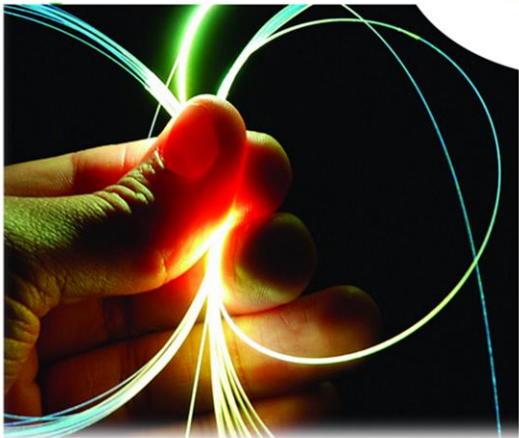


International
School on

Light

Sciences and
Technologies



Core: Light in Health and Medicine

Santander 19-23 de junio de 2023
(Sala Riancho, Palacio de la Magdalena, Santander)

PROGRAM (provisional)



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VI-International School on Light
Sciences and Technologies VI-ISLiST
June 19-23, 2023, Santander, Spain

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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 21st 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 20th 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 (every fourth week of 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 Health and medicine*** is the core of this 2023 edition: VI-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, and Beat Neuenschwander, 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 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 meeting.

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 VI 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 (Fyla Lasers and Ambar Telecommunications)** and **Bronze (OZ Optics, Semicrol, ERZIA, Lasing, Ayuntamiento de Santander, Colegio de Medicos de Cantabria, CIBER-BBN, hotel Santemar and the Photonics Engineering Group** of the University of Cantabria, CIBER-BBN and IDIVAL. Without these Sponsor and Collaborators, this top-quality school and over 30 Student Grants (already allocated from over 20 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 19, 2023) to Friday (June 23, 2023). During the week along seventeen outstanding lectures a wide set of key topics on light and light sciences and technologies useful for both to supervise and maintain the health and also to recover the health will be presented and discussed. How light affect the mood and the cognitive behaviours, technique to supervise, to enable more accurate diagnosis or to do treatments or to do tools for regenerative medicine including to print tissues or to review the possibility to generate protons for proton-therapy using very intense lasers will be presented. In the format of two round tables challenges to face concerning light technologies on diagnosis and monitoring task will be commented and discussed along the first one (Monday afternoon); Along the second one, (Thursday afternoon), challenges to face on light-based treatments and tools to maintain or/and to recover the health will be presented and discussed.

General Schedule

Time	Monday 19 th	Tuesday 20 th	Wednesday 21 st	Thursday 22 nd	Friday 23 rd
9:30		Dr. Angelos Karlas Group Leader, Institute for Biological and Medical Imaging at the Helmholtz Zentrum München, Munich, Germany Listening to Light: Advances in Optoacoustic Imaging	Prof. Kishan Dholakia Director, Centre of Light for life and School of Biological Sciences, University of Adelaide, Australia Optical tweezers: Trapping and Manipulation for biomedical applications	Dr. Alexis Méndez President, MCH Engineering, Alameda, CA, USA Optical Fiber Technology on Biomedical Applications	Prof. Carlos Molpeceres Director, Laser Center, Polytechnic University of Madrid, Spain Laser fabrication technologies helping the regenerative medicine
10:15	Opening Remarks				
10:40	Coffee Break	Coffee Break	Coffee Break	Coffee Break	Coffee Break
11:00	Prof. Aydogan Ozcan / Opening talk Director, Bio&Nano-Photonics Laboratory, University of California, Los Angeles, USA Deep- learning enabled computational microscopy and diffractive imaging	Prof. Mariana G. Figueiro Director, Light and Health Research Center (LHRC), Icahn School of Medicine, Mount Sinai, NY, USA Light's effects on human health, well-being, and behaviour	Prof. Paola Taroni Head, Photonics for health, Food and Cultural Heritage, Politecnico di Milano Milano, Italy Optical Diffuse Systems for effective Management of breast cancer	Prof. Tayyaba Hasan Harvard Medical School and MIT, Wellman Center for Photomedicine, Boston, USA Light to fight cancer and infectious diseases: The Yin and Yang of the PDT	Prof. Mark Rea /closing talk Icahn School of Medicine, at Mount of Sinai, New York NY, USA Bridging the science of Circadian Rhythms to real-world applications
12:10	Prof. JM López-Higuera Head, Photonic Engineering Group, University of Cantabria, Ciber-BBN and IDIVAL, Spain Light in Health and Medicine: an introduction	Prof. Michael Schmitt Institute of Photonic Technology Jena, Germany Raman based Spectroscopic techniques for Biomedical diagnosis life Sciences	Prof. Laura Lechuga Head, Nanobiosensors and Bioanalytical Applications Group, ICN2, CSIC, CIBER-BBN and BIST, Barcelona, Spain Bio-Photonic Sensors after the COVID-19 pandemic	Dr. Alessandro Corsi Director, Simple Vulnology Unit at the IRCCS, San Raffaele Hospital, Milano, Italy Photo-biomodulation for effective treatment of skin lesions	12:30 Closing Remarks, ISLIST-2024 Announcement and Diploma Delivery
13:30-15:0	Lunch	Lunch	Lunch	Lunch	
15:30	Round Table I / Challenges to face on light in diagnostics Aydogan Ozcan , Challenges to face wearables devices based on Smartphone platforms Angelos Karlas , Challenges to face on Optoacoustic Imaging in Pharmacology Marina G. Figueiro , Challenges on lighting to improve the way of older adults Pablo Artal , light-based techniques to reach very effective, efficient and socialized diagnosis of humans' vision Moderator: JM López-Higuera	Prof. Pablo Artal Director, Laboratorio de Óptica, University of Murcia, Murcia, Spain Light based techniques to evaluate vision	Dra. Valentina Emiliani Director of Photonics Department, Head of WFEMO, CNRS Vision Institute, Paris, France All-optical control of neuronal circuits by wave front shaping and optogenetics	Round Table II /Challenges on light based treatments and tools Susana Marcos , challenges and results on light and silk-based biopolymers in ocular regeneration (Silk-Eye project) Carlos Molpeceres , lasers technology in regenerative medicine Valentina Emiliani , rights for humans' brain Tayyaba Hasan , on PDT translation to Clinic Mark Rea , Bridging the science of Circadian Rhythms to real- world applications Moderator: JM López-Higuera	
16:40		Prof. Susana Marcos D. R. W. Director, Center for Visual Science, The Institute of Optics, University of Rochester, NY, USA Light based techniques for human vision correction	Prof. Turgut Durduran Head, Medical Optics Group, Instituto de Ciencias Fotónicas, ICFO, Barcelona, Spain. Noninvasive measurement of deep tissue hemodynamics and oxygen metabolism at the intensive care		
17:55			Family Photo Santander City Council Reception		

PROGRAM

Monday, 19

Morning

10:15 h

Opening Ceremony

10:40 h / **Break**

11:00 h Opening Lecture

Deep-learning enabled computational microscopy and diffractive imaging

Prof. Aydogan Ozcan

Director, Bio&Nano-Photonics Laboratory, **University of California**, Los Angeles, USA.

12:10 h / Introductory Lecture

Light in Health and Medicine: a general overview

Prof. José Miguel López-Higuera

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

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

Afternoon

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

Light in diagnostics: Challenges to face on

Prof. Aydogan Ozcan, University of California, Los Angeles, USA:

wearables devices based on Smartphone platforms

Dr. Angelos Karlas, Helmholtz Zentrum München, Germany:

Optoacoustic Imaging in Pharmacology

Prof. Marina G. Figueiro, Mount Sinai Hospital, NY, USA:

lighting to improve the way of older adults

Prof. Pablo Artal, University of Murcia, Spain:

light-based techniques to reach very effective, efficient and socialized diagnosis of humans' vision

Prof. JM López-Higuera, Director ISLiST, Moderator

Tuesday, 20

Morning: Light in Diagnostics and Mood

9:30 h / Invited keynote

Listening to Light: Advances in Optoacoustic Imaging

Dr. Angelos Karlas

Group Leader, Institute for Biological and Medical Imaging at the **Helmholtz Zentrum München**, Munich, Germany

10:40 h / Break

11:00 h / Invited Lecture

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

Prof. Mariana G. Figueiro

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

12:10 h / Invited Lecture

Raman based Spectroscopic techniques for Biomedical diagnosis Life Sciences

Prof. Michael Schmitt

Group Leader, Institute of Photonic Technology, Jena, Germany

13:30-15:00 h / Lunch Time

Afternoon: Light technologies in human visual system

15:30-16:30 / Invited Lecture

Light based techniques to evaluate vision

Prof. Pablo Artal

Director, Laboratorio de Óptica, **University of Murcia**, Murcia, Spain

16:40h / Invited Lecture

Light based techniques for human vision correction

Prof. Susana Marcos

D. R. W. Director, Center for Visual Science, The Institute of Optics, **University of Rochester**, NY, USA

Wednesday, 21

Morning: **Light in Diagnostic/Sensing and Treatment**

9:30 h / Invited Talk

Optical Tweezers: trapping and manipulation for biomedical applications

Prof. Kishan Dholakia

Director, Centre of Light for life and School of Biological Sciences, University of Adelaide, Australia

10:40h / Break

11:00h / Invited Talk

Optical Diffuse Systems for effective Management of breast cancer

Prof. Paola Taroni

Head, Photonics for health, Food and Cultural Heritage, Politecnico di Milano, Italy

12:10h / Invited Talk

Bio-Photonic Sensors after the COVID-19 pandemic

Prof. Laura Lechuga

Head, Nanobiosensors and Bioanalytical Applications Group, ICN2, CSIC, CIBER-BBN and BIST, Barcelona, Spain

13:30 -15:00h / Lunch Time

Afternoon: **Light in the human's Brain**

15:30-16:30 / Invited Talk

All-optical control of neuronal circuits by wave front shaping and optogenetics

Dr. Valentina Emiliani

Director of Photonics Department, Head of WFEMO, CNRS Vision Institute, Paris, France

16:40h / Invited Talk

Noninvasive measurement of deep tissue hemodynamics and oxygen metabolism at the intensive care

Prof. Turgut Durduran

Head, Medical Optics Group, Instituto de Ciencias Fotónicas, ICFO, Barcelona, Spain.

17:55 h VI 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.

Thursday, 22

Morning: **Light in Supervision, Sensing and Treatment**

9:30h / Invited Lecture

Optical Fiber technology on Biomedical Applications

Dr. Alexis Méndez

President, MCH Engineering LLC, Alameda, California, USA

10:40h / Break

11:00h / Invited Lecture / **To Be Confirmed**

Light to fight cancer and infectious diseases: The Yin and Yang of PDT

Prof. Tayyaba Hasan

Director, Harvard Medical School and MIT, Wellman Center for Photomedicine, Boston, USA

12:10h / Invited talk

Photobiomodulation for effective treatment of skin lesions

Dr. Alessandro Corsi

Director, Simple Vulnology Unit at the IRCCS, San Raffaele Hospital, Milan, Italy

13:30 -15:00h / Lunch Time

Afternoon

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

Treatments and tools using light-based technologies

Challenges to face on

Susana Marcos, University of Rochester, NY, USA:

Light and silk-based biopolymers in ocular regeneration (Silk-Eye project)

Carlos Molpeceres, Laser Center, Polytechnic University of Madrid, Spain:

Laser based technology for regenerative medicine

Valentina Emiliani, Photonics Department, CNRS Vision Institute, Paris, France:

Optogenetic for light control of biological Systems

Tayyaba Hasan, Harvard Medical School and MIT, Wellman Center for Photomedicine, Boston, US:

PDT translation to Clinic

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

How does the light exposure affect memory and cognitive vitality?

Prof. JM López-Higuera, Director ISLiST, Moderator

Friday, 24

Morning

Laser light in regenerative and protons generation

9:30-10:40h / invited Lecture

Laser fabrication technologies helping the regenerative medicine

Prof. Carlos Molpeceres

Director, Director, Laser Institute, Polytechnic University of Madrid, Spain

10:40h / Break

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

Bridging the science of circadian rhythms to real-world applications

Prof. Mark Rea

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

12:15 h

Closing Remarks, Announcement of ISLiST 2024 and Diploma Delivery

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

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>Prof. Aydogan Ozcan</p> <p>Director Bio&Nano-Photonics Laboratory, Chancellor's Professor University of California, Los Angeles, USA</p> <p>Opening Invited Talk Monday, June 19 11:00 hours</p> <p>Round table I Monday, June 19 15:30 hours</p>	<p>Deep-learning enabled computational microscopy and diffractive imaging</p> <p>I will discuss diffractive optical networks designed by deep learning to all-optically implement various complex functions as the input light diffracts through spatially-engineered surfaces. These diffractive processors designed by deep learning have various applications, e.g., all-optical image analysis, feature detection, object classification, computational imaging and seeing through diffusers, also enabling task-specific camera designs and new optical components for spatial, spectral and temporal beam shaping and spatially-controlled wavelength division multiplexing. These deep learning-designed diffractive systems can broadly impact (1) all-optical statistical inference engines, (2) computational camera and microscope designs and (3) inverse design of optical systems that are task-specific. In this talk, I will give examples of each group, enabling transformative capabilities for various applications of interest in e.g., autonomous systems, defense/security, telecommunications as well as biomedical imaging and sensing.</p>	<p>Prof. Ozcan Dr. Aydogan Ozcan is the Chancellor's Professor and the Volgenau Chair for Engineering Innovation at UCLA and an HHMI Professor with the Howard Hughes Medical Institute. He is also the Associate Director of the California NanoSystems Institute. Dr. Ozcan is elected Fellow of the National Academy of Inventors (NAI) and holds >60 issued/granted patents in microscopy, holography, computational imaging, sensing, mobile diagnostics, nonlinear optics and fiber-optics, and is also the author of one book and the co-author of >1000 peer-reviewed publications in leading scientific journals/conferences. Dr. Ozcan received major awards, including the Presidential Early Career Award for Scientists and Engineers (PECASE), International Commission for Optics ICO Prize, Dennis Gabor Award (SPIE), Joseph Fraunhofer Award & Robert M. Burley Prize (Optica), SPIE Biophotonics Technology Innovator Award, Rahmi Koc Science Medal, SPIE Early Career Achievement Award, Army Young Investigator Award, NSF CAREER Award, NIH Director's New Innovator Award, Navy Young Investigator Award, IEEE Photonics Society Young Investigator Award and Distinguished Lecturer Award, National Geographic Emerging Explorer Award, National Academy of Engineering The Grainger Foundation Frontiers of Engineering Award and MIT's TR35 Award for his seminal contributions to computational imaging, sensing and diagnostics. Dr. Ozcan is elected Fellow of Optica, AAAS, SPIE, IEEE, AIMBE, RSC, APS and the Guggenheim Foundation, and is a Lifetime Fellow Member of Optica, NAI, AAAS, and SPIE.</p>
 <p>Prof. José Miguel López-Higuera</p> <p>Head Photonic Engineering Group of University of</p>	<p>Light in Health and Medicine: a general overview</p> <p>Light Science and Technologies (Photonics) now touches almost every area of our lives. It is considering a key technology for the development of the counties in this 21st century. Photonics is essential in the conversion of sunlight to electrical, thermal, and chemical energy and in the meantime it makes an important and significant contribution to reducing energy consumption. Light based technologies are also essential for the industry 4.0 and many of their involved processes including the manufacturing using laser based techniques.</p>	<p>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&i projects, acting in more than 100 of them as manager. He has contributed with more than 850 research publications and 25 patents and also directed 20 PhD theses. He has worked as an editor and co-</p>

Cantabria, CIBER-BBN and
IDIVAL, Spain

Talk
June19 / 12:10 h

Round Tables I & II
moderator

In this talk, after a brief mention of what should be understood as the Photonics Field we will go into key characteristics of the interaction light-human tissues. Then, a wide set of significant cases of the application of light, light-based technologies and tools in health and medicine will be presented and very briefly discussed in the presentation. After that, the attendees will be aware of the significant impact of Light Sciences and Technologies on hot topics concerning the core of this VI ISLiST edition.

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 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.

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

Light in diagnostics: Challenges to face

Prof. Aydogan Ozcan, University of California, Los Angeles, USA

on wearables devices based on Smartphone platforms

Prof. Vasilis Ntziarchristos, Helmholtz Zentrum München, Germany

on Optoacoustic Imaging in Pharmacology

Prof. Marina G. Figueiro, Mount Sinai Hospital, NY, USA

on lighting to improve the way of older adults

Prof. Pablo Artal, University of Murcia, Spain

on light-based techniques to reach very effective, efficient and socialized diagnosis of humans' vision

Prof. JM López-Higuera, Director ISLiST, Moderator

MONDAY END



Dr. Angelos Karlas

Group Leader

Institute of Biological and
Medical Imaging,
Helmholtz Zentrum
München

Professor and Chair of
Biological Imaging,
Technische Universität
München
Munich, Germany

Invited keynote
Tuesday 20/9:30h
Round table I
June 19 /15:30 h

**Listening to Light: Advances in
Optoacoustic Imaging**

Biological discovery is a driving force of biomedical progress. With rapidly advancing technology to collect and analyze information from cells and tissues, we generate biomedical knowledge at rates never before attainable to science. Nevertheless, conversion of this knowledge to patient benefits remains a slow process. To accelerate the process of reaching solutions for healthcare, it would be important to complement this culture of discovery with a culture of problem-solving. In this talk, we focus on advances in optical and optoacoustic technologies from the perspective of problem solving, in particular in the areas of early disease detection and monitoring. We show how new classes of imaging systems and sensors can play a critical role in the frequent assessment of biochemical and pathophysiological parameters of systemic diseases, complement knowledge from – omic analytics and drive integrated solutions for improving healthcare.

Dr. Angelos Karlas studied Medicine (M.D.) as well as Electrical and Computer Engineering (Dipl.-Ing.) at the Aristotle University of Thessaloniki, Greece. He holds a Master of Science (M.Sc.) in Medical Informatics from the same university and a Master of Research (M.Res.) in Medical Robotics and Image-Guided Interventions from Imperial College London (DIC), UK. He is currently working as advanced clinical resident at the Department for Vascular and Endovascular Surgery at the 'rechts der Isar' University Hospital in Munich, Germany. He is also the 'Tenure-Track' Group Leader of the interdisciplinary Clinical Bioengineering Group at the Institute for Biological and Medical Imaging, Helmholtz Center Munich, Germany. He completed his PhD (Dr.rer.nat.) in Experimental Medicine and he is currently a Dr. med. and Lecturer (Privatdozent) candidate at the Technical University of Munich, Germany. His main research interests are in the areas of vasometabolic and optoacoustic imaging/sensing, AI-based biomarkers as well as image-guided vascular interventions.



**Prof. Mariana
Figueiro**

Director

Light and Health Research
Centre, Mount Sinai, USA

Invited Talk
Tuesday 20/11:00 h

Round table I
June 19 /15:30 h

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

Almost every living thing experiences internal biological cycles that repeat daily. Known as circadian rhythms, in humans these cycles regulate all metabolic, physiological, psychological, and behavioural processes (e.g., sleeping and waking, hormone production, body temperature). Research shows that the daily pattern of light and dark incident on the retinas sets the timing for many circadian rhythms, synchronizing our master biological clock with the 24-hour solar cycle at our place and time on Earth. Asynchrony between our circadian rhythms and local time, however, as might occur between our preferred sleep patterns and work schedules or air travel across several time zones, can lead to social, behavioural, and metabolic health problems such as diabetes, obesity, cardiovascular disease, and cancer. Laboratory and field studies have demonstrated that lighting interventions can help to remedy circadian disruption and reduce health risks. Light also has an acute alerting effect on humans, like a cup of coffee.

Mariana G. Figueiro, Ph.D., is Director of the Light and Health Research Center (LHRC) at Mount Sinai and Professor of Population Health Science and Policy at the Icahn School of Medicine at Mount Sinai. She was Director of the Lighting Research Center (LRC) and Professor of Architecture at Rensselaer Polytechnic Institute. She has also served as Light and Health Program Director at the LRC since 1999. Figueiro is the recipient of the 2007 NYSTAR James D. Watson Award, the 2008 Office of Naval Research Young Investigator Award, and the 2010 Rensselaer James M. Tien '66 Early Career Award. In 2013 she was elected Fellow of the Illuminating Engineering Society. Prof. Figueiro is well known for her research on the effects of light on human health, circadian photobiology, and lighting for older adults. In 2013, she was elected Fellow of the Illuminating Engineering Society. She is the author of more than 150 scientific articles in her field of research, and her research is regularly featured in national media, including a TEDMED talk. Her research is regularly featured in national media including *The New York Times*, *The Wall Street Journal*, and *Scientific American*.



**Prof. Dr. Michael
Schmitt**

Group Leader

Institute of Physical
Chemistry, Friedrich-
Schiller University Jena,
Germany, Helmoltzweg
4, D-07743 Jena

Invited Talk
Tuesday, June20 / 12:10 h

Round table I
MoJune19 / 15:30 h

**Raman-based Spectroscopic
techniques for biomedical
diagnosis and life sciences**

Raman based technologies have shown its great impact on life sciences and biomedical research and complement established analytical approaches like fluorescence. While the advantages of Raman spectroscopy are its unprecedented high molecular specificity and its versatility it suffers from its poor sensitivity. This disadvantage can be overcome by utilizing special Raman signal enhancing techniques like e.g., resonance Raman spectroscopy or coherent anti-Stokes Raman scattering (CARS). Within this contribution we highlight the great potential of linear and nonlinear Raman approaches for biological and biomedical analysis. It will be shown that Raman spectroscopy allows for a label-free characterization of a broad variety of different biological samples ranging from prokaryotic and eukaryotic cells, fungi, biofilms via tissue sections towards whole organs. The application focus of the presented examples lies on (I) microbial analysis, (II) intraoperative tumor characterization or (III) the Raman spectroscopic visualization of metabolic, defense or chemical communication processes.

Prof. Schmitt received his Ph.D. in chemistry from the University of Würzburg in 1998. From 1999 to 2000 he went for postgraduate studies to the Steacie Institute for Molecular Sciences at the National Research Council of Canada. He subsequently returned to the University of Würzburg, where he finished his habilitation in 2004. Since March 2004 he has been a research associate in the group of Prof. Dr. J. Popp at the Institute of Physical Chemistry at the Friedrich-Schiller-Universität Jena. In 2010 he was promoted to the rank of an associate Professor at the Friedrich-Schiller University Jena. His main research interests are focused on Raman spectroscopy, non-linear spectroscopy and non-linear multimodal imaging for biomedical, life sciences and material research. He has published more than 270 publications in peer-reviewed journals. He is assistant editor of Journal of Biophotonics. In 2018 he received the Kaiser-Friedrich-Forschungspreis.



Prof. Pablo Artal

Director

Optical Laboratory,
Optical and Nanophysics
Research Centre
Universidad de Murcia,
Spain

Invited Talk
Tuesday, afternoon,
June20 / 15:30 h

Round table I
June19 / 15:30 h

**Light-based technologies to
evaluate vision**

A better understanding of the optical properties of the human eye allows to develop new light-based technologies to evaluate and then improve vision. I will revise different experiments we developed based in the use of adaptive optics to evaluate how different type of optical corrections affect vision. In addition, I will present novel approaches to evaluate the effect of scattering in the eye and the use of pulsed invisible infrared lasers to produce vision by means of 2-photon absorption processes.

Prof. Artal studied Physics at the University of Zaragoza. He was a pre-doctoral fellow at the Madrid-CSIC "Instituto de Optica" under the supervision of Javier Santamaria, a post-doctoral research fellow, first at Cambridge University (UK) and later at the Institut d'Optique in Orsay, France. After returning to Spain, he obtained a permanent researcher position at the Instituto de Optica. In 1994, he became the first full Professor of Optics at the University of Murcia, Spain founding the "Laboratorio de Optica". He spent sabbatical years in Rochester (USA) and Sydney (Australia). He is currently a distinguished visiting professor at the Central South University in Changsha, China. His research interests are centered on the optics of eye and the retina and the development of optical and electronic imaging techniques to be applied in Vision, Ophthalmology and Biomedicine.

He has published more than 300 reviewed papers that received more than 24000 citations (h-index of 80) in Google Scholar, presented more than 200 invited talks in international meetings and around 150 seminars in research institutions around the world. He was elected fellow member of the Optical Society of America (OSA) in 1999, fellow of the Association for research in Vision and Ophthalmology (ARVO) in 2009 and 2013 (gold class), fellow of the European Optical Society (EOS) in 2014 and fellow of the SPIE in 2016. In 2013, he received the "Edwin H. Land Medal", in 2014, he was awarded with an Advanced Research grant of the European



**Prof. Susana
Marcos**

David R Williams Director
Center for Visual Science,
Nicholas George Professor of
Optics. The Institute of
Optics.
Professor of Ophthalmology.
Flaum Eye Institute
University of Rochester,
NY, USA

Invited Talk
Tuesday, June20
16:40 h
Round table II
Thursday, June22,
15:30 h

Light based techniques for human vision correction

Light based technologies are at the core of diagnostics and treatments for ophthalmology. Laser refractive surgery has been one of the most successful applications of lasers in medicine. The most common surgical procedure in the world (cataract surgery, 28 million/year) have also recently started using laser technologies. Increasingly, eye procedures are image-guided, with optical technologies being critical for treatment customization. The lecture will present novel vision photo-activated correction alternatives where our lab has contributed, including corneal photo-crosslinking for corneal tissue stiffening, photobonding-enabled accommodating intraocular lenses for accommodation restoration in presbyopia, and laser induced refractive changes contact lens customization. The key information for optimizing these procedures provided by Optical Coherence Tomography, Second Harmonic Generation Microscopy, Optical Coherent Elastography and aberrometry, all light-based, will also be stressed.

Research Council. In 2015, he received the "King Jaime I" award in New Technologies. In 2018, he was awarded the Spanish National Research award "Juan de la Cierva" and in 2019 the "Edgar D. Tillyer" award of the Optical Society of America. In 2021, he was awarded the medal of the Spanish Royal Physics Society. He is a co-inventor of 30 international patents in the fields of Optics and Ophthalmology and the co-founder of four spin-off companies.

Prof. Marcos is currently Director and Professor at the University of Rochester New York. She also leads the Visual Optics and Biophotonics Laboratory, and is past Director of the Institute of Optics of the National Center for Research in Spain. She served as President of the Advisory Board of the Spanish Research Agency. She is currently Director-at-Large of Optica, member of the Board of Editors and Chair of the Publication Council. She is the recipient of the Adolph Lomb Medal (OSA), European Young Investigator Award ICO Prize (International Commission for Optics), Doctor Honoris Causa by the Ukrainian Academy of Science and Technology, Physics, Technology and Innovation Award (Royal Society of Physics-Fundacion BBVA), ARI Award (Alcon Research Institute), Ramon y Cajal Medal (Royal Academy of Sciences), Jaime I Award in New Technologies, National Science Award Leonardo Torres Quevedo (Government of Spain), Edwin Land Medal of Optica, among many others. She is also a double European Research Council Advanced Grantee, an elected Fellow of the European Optical Society, Optica and Gold Fellow of the Association for Vision in Research and Ophthalmology. She is an author of >200 publications, has supervised 25 PhD students, is an inventor in 25 patents, and partner of spin-off Plenoptika Inc and co-founder of 2Eyes Vision.

TUESDAY END



**Prof. Kishan
Dholakia**

Director

Centre of Light for life and
School of Biological Sciences,
University of Adelaide, 5005,
Australia
University of St Andrews,
Scotland, UK

Invited Talk

June 21 / 9:30h

**Optical Tweezers: trapping and
manipulation for biomedical
applications**

Online

Light is incredible. In addition to its exquisite use in areas such as imaging and sensing, light can exert miniscule forces in the form of optical tweezers. This area was recognised by the Nobel Prize Committee in 2018, awarding half of the prize for that year to Arthur Ashkin. Such optical tweezers are ideal for probing and measuring at the cellular or molecular level. In this talk I will describe the background to this area and the importance of advanced photonics such as beam shaping and near field effects to the field. Examples will be presented showing how optical tweezers can be used for both in vitro and in vivo studies in the areas of single molecule biophysics, micro-rheology and intact behaving animals.

Kishan Dholakia is Professor at the University of Adelaide, Australia and St Andrews, Scotland. He is an honorary adjunct Professor at the Centre for Optical Sciences at the University of Arizona, USA, Chiba University, Japan and IIT Madras, India. He works on advanced beam shaping for optical manipulation and imaging. He has published over 350 journal papers and has in excess of 38,000 citations. His work is cited in the Guinness book of Records 2015. He is a Fellow of the Royal Society of Edinburgh, Optica and SPIE. In 2016 he won the R.W. Wood Prize of the Optical Society, in 2017 he won the IOP Thomas Young Medal and Prize and is the 2018 recipient of the SPIE Dennis Gabor Award. In 2021 he won an Australian Research Council Laureate Fellowship and is Director of the newly launched Centre of Light for Life at the University of Adelaide.



Prof. Paola Taroni

Head

Research group on Photonics
for Health, Food and Cultural
Heritage,
Physics Department,
Politecnico di Milano,
Milan, Italy

Invited Talk

June 21 / 11:00 h

**Diffuse optics Systems for
effective Management of Breast
Cancer**

The physical principles of diffuse optics will be introduced, with special attention to its time domain implementation for the highest informative content.

Diffuse optics can be used for the non-invasive in-depth optical characterization of highly diffusive media, such as biological tissues. Then, diffuse optical spectroscopy allows the non-invasive estimate of tissue composition (water, lipid, and collagen content) and functional blood parameters. It also provides information on the microscopic tissue structure.

The potential of the technique will be highlighted describing its implementation and use for the management of breast cancer: non-invasive diagnosis, monitoring and prediction of neoadjuvant chemotherapy, and estimate of cancer risk due to breast density.

Prof. Paola Taroni is Full Professor of Physics at Politecnico di Milano (Milan, Italy) since 2011. Co-author of more than 140 scientific papers on international peer-reviewed journals (Scopus H-index: 46). Her research activity concerns mainly the development of photonics systems for time-resolved spectroscopy and imaging, and their diagnostic applications in biology and medicine, including time domain diffuse optical spectroscopy, with special attention to breast imaging and spectroscopy, and time-resolved fluorescence spectroscopy and fluorescence lifetime imaging for medical diagnostics and microscopy.



**Prof. Laura M.
Lechuga**

Head
Nanobiosensors and
Bioanalytical Applications
Group
Catalan Institute of
Nanoscience and
Nanotechnology (ICN2).
CSIC, CIBER-BBN and BIST
Barcelona, Spain

Invited Talk
Wednesday, June 21
12:10 h

BioPhotonic Sensors after the COVID-19 pandemic

COVID-19 pandemics has evidenced the urgent need of having portable diagnostic tools that enable rapid testing and screening of the population with sensitivity and specificity levels comparable to lab techniques. Biosensor technology is one of the best prepared to tackle the challenging goal of offering fast and user-friendly diagnostics tests than can be employed at the point-of-need. In particular, photonic biosensors can provide sensitive, reliable and selective analysis, while reducing test and therapeutic turnaround times, decreasing and/or eliminating sample transport, and using low sample volume.

We have demonstrated cutting-edge nanophotonic biosensors based on Nanoplasmonics and in Silicon photonics technologies that enable ultrasensitive analysis of body fluids in few minutes. By custom tailoring the biochemistry of the sensor biochips, our POC nanophotonic biosensor technology can perform direct detection of proteins, genetic biomarkers or pathogens within <15 min, with high sensitivity and selectivity.

All-optical control of neuronal circuits by wave front shaping and optogenetics

Genetic targeting of neuronal cells with activity reporters (calcium or voltage indicators) and actuators has initiated the paradigmatic transition whereby photons have replaced electrons for reading and manipulating neuronal activity of genetically identified cell populations.

These progresses have in turn stimulated the development of sophisticated optical methods to enable "all optical" in depth brain circuits interrogation with high spatial and temporal resolution on large volumes.

Here, we will review the most significant breakthroughs of the past years, which enable reading and writing neuronal activity at the relevant spatiotemporal scale for brain circuits manipulation, with particular emphasis on the most recent advances in what we named *circuit optogenetics*: a combination of wave front shaping approaches, including holographic light illumination and temporal focusing, with opsins engineering and laser

Prof. Lechuga is a world reference in the Photonic Biosensor area, making key contributions and opening new horizons in this field. Her research focusses in novel nanobiosensor devices based on nanoplasmonics and silicon-based photonics principles for point-of-care diagnostics. Her activities encompass from fundamental research to the technological operation of complete sensing platforms, including the technological transfer into products of social applicability. She has published over 300 publications (articles, book chapters and proceedings), has 8 families of patents and 4 trade secrets, and has presented her work in more than 430 invited talks. She has co-founded two spin-off companies.

The quality of her research has been recognised by prestigious prizes and awards, as the Spanish National Research Prize in 2020, the King Jaime I award in New Technologies in 2020, the Ada Byron 2020 Prize, the Physics, Innovation and Technology Prize from the Spanish Royal Physics Society (RSEF) and BBVA Foundation (2016), the XVIII Burdinola Research award in 2021, the 2021 Medal of the International Foundation Olof Palme and the Doctor Honoris Causa awarded by the University of Cádiz, among others.



**Prof. Valentina
Emiliani**

Director

Photonics Department
Head of Wavefront-
engineering microscopy
group
CNRS, Sorbonne
University, INSERM
Vision Institute, Paris,
France

Invited Talk
June 21 / 15:30 h

Prof. Emiliani's lab has pioneered the use of wave-front shaping for neuroscience. Precisely, they have proposed several approaches such as computer-generated holography, generalized phase contrast and temporal focusing to sculpt the excitation volume with a shape perfectly tailored on the selected target. Combined with optogenetics, wave front shaping enables the control of neuronal activity with unprecedented spatiotemporal precision. Their findings paved the way to optogenetic manipulation of brain circuits with single cell resolution: an essential methodology to perturb and activate neural circuits for interrogating brain function. Today, her research focuses on the use of these approaches for the study of the neural circuits involved in vision using mice and zebrafish models. She is a recipient of the Prix "Coups d'élan pour la recherche française" from the Bettencourt-Shueller foundation, the Axa Chair *Investigation of Visual Circuits by Optical Wavefront Shaping*, the ERC advanced grant, *HOLOVIS*, the "Silver Medal" from the CNRS, the *Maxime Dahan Prize for Innovation in Methods and Instrumentation at the Interface of Physics, Biology & Medicine* and the *Michael S. Feld Biophotonics Award*.

Round table II
Thursday, June 22
15:30 h



**Prof. Turgut
Durduran**

Head

Medical Group, ICFO,
Barcelona, Spain

Invited Talk
June21 /16:40 h

development enabling the control of single or multiple targets independently in space and time with single-neuron and single-spike precision, at large depths. Finally, we will show examples where *circuits optogeentics* has been applied for the interrogation of mice retina and cortical circuits.

**Noninvasive measurement of
deep tissue hemodynamics and
oxygen metabolism at the
intensive care**

I will describe the physical and technological background of using near-infrared diffuse light to measure deep tissue (~1 cm) hemodynamics and oxygen metabolism. This will be related to the context of intensive care medicine and the ongoing efforts that were triggered by the COVID-19 pandemic. The clinical studies have revealed the ability of these methods to detect microvascular and endothelial dysfunction at the bed-side. Finally, I will show the platform developed during the VASCOVID project which is a user-friendly, portable system for several clinical applications.

Prof. Durduran is an ICREA professor at ICFO (Barcelona, Spain). He leads the ICFO Medical Optics group which collaborates with a broad network of hospitals, industries and academic groups around the world. He is currently coordinating the H2020 consortia VASCOVID and TinyBrains that are developing new modalities for clinical applications.

17:55 h

VI-ISLiST Family Photo

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



Dr. Alexis Méndez

President

MCH Engineering LLC, CA,
USA

Invited Talk
Thursday, June 21
9:30 h

Optical Fiber Technology on Biomedical Applications

Given their EM immunity, intrinsic safety, small size & light weight, autoclave compatibility and capability to perform multi-point and multi-parameter sensing remotely, optical fibers and fiberoptic-based sensors are seeing increased acceptance and new uses for a variety of bio-medical applications—from laser delivery systems, to disposable blood gas sensors, to intra-aortic pressure probes, to digital X-rays to name a few. This talk will provide a broad overview on how optical fibers are being utilized for illumination, imaging, digital X-rays, sensing, laser delivery in the biomedical arena, highlighting their intrinsic characteristics, advantages and limitations. Key industry trends, technology challenges and future commercial outlook will also be discussed.

Dr. Méndez received a PhD. degree in Electrical Engineering from Brown University, USA in 1992. He is president of MCH Engineering LLC—a consulting firm specializing in optical fiber sensing technology. Dr. Méndez was the former Group Leader of the Fiber Optic Sensors Lab within ABB Corporate Research (USA) where he led R&D activities for the development of fiber sensors for use in industrial plant, oil & gas, and high voltage electric power applications. He was also Director of Engineering Sensing Solutions at Micron Optics. He has written 70 technical publications, taught several short courses on fiber sensors, holds 5 US patents and is recipient of an R&D100 award.

Dr. Méndez is a Fellow of SPIE and was past Chairman of the 2006 International Optical Fiber Sensors Conference (OFS-18), past Technical Chair of the 2nd Workshop on Specialty Optical Fibers and their Applications (WSOF-2). He is also VP of the IEEE Fiber Sensors Standards Committee, and co-editor of the *"Specialty Optical Fibers Handbook"*, and co-author of SPIE's *"Fiber Optical Sensors Book"*.



**Prof. Tayyaba
Hasan**

Director Hasan Lab
Professor
of Dermatology (Harvard
Medical School) and of
Health Sciences and
Technology (Harvard-MIT)
Wellman Center for
Photomedicine
Massachusetts General
Hospital
Boston, USA

Invited Talk

The Yin and Yang of PDT to fight Cancer and infectious diseases

Photochemistry-based photodynamic therapy (PDT) has been approved by regulatory authorities since 1995 as a local therapy. PDT relies on the light activation of specific molecules, photosensitizers, to generate active molecular species that, in enough concentration, cause toxicity to biological targets. Most of the light-activable molecules used in PDT have finite fluorescence quantum yields. Harnessed appropriately, photodynamic activation can be both a potent therapeutic and an imaging tool. With advances in optical technologies and the development of less expensive light source/detection systems, PDT lends itself to adoption in Low Resource settings, especially with the incorporation of mobile smartphone-based devices. With a deeper understanding of molecular medicine, PDT becomes an enhancer of existing and emerging therapies with the potential for use in precision medicine.

Tayyaba Hasan, PhD is a Professor of Dermatology at Harvard Medical School and a Professor of Health Sciences and Technology at Harvard-MIT. She is a leader in photochemical and photobiological approaches to treatment and diagnosis of cancer and infection using targeted strategies especially nanotechnology. She is an inventor of the photodynamic treatment of Age-Related Macular Degeneration in the eye, which has been used for millions of patients. She has ~300 publications and over 30 inventions. Dr. Hasan leads an NCI-funded multinational Program Project grant focused on image-guided treatment of pancreatic and skin cancers and an international consortium on developing low-cost technologies for image-guided photodynamic therapy of oral cancer in addition to several investigator-initiated programs.

Dr. Hasan's contributions to successful translational studies and other discoveries earned her the coveted US National Institutes of Health Pioneer Award in Biomedical Optics Award. She has received 5 Lifetime Achievement awards from leading scientific organizations, including the ICPP, the American Society for Photobiology, the International Photodynamic Association,

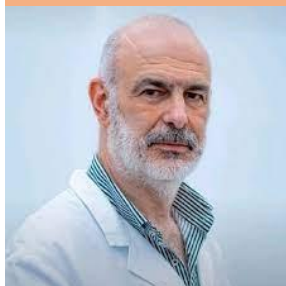
Thursday, 11am, June22

And Round table II
Thursday 15:30pm, June
22

Despite being approved for almost 3 decades and proven to be a minimally invasive and effective modality (sometimes when all else has failed), PDT has not yet had the impact it deserves, and adoption of PDT has been slow.

I will project my view on the Yin and Yang of this apparently promising approach that has failed to impact medicine as might be expected.

and the Society of American Asian Scientists in Cancer Research. Recent awards include the Gold Medal Award for Excellence in Photobiological Research from the European Society for Photobiology, and the Gold Medal from the International Photodynamic Association, recognizing her significant career in photodynamic therapy. She has also earned numerous awards for her commitment to mentoring, teaching, and equitable representation in science.



**Dr. Alessandro
Corsi**

Director

Wound Care Unit
San Raffaele Hospital,
Milan, Italy

Invited Talk
Thursday, June22
12:10 hours

Photobiomodulation for effective treatment of skin lesions

The application of light in the treatment of skin lesions, acute and chronic, has been used for years to reactivate the tissue repair process in order to allow complete and rapid healing of lesions by skin regeneration (and not by scarring).

The use of monochromatic or fluorescence light has now become part of the normal activity of Wound Care centers.

In this presentation, we analyze in detail the interference of light at different stages of the healing process, what are the outcomes, functional and aesthetic, and the economic impact of the use of this technology.

Dr. Alessandro Corsi: Degree in Medicine and Surgery at the University of Florence (Italy) in 1994.

Specialization in General Surgery at the University of Florence (Italy) in 2000. Master in Wound Care at the University Di Torino (Italy) in 2009.

Diploma of Expert In Wound Care at the Italian Academy of Wound Care (IAWC) in 2013.

Since 2017 Consultant at the Wound Care Unit of the Hospital "San Raffaele" in Milan (Italy), of which he became Director since October 2020.

Adjunct Professor at the University view Health of the Hospital "San Raffaele" in Milan (Italy), he is author and co-author of numerous articles on General Surgery and Wound Care.

He has participated as a speaker in numerous national and international Courses and Congresses.

Afternoon

15:30- 17:45 h

Round Table II

Treatments and tools using light-based-based technologies

Challenges to face on

Susana Marcos, University of Rochester, New York, NY, USA:

Light and silk based bio-polymers to regenerate ocular vision (Silk-Eye projet)

Carlos Molpeceres, Laser Center, Polytechnic University of Madrid, Spain:

Laser based technology for regenerative medicine

Valentina Emiliani, Photonics Department, CNRS Vision Institute, Paris, France:

Optogenetic for light control of biological Systems

Tayyaba Hasan, Harvard Medical School and MIT, Wellman Center for Photomedicine, Boston, USA:

PDT translation to Clinic

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

How does the light exposure affect memory and cognitive vitality?

Prof. JM López-Higuera, Director ISLiST, Moderator

THURSDAY END



**Prof. Carlos
Molpeceres**

Director

Centro Láser, Universidad
Politécnica de Madrid,
Spain

Invited Talk
June 23 /9:30 h

Round Table II
June 22 /15:30h

Laser Fabrication Technologies helping the Regenerative Medicine

Since their invention, lasers have been a fundamental tool for the processing of inert materials, being to date a disruptive technology in manufacturing processes in practically any industrial sector. The medical field has also benefited from the unique characteristics of this tool since its inception, presenting itself today as a technology of enormous impact in diagnosis and treatment of diseases. Currently, the use of lasers is beginning to appear as an absolutely differential option in the field of tissue engineering, a multidisciplinary field of enormous growth and where laser based additive manufacturing and laser bioprinting techniques are gaining interest for their unique characteristics. This presentation explores the fundamentals of laser based additive manufacturing techniques and bioprinting processes in tissue engineering, highlighting the differential characteristics of these techniques in comparison with competitive technologies, and presenting some of the applications currently under development in this field of regenerative medicine.

Prof. Carlos Molpeceres is Director of the Laser Center UPM (www.upmlaser.upm.es) and Full Professor at Department of Applied Physics and Materials Engineering at Universidad Politécnica de Madrid, the largest and oldest Technical University in Spain. He is also Leader of the UPM Research Group Advanced Laser-Based Manufacturing mainly focused in the development of laser micro and nano processing of materials. His group coordinates the activity in Spain of Appolo Hub (www.appolohub.eu), an European network of laser laboratories that provides laser micromachining assessment services for industry partners. He has been or still is Member of different International Committees of Conferences (SPIE, PVSEC, ICALEO, LANE, etc.). Currently his research activity is focused in the development of new laser micro and nano processing techniques, using state of the art laser technology, in the fields of energy, flexible electronics, tissue engineering and translational oncology research.



Prof. Mark Rea

Former Director

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

Closing Invited talk
June 23 /11:00 h

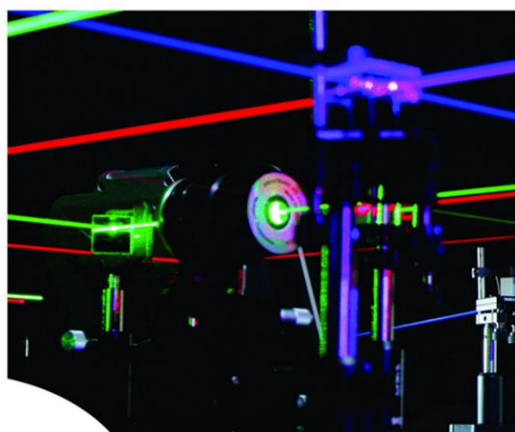
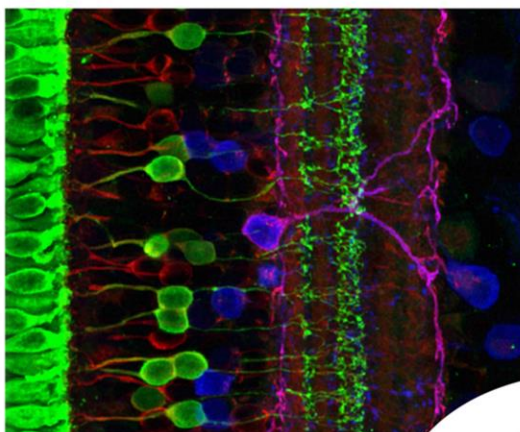
Round Table II
June 22 / 15:30

Bridging the science of circadian rhythms to real-world applications

The fundamentals of circadian rhythms and how the light-dark cycle entrains behavior and physiology to our local position on Earth are understood well enough now that we could collectively translate that knowledge into practice, improving the well-being and health of building occupants. But this has not happened on a large scale because science is not enough for widespread implementation. Application guidelines and innovative products are certainly needed. What is needed most, however, are large real estate owners employing strategies like those being developed by the General Services Administration (GSA) in the United States where individuals in offices (home or commercial spaces) are provided with circadian-effective lighting without having to think about the science at all.

Prof. Mark S. Rea, Ph.D., was a former Director at Lighting Research Center Rensselaer Polytechnic Institute, USA. In the current, he 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.

ISLiST / UIMP
Universidad Internacional
Menéndez Pelayo



International
School on

Light

Sciences and
Technologies



NOTEBOOK



June 19 / 11:00 h / **Prof. Ozcan**

**Deep-learning enabled computational microscopy and diffractive
imaging**

NOTES:



June 19 / 12:10h / **Prof. López-Higuera**

Light in Health and Medicine: a general overview

NOTES:

June 19/15:30 h / **Round Table I:**

Challenges to face on supervision sensing and diagnosis



NOTES:



June 20 / 9:30 h / **Dr. Angelos Karlas**

Listening to Light: Advances in Optoacoustic Imaging

NOTES:



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

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

NOTES:



June 21 / 12:10 h / **Prof. Schmitt**

Raman based Spectroscopic techniques for biomedical diagnosis and life sciences

NOTES:



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June 21 / 15:30 h / **Prof. Artal**

Light-based technologies to evaluate vision

NOTES:



June 21/ 16:40 h / **Prof. Susana Marcos**

Light based techniques for human vision correction

NOTES:



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June 22/ 9:30 h / **Prof. Dolakia**

Optical Tweezers: trapping and manipulation for biomedical applications



June 22 / 11:00 h / **Prof. Taroni**

Diffuse optics Systems for effective Management of Breast Cancer

NOTES:



June 22 / 12:10h / **Prof. Lechuga**

BioPhotonic Sensors after the COVID-19 pandemic

NOTES:

NOTES:



June 22 / 15:30 h / **Prof. Emiliani**

All-optical control of neuronal circuits by wave front shaping and optogenetics

NOTES:



June 21 / 16:40 h / **Prof. Durduran**

**Noninvasive measurement of deep tissue hemodynamics and
oxygen metabolism at the intensive care**

NOTES:



June 23 /9:30 h / **Dr. Mendez**

Optical Fiber Technology on Biomedical Applications

NOTES:



June 23 / 11:00 h / **Prof. Tayyaba Hasan**

Light to fight cancer and infectious diseases: the yin and yan of PDT

NOTES:



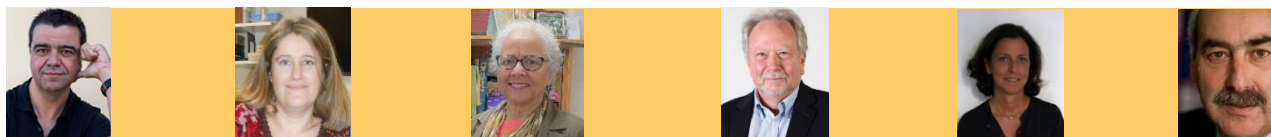
June 23 / 12:10 h / **Dr. Corsi**

Photobiomodulation for effective treatment of skin lesions

NOTES:

June 23/15:30 h / Round Table II:

Light on treatments and tools: Challenges to face



NOTES:



June 23 / 9:30h / **Prof. Molpeceres**

Laser Fabrication Technologies helping the Regenerative Medicine

NOTES:



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June 23 / 11:00 h / **Prof. Mark Rea/closing Talk**

Bridging the science of Circadian Rhythms to real-world applications

NOTES: