fibre, Romsey, UK

mitigating limitations imposed by glass interactions. They allow launching more power without fibre damage, transmit information faster, lose less power as light propagates, and operate at customized wavelengths. The technology offers remarkable opportunities in many areas, which will be reviewed in this lecture.

Lumenity, which in 2022 was acquired by Microsoft Azure. As a result, he currently also holds a position as a Microsoft Partner Researcher, leading the research activities on HCFs for optical data communications.



**Optical communications in space: Currents and trends**

The first activities in the field of optical communications for space applications are more than 25 years old nevertheless the use of this technology is still limited or is just taking up. Why? What has been done and what are the present fields of application and trends for the use of optical communication in space? What are the challenges and the opportunities? Many aspects such as standardization, interoperability, complexity, costs and business cases are driving the developments and the implementation of this technology in present and future space programs. A long-term vision for a new era of space missions!

**Dra. Rugi** has been working in the development of instruments for science and Earth observation and has been focusing on optical communication since the mid '90. She is serving as the CEO of Thales Alenia Space Switzerland since 2016. Prior to this, she held the position of General Manager at the Opto-Electronics Division of RUAG. Among her various qualifications and appointments, she holds a master in aerospace engineering degree from the University of Pisa and she is a member of the Swiss Federal Commission for Space Affairs.

Thales Alenia Space Switzerland's products and solutions contributes to a variety of space missions in science, exploration and Earth observation. In the field of optical communications, the Swiss team is active in optical communication payloads for direct to Earth applications from LEO and GEO and on products for inter-satellite links in constellations.

**Dra. Elisabetta Rugi**

**CEO**

Thales Alenia Space, Switzerland, Switzerland

Invited Talk  
Tuesday 18/11:00 h

Round Table I  
Tuesday 18/15:30 h



**Optical Wireless Communication – a green wireless communication technology with high potential and great prospects**

The need for wireless communication is growing fast, driven by the growing numbers of people who want to use broadband internet services, fast data file transfer, video streaming, etc., wherever they are, and this growth is also fueled by the upcoming internet-of-things. Wireless communication by radio techniques (such as WiFi and 5G) is running into its limits due to spectrum congestion within the (licensed) RF bands and crosstalk in densely populated areas. Optical wireless communication (OWC) by steered narrow beams can alleviate these problems, as it can provide 'fiber-like' high capacity at high user densities without causing crosstalk and experiencing congestion in the abundant optical spectrum available. Moreover, it is highly energy efficient as it needs to offer capacity only where and when needed, and it is free from electro-magnetic interference (EMI) issues.

The keynote will review the state-of-the-art in OWC, present the pros and cons of beam-steered OWC, discuss how the key functions can be realized, and show

**Prof. Koonen** is emeritus professor in Eindhoven University of Technology (TU/e) since 2021, and was full professor since 2001. He chaired the group Electro-Optical Communication Systems (2004-2021), was vice-dean of the department Electrical Engineering (2012-2020), and Scientific Director of the Institute for Photonic Integration at TU/e (2016-2019). Before 2001, he worked for more than 20 years in applied research in industry, amongst others in Bell Laboratories - Lucent Technologies.

Ton Koonen is a Bell Labs Fellow (1998), IEEE Fellow (2007), and OPTICA (formerly OSA) Fellow (2013). In 2011, he received an Advanced Investigator Grant of the European Research Council on optical wireless communication. In Sep. 2021 at his valedictory lecture, he received the Dutch Royal distinction 'Ridder in de Orde van de Nederlandse Leeuw' ('Knight in the Order of the Dutch Lion').

Ton's current research interests are optical fiber-supported in-building

**Prof. Ton Koonen**

**Emeritus Professor,**

University of Technology, Eindhoven, Netherlands  
Países Bajos

Invited Talk  
Tuesday 18/12:10h

Round Table I  
Tuesday 18/15:30 h



VII-International School on Light Sciences and Technologies VII-ISLIST  
June 17-21, 2024, Santander, Spain

how these have been implemented and validated in a bidirectional experimental OWC system featuring high-definition video streaming.

networks (including optical wireless communication techniques, radio-over-fiber techniques) and optical access networks.

15:30 h- 17:35 / Round Table I

**Light in Communications: Challenges to face on**

**Prof. Leeb,** Chief Executive Officer, CEO, Lightwave Logic, San Francisco, USA

*high Performance Polymer Photonics for Next Generation PICs*

**Dr. Winzer,** Founder and Chief Technical Officer, CTO, Nubis Communications, New Providence, NJ07974, USA

*massive integrated spatial parallelism in future Optical Communications*

**Dra. Rugi Grond,** CEO, Thales Alenia Space, Switzerland, Switzerland

*Laser-based communications in Space in the Era of 6G*

**Prof. Koonen,** Emeritus Professor, University of Technology, Eindhoven, Netherlands

*In indoor optical wireless communications in Space in the Era of 6G*

**Moderator: Prof. JM López-Higuera,** Director ISLiST

MONDAY END



**Sensing using Light: doctrinal conception, currents and trends**

Light Science and Technologies (Photonics) now touches almost every area of our lives. It is considering a key technology for the development of the countries in this 21st century.

This lecture will present a doctrinal conception that will enable a comprehensive understanding of any sensor using light techniques, including their constituent parts and their various types. Then, to enable a better understanding of the above to the participants, it will be offered a concise overview of important cases that use different principles, techniques and technologies to detect different parameters in a wide set of selected application sectors such as civil engineering, industrial processes, health and medicine, environmental, energy, among others.

Finally, some reflections on expected market trends and challenges to be addressed in the near future will also be presented.

After this presentation, any sensing approach using Light will be easily identified as a Light-based Sensor or Photonic Sensor in which optical fiber sensors are, really, a particular case.

**Prof. López-Higuera** is the founder and head of the Photonics Engineering Group of the University of Cantabria, CIBER-BBN of Institute of Health Carlos III and IDIVAL of Hospital Universitario Marqués de Valdecilla, Spain. He is a member of a wide set of international Committees of Conferences, R&D Institutions, and Companies in the area of photonic sensing. His work is focused on optical sensor systems and instrumentations for any sector application. He has worked in a wide range of R&D projects, acting in more than 110 of them as manager or Principal Investigator. He has contributed with more than 950 research publications and 26 patents and also directed 22 PhD theses. He has worked as an editor and co-author of four R&D international books, as a co-editor of several conference proceedings and Journals. He is co-founder of three technology-based companies. Prof. López-Higuera, founder of ISLiST, is a Fellow of OSA, Fellow of SPIE, Fellow IAAM, Fellow VEBLEO, Senior of IEEE and a Member of the Royal Academy of Medicine of Cantabria.

**Prof. José Miguel López-Higuera**

**Head**

Photonic Engineering Group of University of Cantabria, CIBER-BBN and IDIVAL, Spain

Talk  
June 19 / 9:30 h

Round Tables I & II  
moderator





VII-International School on Light  
Sciences and Technologies VII-ISLIST  
June 17-21, 2024, Santander, Spain



**Dr. Sinead O'Keeffe**

Optical Fibre Sensors  
Research Centre,  
Health Research Institute  
University of Limerick,  
Ireland

Invited Talk

Wednesday 19/11:00 h

**Optical Fibre Sensors for  
Radiotherapy Dosimetry:  
Challenges and Opportunities**

Radiotherapy is the use of ionising radiation for the treatment of cancer, with 50 – 60 % of patients requiring radiotherapy at some point during their treatment. Optical fibre sensors have demonstrated excellent potential for radiotherapy dosimetry, due to their small size, high sensitivity, immunity to electromagnetic interference and remote sensing capability. However, monitoring radiation doses within clinical environments presents a number of significant challenges that must be overcome before optical fibre dosimeters will be embraced by the clinical end users. The low doses, wide ranging dose rates and varying radiation energies, associated with radiotherapy, all compound the complexities of dosimetry in this application area. We will present our latest advances in optical fibre sensors for radiation dosimetry, with a particular focus on radiotherapy dosimetry, and discuss the main challenges and opportunities for improving patient outcomes.

**Dr O'Keeffe** is a Royal Society – Science Foundation Ireland University Research Fellow within the Optical Fibre Sensors Research Centre, Department of Electronic & Computer Engineering at the University of Limerick, Ireland. She is leading a team that focuses on the development of optical fibre based sensor systems for biomedical applications. Her current research primarily focuses on radiotherapy for prostate and gynaecological cancer treatment. Sensors are being developed to measure the real-time radiation dose to the tumour and nearby critical structures and to measure the oxygen concentration of the tumour, which determines how resilient the tumour is to the radiation. She is coordinating the European H2020 Research and Innovation Programme Project “ORIGIN” developing an optical fibre dose imaging platform for adaptive brachytherapy.



**Dr. Vincent Menoret**

Head

of Quantum Sensors R&D  
Exail Quantum Systems  
Institut d'Optique  
d'Aquitaine, Talence,  
France

Invited Talk

Wednesday 19/12:10 h

**Cold atom quantum sensors for  
field applications**

Quantum inertial sensors based on matter-wave interferometry with laser-cooled atoms have significantly improved over the last decade. Quantum gravimeters are industrially and technically mature for large-scale use in field conditions. They are deployed in challenging environments around the world and provide valuable data for geophysicists studying hydrology, geodesy or volcanology. To go from static measurements to larger scale mapping, we have developed a differential quantum gravimeter that is particularly suited to the detection of small sources at shallow depths while operating at the quantum projection noise limit. The next generation of quantum sensors will be able to operate on moving platforms. This is challenging because atom interferometers have an intrinsically small dynamic range. We address this challenge by hybridizing the quantum sensor with classical accelerometers and fiber-optic gyroscopes in a ‘best of both worlds’ approach. Our recent results pave the way to onboard applications such as geophysics and inertial navigation.

**Dr. Ménoret** is a senior scientist in the Quantum Systems division of Exail, where he leads research and development activities related to quantum inertial sensors. His research focuses on real-life implementation of quantum sensors for geophysics and inertial navigation. In this field, he participated to the first demonstration of a matter-wave interferometer on a plane and has led the development of the first industrial quantum gravimeter. He also has experience in designing robust and compact laser systems and components to be used in integrated systems. His current research on hybrid classical-quantum sensors is conducted in the frame of a joint laboratory between Exail and Laboratoire Photonique Numérique Nanosciences (LP2N) at Institut d'Optique in Bordeaux (France), with a focus on bridging the gap between fundamental research and practical applications.



## VII-International School on Light Sciences and Technologies VII-ISLiST

June 17-21, 2024, Santander, Spain



**Prof. Roberto Osellame**

**Research Director**

Institute for Photonics and Nanotechnologies - CNR, Milano, Italy

Invited Talk  
Wednesday 19/15:30 h

Round table  
June 20, 15:30 hours

### Advanced photonic and optofluidic devices fabricated in glass using femtosecond lasers for Lab-On-Chip sensors

Femtosecond laser micromachining is rapidly becoming a widely appreciated method for processing transparent materials. Being contactless, maskless, cost-effective and capable of 3D structuring, it raised great interest both in scientific as well as in industrial applications. Its properties are particularly advantageous for the realization of lab-on-chip devices where the combination of microfluidics and photonic components enable the integrated manipulation and high-quality imaging of biological samples, from organoids to single cells.

**Prof. Osellame** is a Director of Research at the Institute for Photonics and Nanotechnologies (IFN) of the Italian National Research Council (CNR). He graduated at the Politecnico di Milano and received a Ph.D. in Physics from the Politecnico di Torino (Italy) in 2000. Dr. Osellame has been one of the pioneers in femtosecond laser micromachining of transparent materials. His research activity includes the development of photonic circuits for quantum information, the fabrication by two-photon-polymerization of micro/nano-structures of arbitrary geometry, and the development of lab-on-a-chip and optofluidic devices. He is co-author of more than 250 publications on major international journals and holds 15 patents in the field of optics and photonics. He is a Fellow of OPTICA and a recipient of an Advanced Grant from the European Research Council (ERC).



**Prof. Andrea Cusano**

**Head,**

Optoelectronic and Photonic Group  
Università degli Studi del Sannio, Benevento (UniSannio);  
Optoelectronics and Photonic Research Center for Life Science -CNOS Italy

Invited Talk  
Wednesday 19/16:40 h

### Lab on Fiber: A key enabling technology for precision medicine"

2000 years ago, Hippocrates recognized that "The right therapy depends exclusively on the right diagnosis". He thus anticipated what we now call the era of personalized medicine, in which treatments are selected on the basis of individual molecular markers in order to obtain a precise diagnosis and find the right treatment for the right patient at the right time. In this context, Lab on fiber technology was introduced ten years ago as a promising key enabling technology aimed to develop new theranostic devices that can be integrated into the working channels of mini-invasive clinical instruments (needles, catheters and nanoscopes) for in vivo liquid and tissue biopsy, supporting light-assisted local therapies. After one decade, new functionalities and unprecedented performances have been achieved connected with relevant milestones and significant breakthroughs, showing that lab on fiber technology is much more than a simple vision, especially when personalized life sciences are envisaged as a target application area.

**Prof. Cusano** is full Professor of Electronics, Optoelectronics and Photonics at the University of Sannio. His research interests are focused on the suitable merging of optical fibers and nanotechnologies and was the pioneer of the "Lab on fiber Technology" concept, nowadays recognized as an hot topic in nanophotonics. He published over 500 papers on prestigious international journals and communications in well-known international conferences worldwide; he has close to 20 national and international patents currently in charge of prestigious industrial companies. He is co-author of more than 100 invited chapters published in international books, invited papers, key note and plenary lectures in prestigious scientific international journals as well as international conferences. In 2020, he was appointed as Technical Director of the Research Infrastructure (C-NOS: Optoelectronics and Photonics Technologies for Life Science Applications).

17:55 h

## VII-ISLiST Family Photo



VII-International School on Light  
Sciences and Technologies VII-ISLIST  
June 17-21, 2024, Santander, Spain

18:05 h / Special Event

## Santander Council Reception

The Santander City Council will offer to VI-ISLIST attendees a special reception that, in addition, will be an optimum time to share experiences and promote networking.

WEDNESDAY END



**Prof. Kenneth Grattan**

OBE, FREng, Royal Academy  
of Engineering

Director of Instrumentation  
& Sensors Research Centre  
City-University of London,  
UK

Invited Talk  
Thursday 20/9:30 h  
Round table II  
Thursday 20/15:30 h

### Optical sensing technologies for key environmental measurands in the I4.0 era

Optical Fibre Sensors have been developed extensively now over some four decades and more – refined during that time to address a range of challenging industrial applications, usually where conventional sensors often are badly conditioned and do not fit well, especially for 'niche' sensing needs. Such systems are required to enhance safety, to allow assets to be used for longer, to schedule repair and maintenance better and to create a more cost effectively and improve the working environment for us all. The 'Grand Challenges' that will transform our world have produced many interesting opportunities for new sensor systems.

This talk will review, focusing on a series of 'case studies' carried out at City, University of London, the essential background to optical fibre sensors and then look at how a range of optical fibre-based techniques can be applied to topical problems and offer alternative, and better solutions to those from current technologies to enhance the environment and respond to the I4.0 era in which we live and work.

**Professor Grattan** graduated from Queen's University Belfast, followed by a PhD in laser physics. He then joined City University London and was appointed George Daniels Professor of Scientific Instrumentation and to a Royal Academy of Engineering Research Chair.

His research interests include the development and use of fibre optic and optical systems in the measurement of a range of physical and chemical parameters.

He was elected President of the International Measurement Confederation (IMEKO) in 2014, serving from 2015 to 2018. He was elected to the Royal Academy of Engineering, the UK National Academy of Engineering, in 2008. He was awarded the Officer of the Order of the British Empire (OBE) in November 2018.

Professor Grattan is the author and co-author of over seven hundred refereed publications in major international journals and a similar number at conferences and is the co-editor (with Professor B T Meggitt) of a five-volume topical series on optical fiber sensor technology. His work is highly cited by his peers nationally and internationally.



## VII-International School on Light Sciences and Technologies VII-ISLIST

June 17-21, 2024, Santander, Spain



**Prof. Valerio Pruneri**

**Head,**

Optoelectronics Group,  
Instituto de Ciencias  
Fotónicas, ICFO,  
Barcelona, Spain.

Invited Talk  
Thursday 20/11:00 h

### Engineered surfaces and devices for the display and imaging industries

There is a strong interest on increasing light-matter interaction, interference effects and enhancing surface properties for display and imaging. In the talk I will review some state-of-the-art and present the group's research on nano-structured transparent surfaces and devices for display screens with multiple functionalities and imaging systems. In particular, new designs and implementations of (i) transparent screens with conductive, antireflective or antimicrobial properties; (ii) large-field-of-view phase imagers for detecting material defects, morphology, biomarkers or cells with light matter interaction enhanced by nano-structuring; and (iii) quantum-enhanced imaging using photon correlations and entanglement.

**Valerio Pruneri** is an ICREA Professor, Corning Inc. chair and group leader at ICFO. Previously he had worked in industry, including Avanex Corporation and Corning OTI. His research spans from engineered optical materials to photonic devices and systems, and quantum technologies. He has about 70 granted or pending patent families and 110 invited talks at international events. He is currently coordinating several projects, including the Quantum Flagship Partnership QSNP and EuroQCI-Spain, aimed at, respectively, developing and deploying technology for quantum-secure networks. The research of his group has contributed to three spin-offs ([www.quside.com](http://www.quside.com), [www.luxquanta.com](http://www.luxquanta.com), [www.sixsenso.com](http://www.sixsenso.com)) with more than 70 employees and two of them awarded the EIC accelerator. A fourth one is being launched ([www.shinephi.tech](http://www.shinephi.tech)). He has received the Pirelli Fellowship, Philip Morris Prize, IBM Faculty Award, Duran Farell Prize, Paul Ehrenfest Best Paper Award, National Award for creation of innovative company (Luxquanta), Corning Inc. chair and RSEF-BBVA Prize for Physics, Innovation and Technology



**Prof. Sonia Martín López**

**Co-Head**

of Photonics Engineering  
Group, of Alcala de  
Henares, Spain

Invited Talk  
Thursday 20/12:10 h

### Distributed Acoustic Sensors (DAS) for Seafloor Seismic Monitoring: from earthquakes to tsunamis

In recent decades, the massive use of telecommunications has driven the need to lay millions of kilometers of optical fiber cables all over the planet, particularly in the oceans. Recent developments in the field of fiber optic sensing have revealed the possibility of transforming all these cables into powerful arrays of geophysical sensors, capable of measuring variables such as deformation and temperature with high sensitivity, over tens of kilometers of distance and providing spatial information. This talk will review the key technological aspects behind these systems, with special attention to the performance achievable in this application scenario.

**Prof. Martín-Lopez** received the Ph.D. degree from the Universidad Complutense de Madrid, in May 2006. The topic of her doctoral dissertation was on experimental and theoretical understanding of continuous wave pumped supercontinuum generation in optical fibers. She had a predoctoral stay with the Nanophotonics and Metrology Laboratory-EPFL, Switzerland. She has been involved as a Postdoctoral Researcher with the Applied Physics Institute and with the Optics Institute, Spanish Council as a Researcher for six years. She is currently an Associate Professor with the Photonics Engineering Group, University of Alcala. She is the author or coauthor of more than 200 papers in international refereed journals and conference contributions.

Afternoon/15:30- 17:45 h

Round Table II: *optical sensing technologies for real industrial applications and Lighting*

**Challenges to face on**

**Kenneth Grattan**, Director of Instrumentation & Sensors Research Centre, City-University of London, UK

*Challenges to face in optical sensing technologies for real industrial applications.*

**Roberto Osellame**, Director, Institute of Photonics and Nanotechnologies-CNR, Milano Polytechnic, Italy.



VII-International School on Light  
Sciences and Technologies VII-ISLiST  
June 17-21, 2024, Santander, Spain

*To reach useful integrated advanced microscopy in optofluidic Lab-on-Chip devices*

**Mariana Figueiro**, Director, Light and Research Center, (LHRC), Icahn School of Medicine, Mount Sinai, NY, USA

*challenges to be faced on next generation of human centred lighting*

**Mark Rea**, Former Director, Lighting Research Center Rensselaer Polytechnic Institute

*Uniting the science of circadian rhythms with real lighting applications and especially with hospitals and nursing homes*

**Moderator: Prof. JM López-Higuera**, Director ISLiST

THURSDAY END



VII-International School on Light  
Sciences and Technologies VII-ISLIST  
June 17-21, 2024, Santander, Spain



**Prof. Mark Rea**

Icahn School of  
Medicine at Mount  
Sinai,  
New York, NY USA

**Former Director**  
at LRC at RPI, USA

Round table II  
June 20/15:30 h

Invited Talk  
Friday 21/9:30 h

### Light's effects on human health, well-being, and behaviours

Unlike all other Standard International (SI) quantities and units characterizing the physical world, light is a biophysical construct. The candela quantifies light in terms of radiant intensity spectrally weighted in terms of the photopic luminous efficiency function  $V(\lambda)$  derived from human vision experiments conducted in the 1920s. From the candela, all other photometric quantities and units can be derived: luminous flux (lumens), illuminance (lux), and luminance (nits). The SI system was developed to support international commerce, and the standardization of quantities and units also supports science, except perhaps with the definition of light. Technically, light as defined in the SI system has no meaning to any other species, plant or animal, because their spectral sensitivities to optical radiation are different and never the same as  $V(\lambda)$ . Thus, instruments calibrated in terms of  $V(\lambda)$  can seriously mislead scientific investigation when it has been assumed that the instrumentation is agnostic with respect to the species under study. Moreover, there are multiple spectral sensitivity functions for humans, so light as it is formally defined has no meaning for quantifying the photic stimulus for many important human visual and non-visual functions like detection of moving objects in the periphery, glare judgments of automobile headlights, or regulation of circadian rhythms. Here again, scientists can be misled by photometric measurements based upon  $V(\lambda)$ . This presentation describes how the definition of light was developed, its limitations as a SI quantity, and how a family of spectral sensitivity functions can be used to quantify optical radiation in terms of important human visual and non-visual functions.

**Prof. Rea**, Ph.D., is Professor of Population Health Science and Policy at the Icahn School of Medicine at Mount Sinai. Dr. Rea is well known for his research in circadian photobiology, mesopic vision, psychological responses to light, lighting engineering, and visual performance. He is the author of more than 250 scientific and technical articles related to vision, lighting engineering, and human factors and was the editor-in-chief of the 8th and 9th editions of the Illuminating Engineering Society of North America (IESNA) *Lighting Handbook*. He has been elected Fellow of the Society of Light and Lighting (UK) and Fellow of the IESNA. In addition, he is recipient of the IESNA Medal. Dedicated to the notion that society undervalues light because we do not properly measure its benefits, his recent book *Value Metrics for Better Lighting* brings together a wide range of research to illustrate how the effective use of light can benefit society and the environment.



**Prof. Mariana Figueiro**

Director  
Light and Health Research  
Centre, Mount Sinai,  
USA

Round table II  
June 20/15:30 h  
Invited Talk  
Friday 21/11:00 h

### Principles of Indoor and Outdoor Lighting for Healthy Environments

Light incident on the retinae affects humans through three systems: visual, non-visual and perceptual. While the lighting characteristics affecting these systems differ, lighting designed to promote human health can effectively and comfortably meet the needs of all three systems. This presentation describes these systems, specifically focusing on how they are affected by the amount, spectrum, timing, duration and distribution of light stimuli. Key principles for designing and applying both indoor and outdoor lighting to promote health and well-being will be discussed. Particular emphasis will be placed on real-world examples of how energy-efficient, simple sensing technologies can be used to achieve those ends.

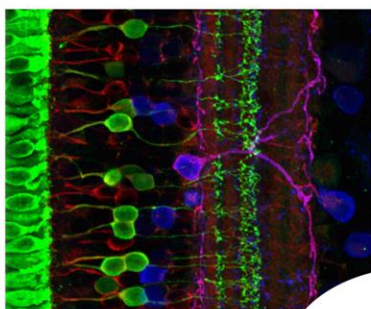
**Prof. Figueiro**, PhD, is the Director of the Mount Sinai Light and Health Research Center and Mount Sinai Endowed Professor of Light and Health Research at the Department of Population Health Science and Policy at the Icahn School of Medicine. Dr. Figueiro is well known for her research on the effects of light on human health, circadian photobiology, and lighting for older adults. In addition to performing basic research investigating the impact of light on physiology, Dr. Figueiro conducts field studies examining the impact of circadian-effective lighting in office spaces and works in nursing homes and assisted living facilities to use light to improve sleep, mood and behaviour in Alzheimer's disease and mild cognitive impairment patients. She also works with Mount Sinai physicians to improve the lives of those undergoing cancer treatments and who are suffering from Parkinson's disease and other neurological diseases. Among her many other projects, she is presently field-testing novel lighting systems to reduce falls.



**UIMP**  
Universidad Internacional  
Menéndez Pelayo

VII-International School on Light  
Sciences and Technologies VII-ISLIST  
June 17-21, 2024, Santander, Spain

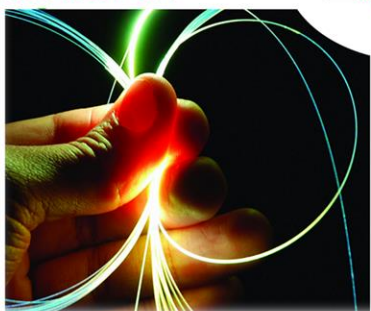
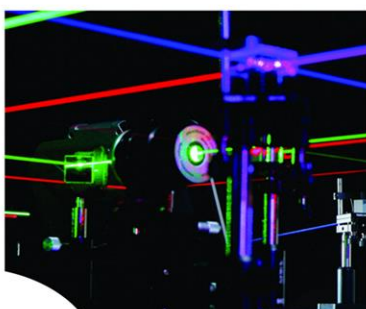
**ISLIST / UIMP**  
Universidad Internacional  
Menéndez Pelayo



International  
School on

**Light**

Sciences and  
Technologies



**VII-ISLIST**

**NOTEBOOK**



**UIMP**  
Universidad Internacional  
Menéndez Pelayo

VII-International School on Light  
Sciences and Technologies VII-ISLIST  
June 17-21, 2024, Santander, Spain



June 17 / 11:00 h / **Prof. Winzer**

**The Next Generation of Optical Communications will be massively Parallel**

NOTES:



June 17 / 12:10h / **Prof. Leeby**

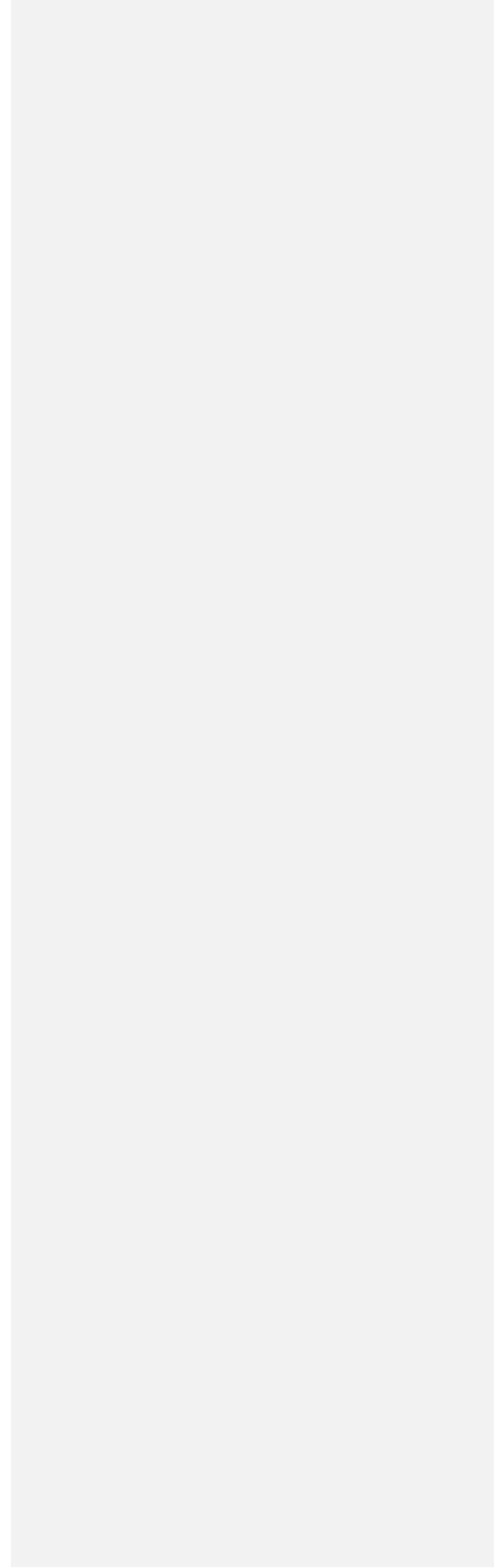
**Next Generation of Photonic Integrated Circuits as key for communications and sensing**





VII-International School on Light  
Sciences and Technologies VII-ISLIST  
June 17-21, 2024, Santander, Spain

**NOTES:**





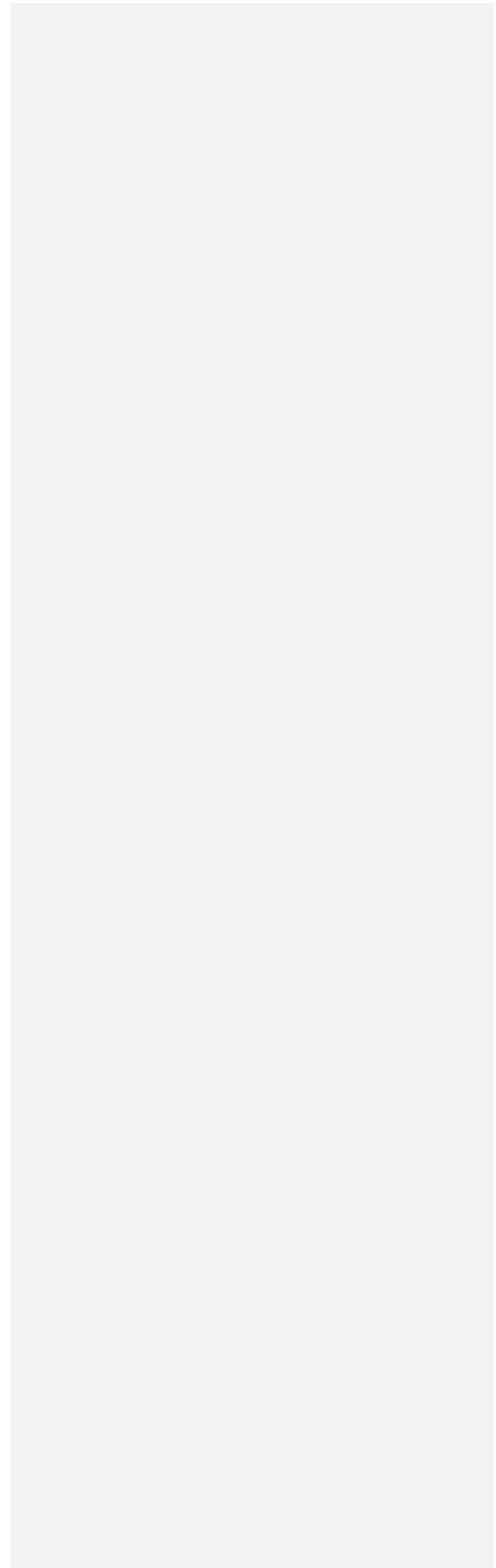
**UIMP**  
Universidad Internacional  
Menéndez Pelayo

VII-International School on Light  
Sciences and Technologies VII-ISLIST  
June 17-21, 2024, Santander, Spain



June 17 / 15:30 h / **Prof. Capmani**

**Programmable integrated Photonic Circuits: what?, why? and when**





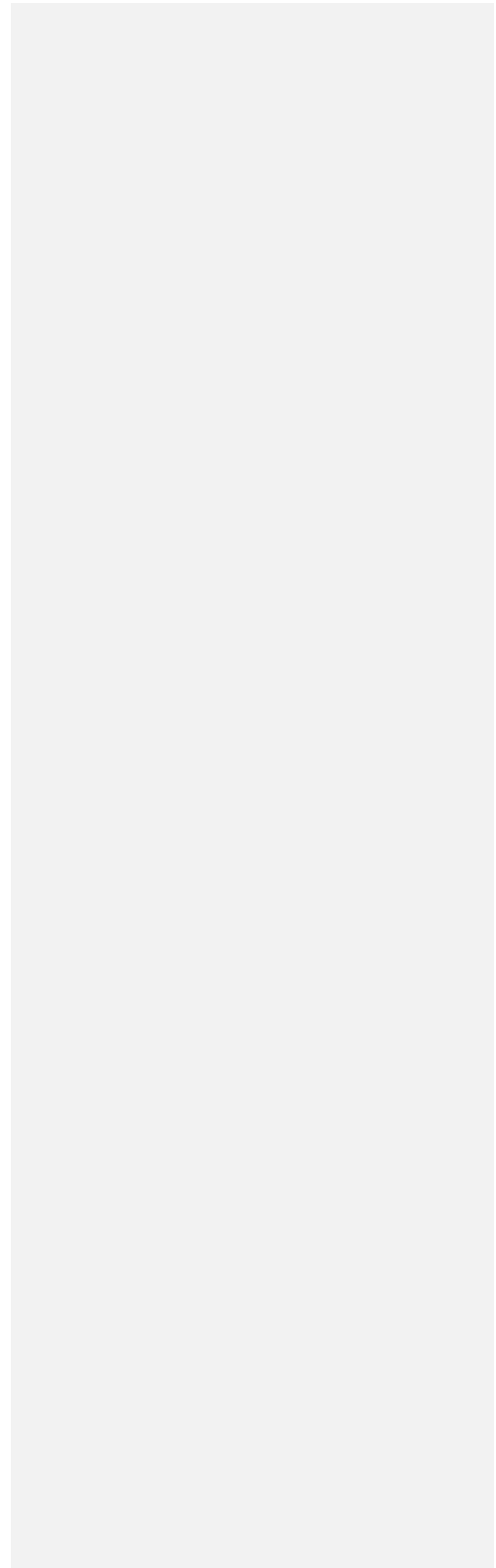
**UIMP**  
Universidad Internacional  
Menéndez Pelayo

VII-International School on Light  
Sciences and Technologies VII-ISLIST  
June 17-21, 2024, Santander, Spain



June 17 / 16:40 h / **Prof. Capmany**

**Microwave Photonics**





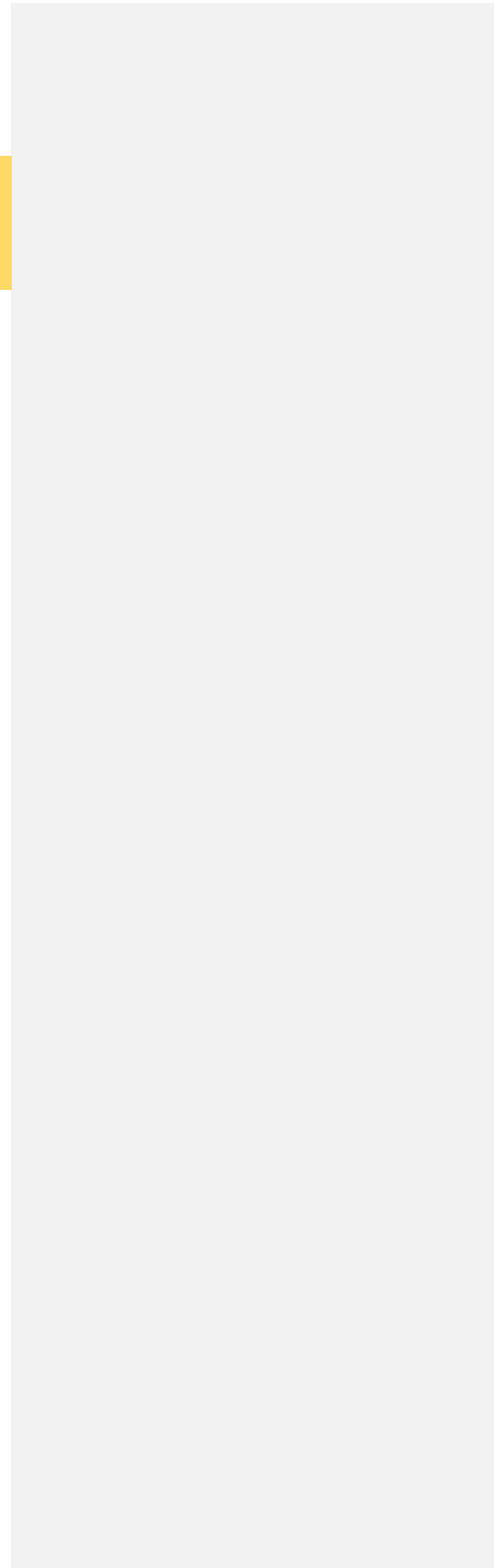
VII-International School on Light  
Sciences and Technologies VII-ISLIST  
June 17-21, 2024, Santander, Spain



June18 / 12:10 h / **Prof. Poletti**

**Hollow Core Optical fibres: a revolutionary technology for optical communications, quantum applications and laser delivery**

NOTES:





**UIMP**  
Universidad Internacional  
Menéndez Pelayo

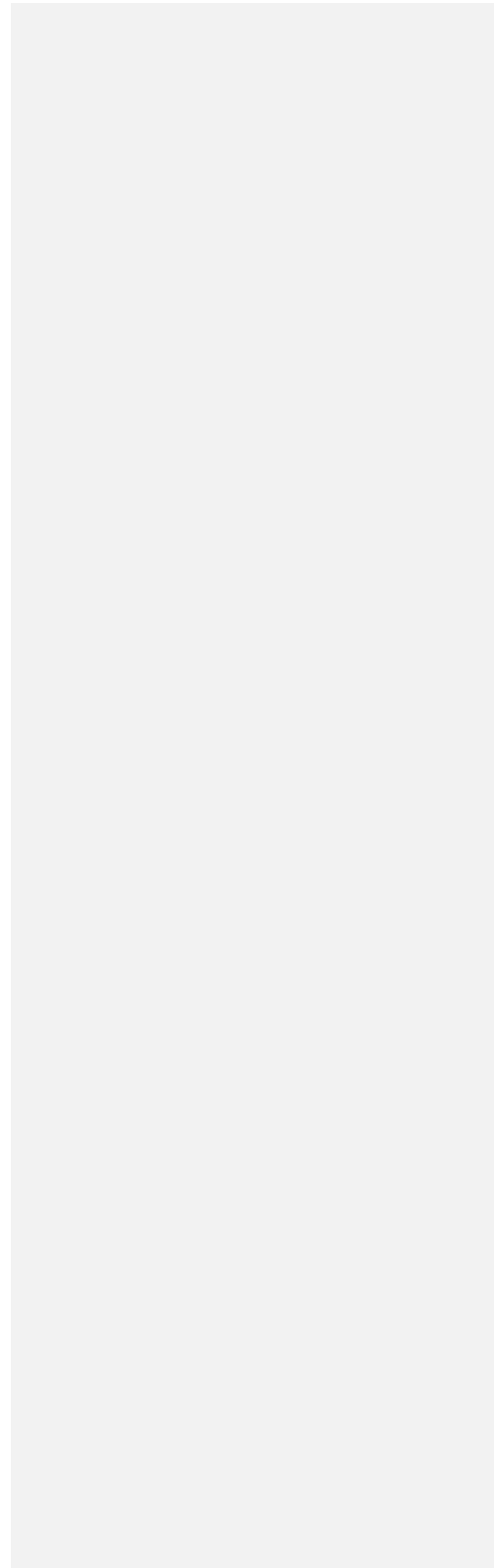
VII-International School on Light  
Sciences and Technologies VII-ISLIST  
June 17-21, 2024, Santander, Spain



June 18 / 15:30 h / **Prof. Rugi**

**Optical communications in space: Currents and trends**

**NOTES:**





**UIMP**  
Universidad Internacional  
Menéndez Pelayo

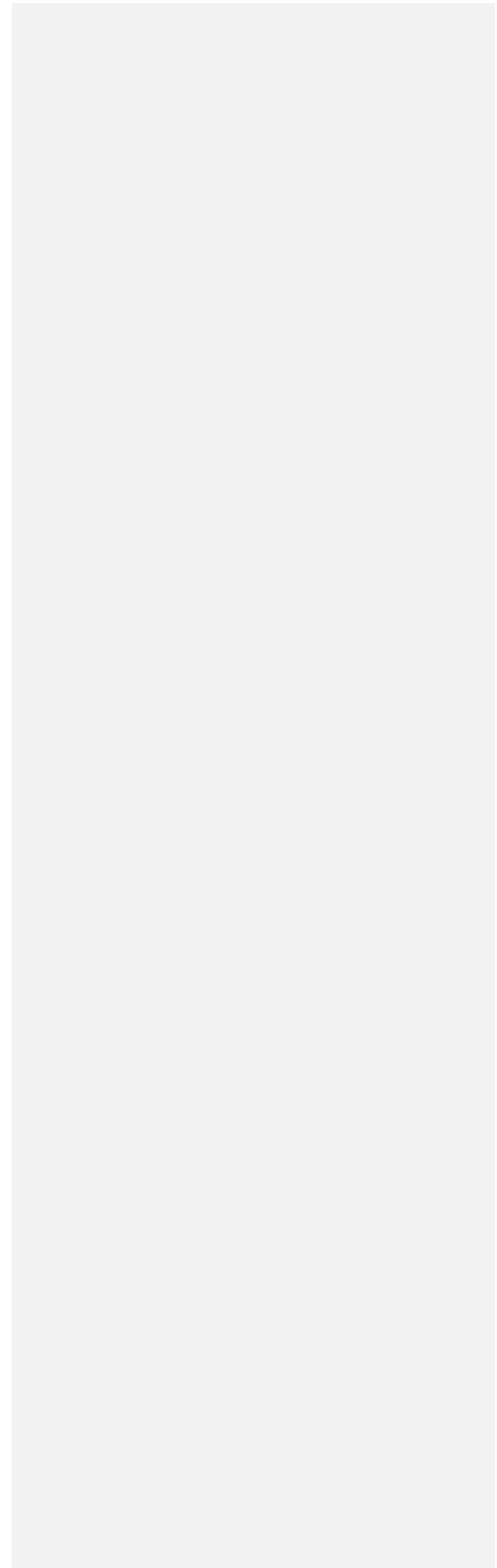
VII-International School on Light  
Sciences and Technologies VII-ISLIST  
June 17-21, 2024, Santander, Spain



June 18/ 16:40 h / **Prof. Koonen**

**Optical Wireless Communication –a green wireless communication  
technology with high potential and great prospects**

NOTES:





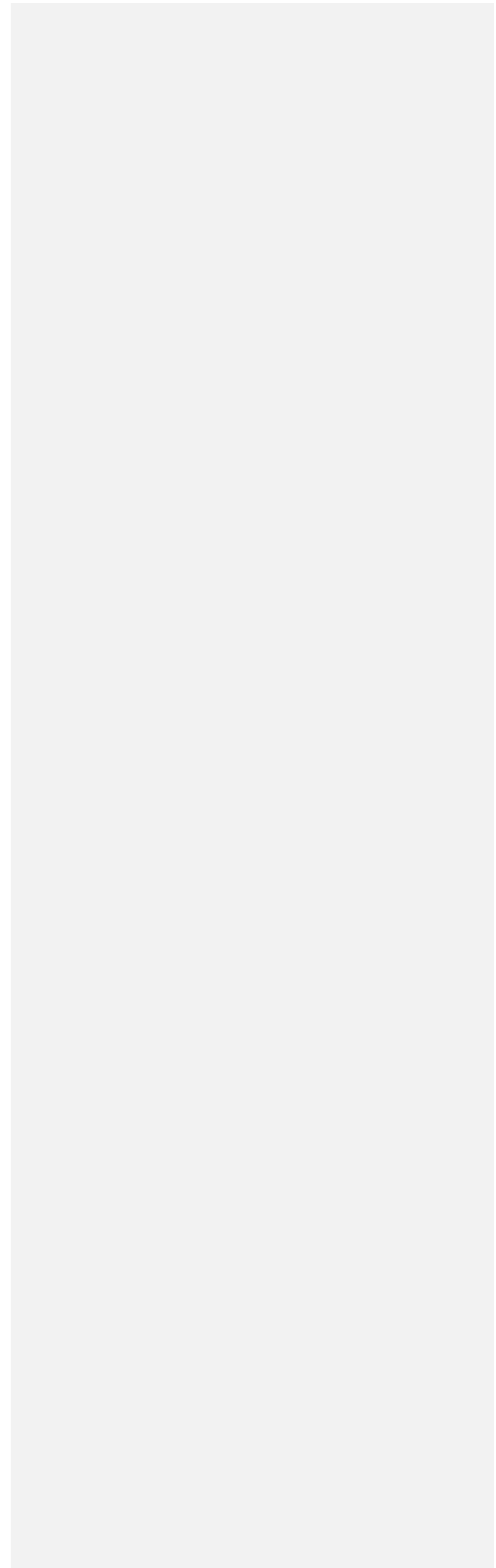
VII-International School on Light  
Sciences and Technologies VII-ISLIST  
June 17-21, 2024, Santander, Spain

June 18/15:30 h / Round Table I:

### Challenges to face on optical communications



NOTES:





**UIMP**  
Universidad Internacional  
Menéndez Pelayo

VII-International School on Light  
Sciences and Technologies VII-ISLIST  
June 17-21, 2024, Santander, Spain



June 19/ 9:30 h / **Prof. López-Higuera**

**Sensing using Light: doctrinal conception, currents and trends**

Comentado [LHJM1]:





**UIMP**  
Universidad Internacional  
Menéndez Pelayo

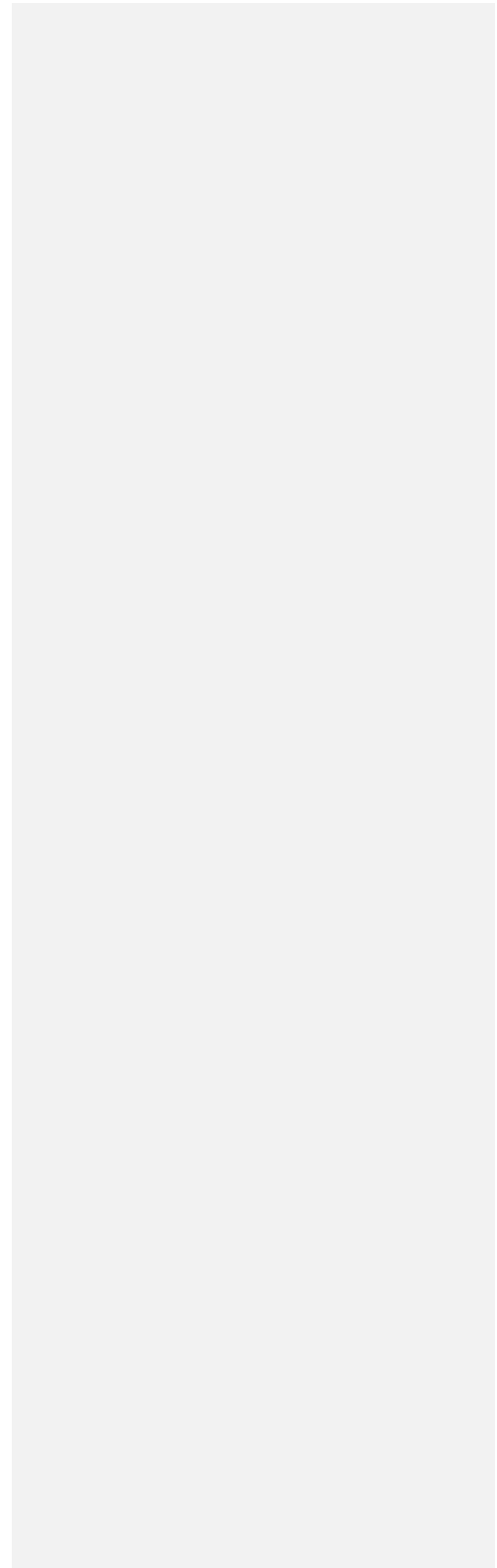
VII-International School on Light  
Sciences and Technologies VII-ISLIST  
June 17-21, 2024, Santander, Spain



June 19 / 11:00 h / **Dra. O'Keefe**

**Optical Fibre Sensors for Radiotherapy Dosimetry: Challenges and Opportunities**

NOTES:





**UIMP**  
Universidad Internacional  
Menéndez Pelayo

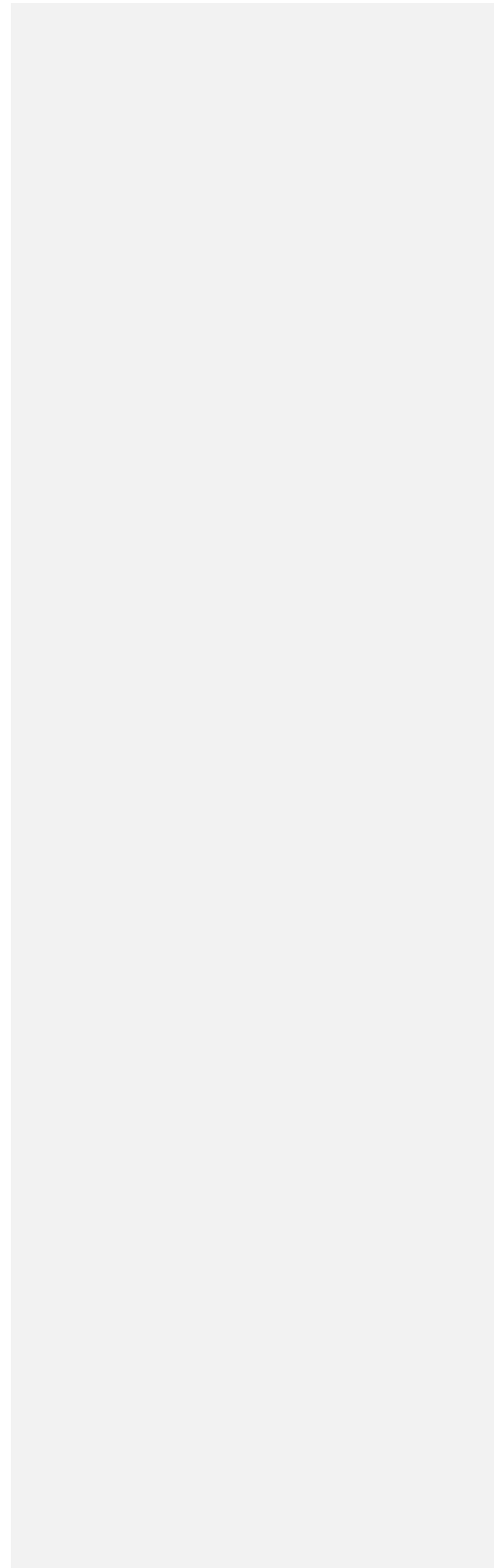
VII-International School on Light  
Sciences and Technologies VII-ISLIST  
June 17-21, 2024, Santander, Spain



June 19 / 12:10h / **Dr. Menoret**

**Cold atom quantum sensors for field applications**

NOTES:





VII-International School on Light  
Sciences and Technologies VII-ISLIST  
June 17-21, 2024, Santander, Spain



June 19 / 15:30 h / **Prof. Osellame**

**Advanced photonic and optofluidic devices fabricated in glass using femtosecond lasers for Lab-On-Chip sensors**

NOTES:



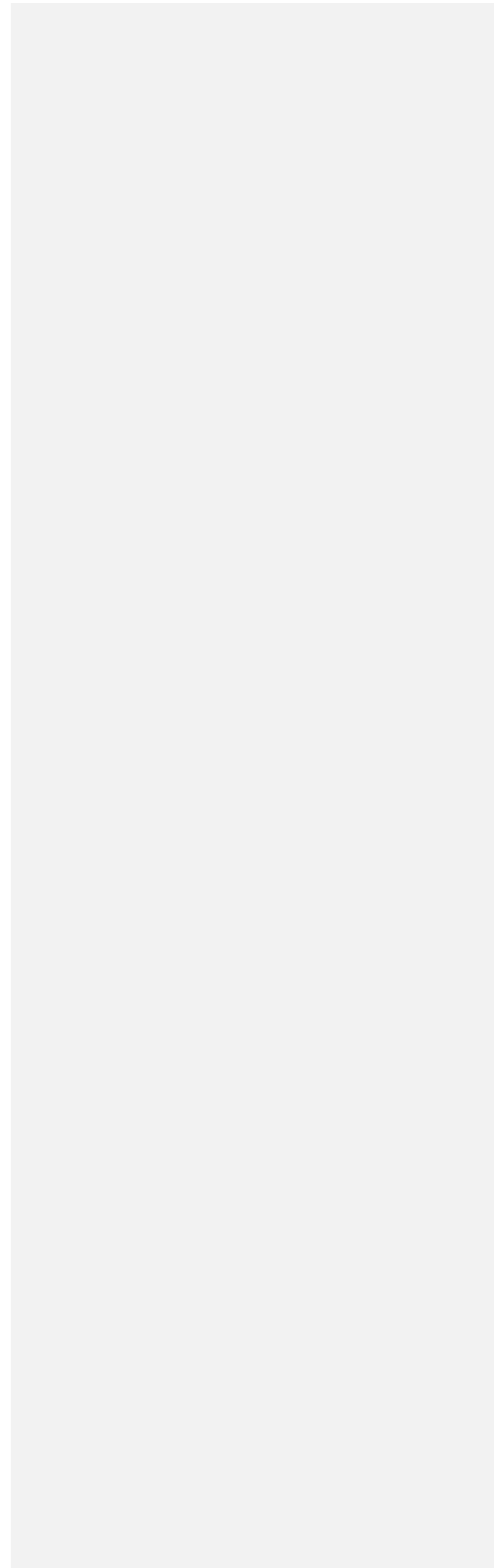
VII-International School on Light  
Sciences and Technologies VII-ISLIST  
June 17-21, 2024, Santander, Spain



June 19 / 16:40 h / **Prof. Cusano**

**Lab on Fiber: A key enabling technology for precision medicine”**

**NOTES:**





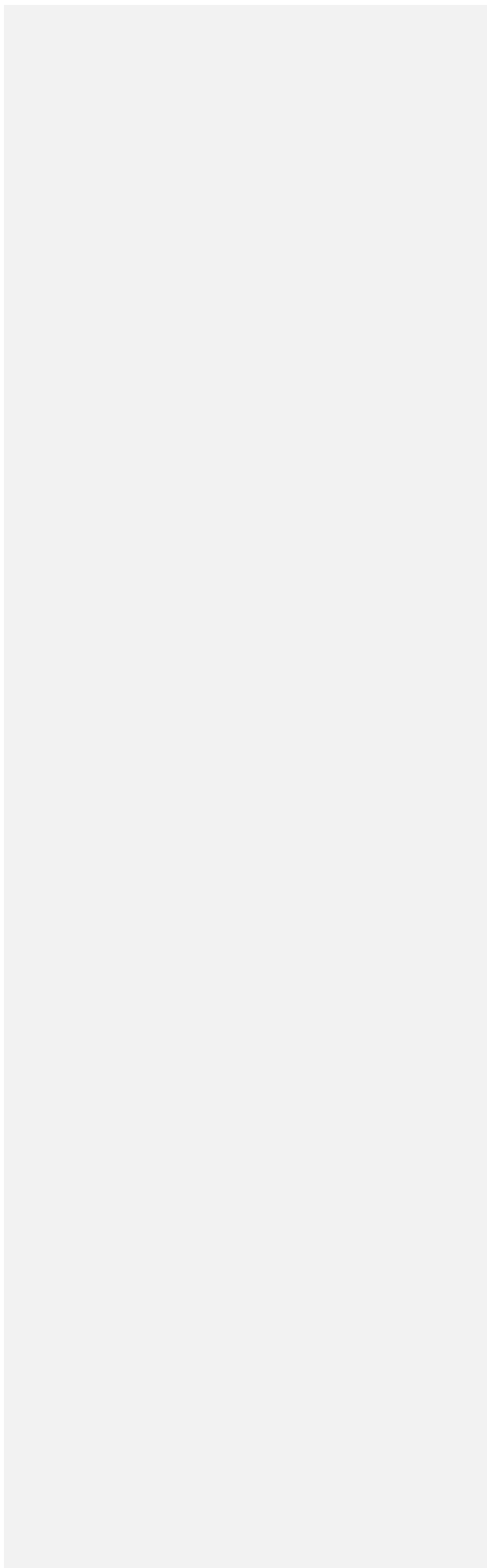
VII-International School on Light  
Sciences and Technologies VII-ISLIST  
June 17-21, 2024, Santander, Spain



June 20 /9:30 h / **Prof. Grattan**

**Optical sensing technologies for key environmental measurands in the  
I4.0 era**

NOTES:





**UIMP**  
Universidad Internacional  
Menéndez Pelayo

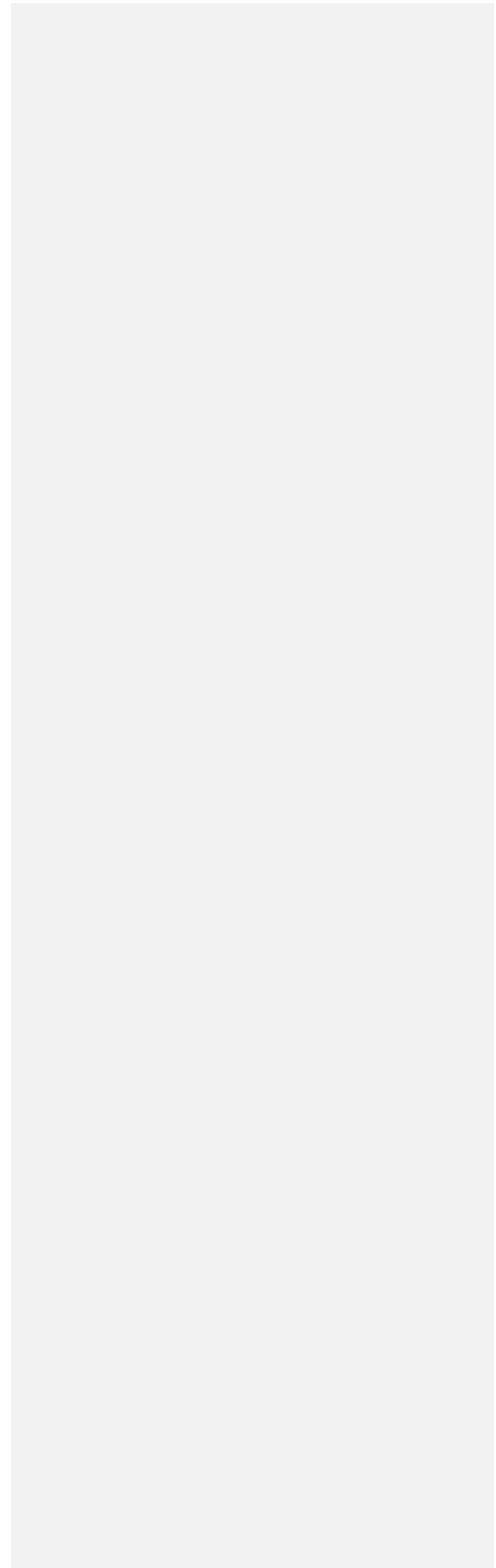
VII-International School on Light  
Sciences and Technologies VII-ISLIST  
June 17-21, 2024, Santander, Spain



June 20 / 11:00 h / **Prof. Pruneri**

**Engineered surfaces and devices for the display and imaging industries**

NOTES:





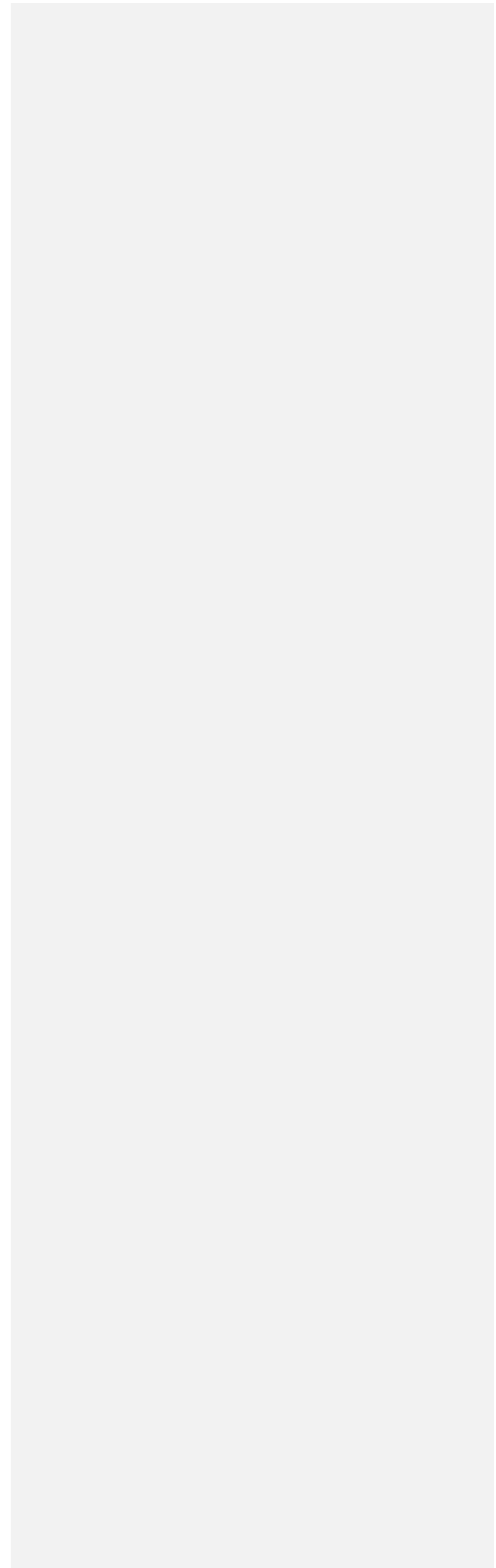
VII-International School on Light  
Sciences and Technologies VII-ISLIST  
June 17-21, 2024, Santander, Spain



June 20 / 12:10 h / **Prof. Martin-López**

**Distributed Acoustic Sensors (DAS) for Seafloor Seismic Monitoring:  
from earthquakes to tsunamis**

NOTES:





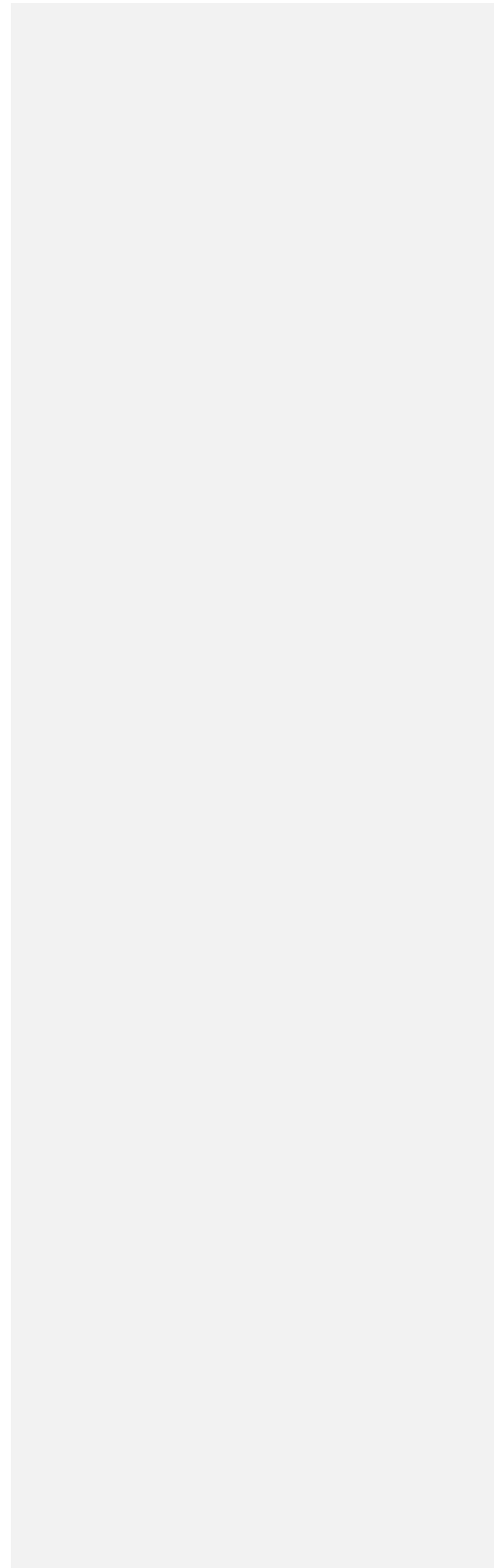
VII-International School on Light  
Sciences and Technologies VII-ISLIST  
June 17-21, 2024, Santander, Spain

June 20/15:30 h / Round Table II:

**Light on treatments and tools: Challenges to face**



NOTES:







**UIMP**  
Universidad Internacional  
Menéndez Pelayo

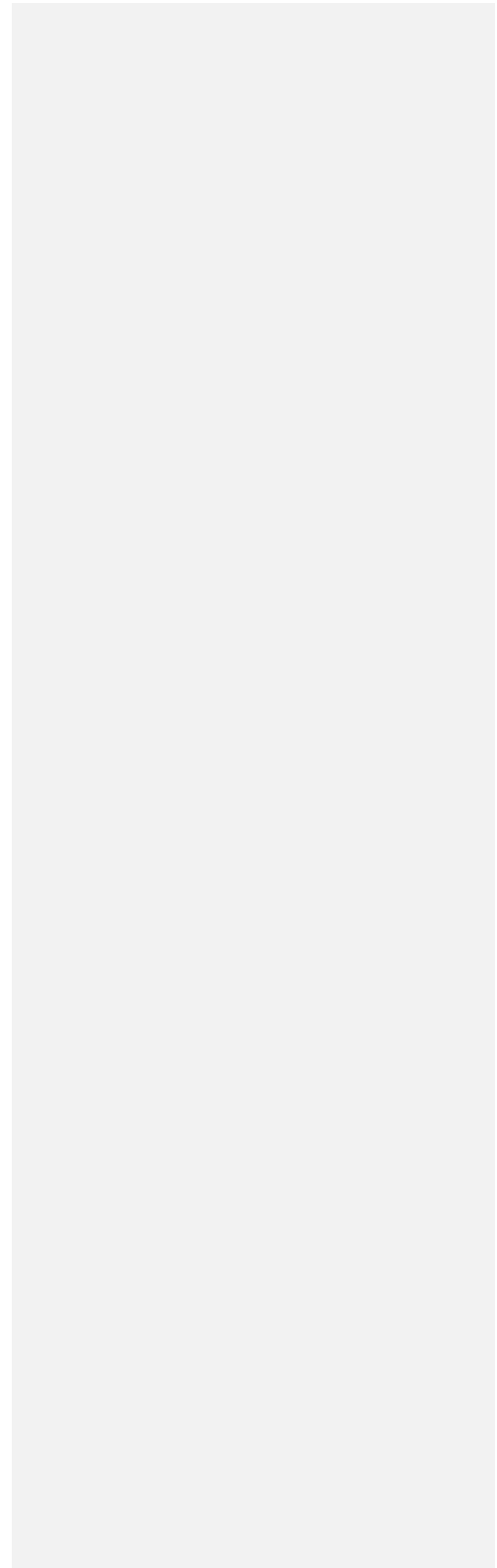
VII-International School on Light  
Sciences and Technologies VII-ISLIST  
June 17-21, 2024, Santander, Spain



June 21 / 9:30h / **Prof. Rea**

**Light's effects on human health, well-being, and behaviours**

**NOTES:**





**UIMP**  
Universidad Internacional  
Menéndez Pelayo

VII-International School on Light  
Sciences and Technologies VII-ISLIST  
June 17-21, 2024, Santander, Spain



June 21 / 11:00 h / **Prof. Figueiro/closing Talk**

**Principles of Indoor and Outdoor Lighting for Healthy Environments**

**NOTES:**

