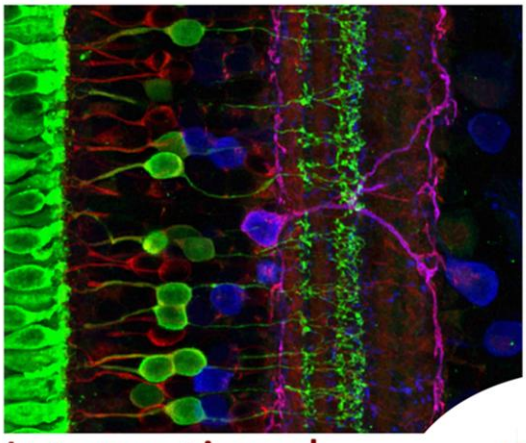
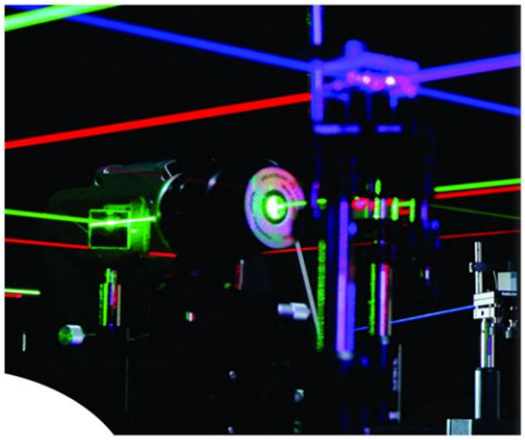
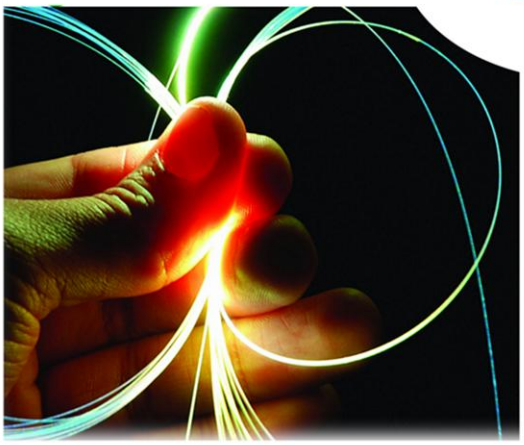
ISLiST / UIMP
Universidad Internacional Menéndez Pelayo

International School on **Light** Sciences and Technologies




Core: Light in Energy, Environment and Laser Manufacturing

Santander 16-20 de junio de 2025
(Sala Bringas-Riancho, Palacio de la Magdalena, Santander)

PROGRAM

DIRECTOR:
José Miguel López Higuera
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Actualidad en el tema y/o antecedentes

Siendo la temática de la escuela propuesta de carácter científico–tecnológico y con el objetivo de ser un foro internacional al más alto nivel y siendo el idioma oficial de ISLIST el inglés, en lo que sigue, se utiliza el citado idioma.

Relevance on the subject and Background

Photonics is the science and techniques 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, and is enabling sustainable development and providing 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, and to raise global awareness, 2015 was proclaimed the International Year of Light and Light-based Technologies (IYL 2015). It has been included amongst UNESCO's most successful International Years. After that, recognising the essential role that light plays in science, culture and art, education, and sustainable development, and in fields as diverse as medicine, communications, and energy, UNESCO proclaimed the International Day of Light. It is being celebrated on 16 May each year, the anniversary of the first successful operation of the laser in 1960 by physicist and engineer, Theodore Maiman. This day is a call to strengthen scientific cooperation and harness its potential to foster peace and sustainable development in order to achieve the goals of UNESCO – building the foundation for peaceful societies.

Taking into account the relevance of photonics for the XXI century, the director that signs this document, proposed (in 2014) to UIMP (Universidad Internacional Menéndez Pelayo) the Advanced Course on *Light Sciences and Technologies for a New Word* (LiST) as an UIMP top event to celebrate the IYL2015 in June 2015. LIST was also conceived as a great opportunity to contribute to the education of citizens, to review and actualize knowledge in this Key or Essential science and technology. It was a very successful event. https://www.teisa.unican.es/ISLiST/index.php/past-editions.

http://www.teisa.unican.es/gif/index.php?option=com_content&task=view&id=902&Itemid=97

Taking in consideration the above mentioned, the very supportive inputs from the main a widely recognized Spanish players and organizations in the field and, with the aim to contribute to accomplish vision and mission of UIMP, it was decided to create the "**International School on light Sciences and Technologies (ISLIST)**". https://www.teisa.unican.es/ISLiST/ .

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.

This international school is envisioned to be a **worldwide top international** forum (every fourth or third week of June) on *Light Sciences and Technologies* in the framework of *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***. To decide each main core, it is always considering the key ones identified in the Strategic Agenda of the European Platform Photonics 21, the National Photonics Initiative, USA, the European Commission Plans and, also, the Spanish National Plans.

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 attendees´s surveys. See final reports. https://www.teisa.unican.es/ISLiST/index.php/final-report

After a very careful identification of the topics to be included in each edition, their most renowned players worldwide are identified and invited. In each ISLiST edition, it is expected that **highly renowned** professors (including Nobel Laureates) and researchers from the most prestigious worldwide institutions and, as well, presidents of the most renowned international Photonic Scientific Organizations and some politicians will participate in this meeting. In addition, Prof. JM López-Higuera, ISLIST Director and Head of the Photonics Engineering Group of the University of Cantabria (and member of CIBER-BBN and IDIVAL) Spain, will also deliver talk/s and coordinate two round tables.

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, Roberto Osellame, Sonia Martín López**,** Francesco Poletti, Siniad O´Keeffe, Andrea Cusano, Kennet Grattan, 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, Vincent Menoret, Michael Leeby, Elisabeta Rugi Grond**,** among others have participated in previous editions.

Quality

To check the quality, the organization, the international nature, the additional activities planned, etc. of the five previous ISLIST editions (two editions were delayed because the COVID 19), it is kindly suggested to analyze their correspondent PROGRAMS https://www.teisa.unican.es/ISLiST/index.php/past-editions and, also, their FINAL REPORTS https://www.teisa.unican.es/ISLiST/index.php/final-report.

Core

Light in Energy, Environment and Laser Manufacturing is going to be the main core of 2025 edition (VIII ISLIST) to combat climatic change, in which decarbonization is of paramount relevance. To accelerate this transition new efficient energies, their storage, new monitoring of green-house gases solutions is required. Works towards this goal will enable new technologies that will dynamize multibillion-application sectors and, will contribute significantly business, employment and social changes.

An excellent panel of very well-known and top world-wide speakers (from seven different nationalities) are already invited and have already confirmed their participation.

New job opportunities for the ISLIST core sector applications will require highly qualified personnel at all levels. Demand for skilled staff will continue to increase, and special efforts in education and training will be necessary to meet this demand. The creativity of skilled individuals will be a key factor in ensuring innovation and maintaining Europe's leading position.

Taking into consideration the above mentioned VIII ISLIST is designed to contribute to reach these objectives in the international arena. They are:

Objectives

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) **offe**r 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.

v) **contribute** to fulfil the vision and mission of UIMP.

vi) **stand** in the international "map" of very reputed events about photonics in Spain, Santander and UIMP, every year.

In addition, and not less important, VIII-ISLIST, aligned with the vision and mission of the UIMP, will humbly contribute to the good name of the academic institution and to consolidate the prestige of this international photonic event of the highest quality in the world, every year in Spain, in Santander.

Methodology and program design

Envisioned as **worldwide top international** forum, to reach the stablished objectives, ISLiST runs along the fourth or third week of every June in the privileged environment of "the Royal Magdalena Palace" in Santander, Cantabria, Spain. Each edition of this international school has an intensification or **main core in a specific application area and sometimes additional current hot topics** as can be observed in previous editions. https://www.teisa.unican.es/ISLiST/index.php/past-editions

For VIII ISLIST, scheduled for June 16-20, 2025, with the main core on ***Light in Energy and Environment and laser manufacturing,*** seventeen hot topics of great interest for research or/and for exploitation or/and for social interest are identified. Then a tentative program has been designed. After that, the more relevant and prestigious players worldwide are also identified as previous step to submit invitations to participate in the VIII ISLIST at UIMP.

VIII ISLiST is programmed in two main blocks: one concerning Light for Energy and the other one concerning Light for Environment and Laser manufacturing. Seventeen invited lectures and two round tables developed by sixteen very well-known speakers from top institutions from USA, from Germany, Belgium, Australia, UK, Denmark and from Spain, among others, are included in the tentative program to be developed along the week. It must be noticed that all invitees have already confirmed their contribution to the VIII-ISLIST edition.

In addition to the scientific-technical program, several additional events are programmed to improve the efficiency and the effectiveness of ISLIST: An exhibition of panels is included in the school to enhance the diffusion of this key field. A Santander **City Council Reception** is programmed at the Royal Palace of Magdalena, to promote the interaction among the ISLIST attendee's and, also, with invited lecturers**.** This ISLIST event (with snacks and drinks) supported by Santander City Council, is envisioned as an optimum time for networking.

In order to be able to:

i) continue to reach more effectively the aims of the ISLIST;

ii) as clear action of transparence and

iii) contribute to sustain the "memory" as a fully international top-quality meeting, an **ISLIST Final Report** is elaborated after each edition by the ISLIST organizers.

In the **Final Report** will be summarized and graphically illustrated, the actions and events "lived" along the ISLIST development. The report will include: an executive summary; brief summaries of each invited talk with **links to the UIMP TV** specific site, in which videos of each recorded talk are available for the attendees along the year after the event (they are very powerful tool to watch the invited talks, as they were); **Links to YouTube**, in which the authorized talks are also available and, also, interviews (done at UIMP) to some of remarkable ISLIST lecturers can be also enjoyed; and brief summaries of the social and special events. In each Final Report, are also include the statistics concerning the ISLIST attendees and the results of the anonymous survey among the ISLIST attendees. This survey is done after each edition, to acquire objective anonymous data (to be able to take appropriate actions, if required) to maintain (and if possible, to improve) the quality, the impact, recognition, etc. of this fully international School. The final report is shared, each edition, to UIMP responsible authorities, to all attendees, and to all sponsors and collaborators. It is also available at the ISLST web site. https://www.teisa.unican.es/ISLiST/index.php/final-report

Based on the methodology above stablished, the **VIII ISLIST tentative program** is designed as follows:

PROGRAM

Monday, 16

Morning
10:15 h
Opening Ceremony

10:40 h / **Break**

Opening Scientific Session

11:00 h Invited Opening Lecture I

The pillars of the decarbonization: impact on the development of a New world
Dr. Javier Cavada
President and Chief Executive Officer, CEO, Mitssubishi Power for Europe, Middled East and Africa.

12:10 h / Invited Lecture II

Concentrating Solar heat for power generation and chemical processes: current trends
Prof. Christian Sattler
Head of Solar Chemical Engineering German A. Center, Germany

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

Afternoon: Light in Green and Blue H2 generation & Photovoltaics

15:30 h / Invited Lectures III
GREEN and BLUE H2 production in Cantabria:

Besaya H2 project
Mr. José Luis Moya Jiménez
CEO Ric Energy, Ric Energy-Copsesa consortium, Spain

Bahia H2 Offshore project
Prof.César Vidal
Emeritus Professor of UC at IH Cantabria, Supercluster Atlantic Wind, SAW, Spain

16:40 h / Invited Lecture IV
The photovoltaic revolution: from the fire age to the light age
Prof. Antonio Gómez Expósito
Director of "Endesa Red" Chair, University of Sevilla, Spain.

Tuesday, 17

Morning: **Light in Energy: Photovoltaics**

9:30 h / Invited Lecture V

Running a net-zero PV-based grid in 2025: modeling and experiences from the Australian "real-wold lab"

Prof. Pierluigi Mancarela

Australian Director of USA-UK-Australia Global Centre in climate change and Clean Energy co-lead with Johns Hopkings university (USA) and Imperial College London, UK.

10:40 h **/ Break**

11:00 h / Invited Lecture VI

Photovoltaic Solar Cells technologies: Currents, Challenges and Opportunities

Prof. Ivan Gordon

Head of Photovoltaic Technology and Energy Systems group, Interuniversity Microelectronics Centre, Belgium.

12:10 h / Invited Lecture VII

Nano-photonics to raise the upper limit for Energy Conversion in solar cells.

Prof. Jordi Martorel

Group Leader, Organic nanostructured Photovoltaic, ICFO; Spain

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

Afternoon

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

Light in Energy: Challenges to face and Opportunities

Dr. Javier Cavada, President and CEO, Mitssubishi Power for Europe, Middled East and Africa, UK
On technological challenges faced by Mitsubishi power on the decarbonization road-map

Prof. Christian Sattler, Head of Solar Chemical Engineering German A. Center, Germany
on using concentration solar power for green fuels real production

Prof. Mike Campbell, Director, Lab. For laser Energetics (LLE), University of Rochester, USA
to reach the technology for a Laser Fusion Energy real exploitation

Prof. Pierluigi Mancarela, Australian-Director of USA-UK-Australia Global Centre in climate change and Clean Energy.
to reach effective and efficient Energy Storage Technologies

Prof. Gómez Expósito, Director of "Endesa Red" Chair, University of Sevilla, Spain.
for the Stability and Resilience of the electric power system with massive penetration of renewables.

Moderator: Prof. JM López-Higuera, Director ISLIST

Wednesday, 18

Morning: Innovative light-based technologies for energy

9:30 h / Invited Lecture VIII

Laser-driven fusion energy

Prof. Mike Campbell

President MCM Consultants, Director Emeritus, Lab. For laser Energetics (LLE), University of Rochester, NY, USA

10:40h / **Break**

11:00h / Invited Lecture IX

Photovoltaic laser power converters for Power-by-light Systems.

Prof. Carlos Algora

Head of III-V Semiconductors Group, UPM, Spain

12:10h / Invited Lecture X

Laser Technology in Photovoltaics

Prof. Carlos Molpeceres

Director, Laser Institute, UPM, Madrid, Spain

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

Afternoon: Light technologies for fabrication and sensing batteries

15:30-16:30 / Invited Lecture XI

Laser Technology in Advanced Batteries Fabrication

Mr. Mikel Bengoa

General Director, Coherent Rofin, Spain.

16:40h / Invited Lecture XII

Multimeasurand Advanced Optical fiber Sensor systems for real time Battery Monitoring

Prof. Christophe Caucheteur

Head, Advanced Photonic Sensors Unit,University of Mons, Belgium

17:55 h **VIII 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, 19

Morning: **Light sensing for energy and environment**

9:30h / Invited Lecture XIII

Monitoring wastewater treatment infrastructure using optical fibre sensors

Prof. Tong Sun

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

10:40h / **Break**

11:00h /Invited Lecture XIV

Fiber Distributed Sensing on Energy and Environment applications

Prof. Miguel González Herraez

Head of Photonic Engineering Group, University of Alcala de Henares, Spain

12:10h / Invited Lecture XV

AI assisted aquatic LiDARs for remote sensing of the ocean

Prof. Christian Pedersen

Head of Optical Sensor Technology Group, Technical University of Denmerk

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

Afternoon

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

Optical sensing technologies for energy and environment

Challenges to face and Opportunities

Prof. Tong Sun, Director of Instrumentation & Sensors Research Centre, City-University of London, UK
in optical sensing technologies for environmental applications.

Prof. Pedersen, Head, of Optical sensor Group, technical university of Denmark
Multimodal LIDAR based sensing technology to monitorize underwater life

Prof. Molpeceres, Director, Laser Institute, UPM, Madrid, Spain
on laser manufacturing

Prof. Miguel González, Head of Photonic Engineering Group, University of Alcalá de Henares, Spain
to reach reliable fiber distributed sensors for Energy and environment

Moderator: Prof. JM López-Higuera, Director ISLiST

Friday, 20

Morning/Special session: **Light in sensing for environment and energy**

9:30-10:40h / Invited Lecture XVI

Atmospheric LIDAR sensing for a green transition

Prof. Christian Pedersen

Head of Optical Sensor Technology Group, Technical University of Denmerk

10:40h / **Break**

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

Cleaning environments with energetic photons

Prof. José Miguel López-Higuera

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

12:15 h

Closing Remarks, Announcement of IX-ISLIST, 2026, and Diploma Delivery

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

Schedule

Time	Monday 16th	Tuesday 17th	Wednesday 18th	Thursday 19th	Friday 20th
9:30		**Prof. Pierluigi Mancarela** Australian Director of USA-UK-Australia Global Centre in climate change and Clean Energy **Running a PV based net-zero grid in 2025: modeling and experiences form the Australian "real-wold lab**	**Prof. E. Michael Campbell** President MCM Consultants, Director Emeritus, Lab. For laser Energetics (LLE), University of Rochester, USA **Laser driven fusion energy**	**Prof. Ton Sun** Head of Sensors and Instrumentation goup, City University of London, UK **Monitoring wastewater treatment infrastructure using optical fibre sensors**	**Prof. Christian Pedersen** Head of Optical Sensor Technology Group Technical University of Denmark **Atmospheric LIDAR sensing for a green transition**
10:15	Opening Remarks				
10:40	Coffee Break	Coffee Break	Coffee Break	Coffee Break	Coffee Break
11:00	**Dr. Javier Cavada** President and CEO of Mitssubishi Power for Europe, middle East and Africa **The pillars of the decarbonization: impact on the development of a new world**	**Prof. Ivan Gordon** Head of Photovoltaic Technology and Energy Systems group, IMEC, Belgium **Photovoltaic Solar Cells technologies: Currents, Challenges and Opportunities**	**Prof. Carlos Algora** Head of III-V Semiconductors Group, UPM, Spain **Photovoltaic laser power converters for Power-by-light Systems**	**Prof. Miguel González Herráez** Head of Photonic Engineering Group, University of Alcala de Henares, Spain **Fiber Distributed Sensing on Energy and environment applications**	**Prof. JM López-Higuera** Emeritus Professor, Photonic Engineering Group, University of Cantabria, Spain **Cleaning the environments with energetic photons**
12:10	**Prof. Christian Sattler** Head, of solar Chemical Engineering German Aerospace Center, Germany **Concentrating Solar heat for power generation and chemical processes: current trends**	**Prof. Jordi Martorel** Head, organic nanostructured Photovoltaic, ICFO; Spain **Nano-photonics to raise the upper limit for-Energy Conversion in solar cells**	**Prof. Carlos Molpeceres** Director, Laser Institute, UPM, Madrid, Spain **Laser Technology in Photovoltaics**	**Prof. Christian Pedersen** Head of Optical Sensor Technology Group Technical University of Denmark **AI assisted aquatic LiDARs for remote sensing of the ocean**	12:15 **Closing Remarks, ISLIST-2026 Announcement and Diploma Delivery**
13:30-15:0	Lunch	Lunch	Lunch	Lunch	
15:30	GREEN and BLUE H2 production in Cantabria: **Mr. José L. Moya,** Ric Energy CEO, RiC-Copsesa consortium, Spain **Besaya H2 project** **Prof.César Vidal,** Emeritus Professor of of UC at IH, Supercl. Atlantic Wind, Spain **Bahía H2 Offshore project**	Round Table I:Light on Energy: Challenges to face and Opportunities Dr. Cavada: by Mitsubishi power on the decarbonization **road-map** *Prof Sattler*- by using concentration solar power for green fuels real production *Prof. Campbell:* to reach the technology for a Laser Fusion Energy real exploitation. *Prof. Mancarela*- to reach effective and eficent energy storage Technologies *Prof Gómez: for the Stability and Resilience of the electric power system with massive penetration of renewables.* Moderator: **JM López-Higuera**	**Mr. Mikel Bengoa** General Director, Coherent Rofin, Spain **Laser technology in Advanced Batteries fabrication**	Round Table II Light on Environment and laser Manufacturing: Challenges to face and Opportunities *Prof. Sun:* challenges to reach reliable OFS for environmental applications *Prof Pedersen:* multimodal LIDAR based sensing technology to monitorize underwater life *Prof. Molpeceres: on laser manufacturing.* *Prof. González:* to reach reliable fiber distributed sensors for Energy and Environment Moderator: **JM López-Higuera**	
16:40	**Prof. Antonio Gómez Expósito** Lead Scientist, energy systems Expert **The photovoltaic revolution: from the fire age to the light age**		**Prof. Christophe Caucheteur** Head, Advanced Photonic Sensors Unit University of Mons, Belgium **Multimeasurand Advanced Optical fiber Sensor systems for real time Battery Monitoring**		
17:55			**Family Photo** **Santander City Council Reception**		

Abstracts/Bios

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

Invited Speaker	Talk&Abstract	Biography
 **Dr. Javier Cavada Camino** President and CEO at Mitsubisshi Power EMEA. Board Director at Galp; President EU Turbines. President Gazelle Wind. President JC Navalips. **Invited Opening Talk** Monday 16/11:00 h Round table I June 17 /15:30 h	**The pillars of the decarbonization: impacts on the development of a new world** As the world accelerates toward a carbon-neutral future, decarbonization has become the foundation for sustainable economic and industrial development. In this session, we will explore the key drivers of the energy transition: renewable integration, energy storage, hydrogen innovation, and advanced power generation technologies. With over two decades of leadership in the global energy sector, Dr. Cavada will share insights on how industries can achieve deep decarbonization while ensuring affordability, reliability, and security of supply. Drawing from his experience transforming major corporations towards sustainability, he will highlight groundbreaking solutions shaping a cleaner, more resilient energy landscape. His perspective will flow through three strategic pillars: the needed decarbonization of existing infrastructure, the development of a global hydrogen economy, and the rise of a carbon value chain. This conference will provide a strategic outlook on the critical role of technological innovation, policy frameworks, and investment in paving the way for a carbon-free future—reshaping economies and societies worldwide.	**Dr. Cavada** is President and CEO of Mitsubishi Power, leading its business in Europe, Middle East, and Africa (EMEA) since 2021. His mission is to expand Mitsubishi's business, accelerate decarbonization, and develop reliable, affordable climate solutions. Mitsubishi holds #1 market share for key technologies such as gas power generation, hydrogen and carbon capture. With over 20 years of global experience in the energy and marine sectors, he was President and CEO of Highview for 4 years, leading the long-duration energy storage industry. Previously, he spent 17 years at Wärtsilä as Global President of Energy, driving its transformation toward renewables. Javier holds a Doctorate Cum Laude in Industrial Engineering from the University of Cantabria and a double MSc from the University of Liverpool (Psychology and International Management), which named him a Distinguished Alumnus in 2023. In 2024, he received Cantabria's Blue Industry Award. An internationally recognized leader, successfully steering major corporations through the energy transition.
 **Prof. Christian Sattler** **Director** German Aerospace Center, DLR´s, Institute of Future Fuels; vicepresident of Hydrogen Europe Research association. **Invited Talk** Monday 16/12:10 h Round table I June 7/15:30 hours	**Concentrating Solar heat for power generation and chemical processes: current trends** The production of electricity and chemical commodities, especially fuels by concentrated solar radiation is an option for efficient industrial applications. The concentrated radiation can be used to replace fossil fuels even in large scale. Solar simulators are used for R&D. Scale-up is done on solar towers. The first industrial demonstration plant was inaugurated in 2024. The next are under development. An important driver is the European regulation on synthetic aviation fuel that is in place since this year. The concentrator systems, mainly heliostat fields, are based on installations for power production. However, chemical reactions require a different heating regime. Therefore, special optics and control systems have to be developed The presentation will give an overview on the concentrating solar technologies for energy applications like power production and chemical processes and an insight in how to design the required heliostat fields, secondary optics, and control systems including the integration of AI.	**Prof. Sattler** studied chemistry in Bonn, Germany and joined the German Aerospace Center DLR in 1997. He was guest scientist at Unversidade Federal de Uberlândia, Brazil. From 2015 to 2022 he was professor for solar fuels production at TU Dresden, Germany, from 2021 to 2023 Divisional Board Member for Energy and Transport of DLR, and since 2021 he is Director of the DLR Institute of Future Fuels and professor for solar fuel production at RWTH Aachen University, Germany. He is Vice-President of the Hydrogen Europe Research association and as an ASME lifetime fellow member of the ASME Clean Energy Technology Group. Researcher ID: A-7860-2012, ORCID 0000-0002-4314-1124.

Mr. José Luis Moya Jiménez

CEO
Ric-Energy,
Ric Energy-COPSESA consortium, Spain

Invited Talk
Monday 16/15:30-16:00h

GREEN and BLUE H2 production in Cantabria: Besaya H2 project

In this presentation, an overview of the main technological aspects concerning the Besaya H2 Project.

Besaya Green is a project to produce **green hydrogen and sustainable aviation fuel** (eSAF), located in the municipalities of **Torrelavega** and **Santillana del Mar**. The initiative proposes the **reindustrialization of the former Sniace land** through the installation of a **250 MW** green hydrogen plant, aimed at producing **60,000 tons of eSAF** annually, which would be equivalent to more than **9,000 flights between Santander and Rome**. This project will significantly contribute to the **decarbonization of the aviation** sector, the **economic revitalization of the region**, and the **generation of sustainable employment**

Mr. **Moya Jiménez,** CEO and founder of RIC Energy Group has more than 30 years of professional experience in management positions. He started in the world of renewable energy in 2005 after a career as an auditor/consultant at Price Waterhouse and Cooper and as a senior executive at leading consumer companies such as Seagram and Diageo. In 2010 he began RIC Energy Group's international expansion through the development and construction of photovoltaic projects in the United States, India, and several African countries. In 2017, RIC Energy Group's presence in Spain was boosted by the award of nearly 4 GW of photovoltaic projects, placing the company among the seven largest renewable energy developers in Spain. After exponential growth, today RIC Energy Group has more than 200 employees on four continents and a project portfolio of more than 20,000 MW, including innovative technologies such as green hydrogen, storage, biogas and wind energy. He is also a director and shareholder of the photovoltaic energy management company Austral Venture Gestión. He is also a director of FertigHy, the European green fertiliser consortium, in which, together with RIC Energy, Heineken, Siemens Financial Services, EIT Innoenergy, Invivo and Maire are also shareholders. He holds a degree in Business Administration and Management, a Master's degree from IESE in the Executive Development Programme and an Executive Management Programme from IE Business School.

Prof. César Vidal Pascual

Emeritus Professor
IH Cantabria,
Supercluster Atlantic Wind, SAW, Spain

Invited Talk
Monday 16/16:00-16:30h

GREEN and BLUE H2 production in Cantabria: Bahía H2 offshore project

Among the e-fuels, green ammonia is emerging as a main contributor to the decarbonization of the marine transport. In this context, the Bahía H2 project objective is to develop offshore Floating Production, Storage and Offloading vessels (FPSOs) that anchored and connected to floating offshore wind farms, will work as offshore transport hubs for ammonia e-fuel for maritime transport and other uses.

The first step objective of Bahía H2 project is to produce green H2 in a barge in Santander Port, using renewable wind energy and sea water, while the H2 storage needs and NH3 production via Harber-Bosh process will be numerically simulated taking into account the variability of the wind power source. Also, environmental concerns relative to H2 and ammonia transfer and storage will be analysed.

Prof. Vidal Pascual has a PhD in Civil Engineering and was a University Professor in Hydraulic Engineering. He has conducted research in various fields related to the design of coastal structures, beach morphodynamics, wave interaction with structures, and marine renewable energy.

From July 1991 to July 1992, he was a Visiting Researcher at the NRC Hydraulics Laboratory, Ottawa, Canada. At the University of Cantabria (UC), he was the director of the Oceanographic and Coastal Engineering Group laboratory, precursor to the UC Institute of Environmental Hydraulics (IHCanta-bria), where he collaborated on the development of the new laboratory and regularly collaborates on the experimental design of the projects developed there.

Since October 1, 2021, he has been Emeritus Professor "Ad Honorem" at the UC and currently works at the IHCantabria

Prof. Antonio Gómez Expósito

Lead Scientist
expert in energy systems
University of Seville, Spain.

Invited Talk
Monday, June 16/ 16:40h

The photovoltaic revolution: from the age of fire to the age of light

Homo sapiens have relied on fire for at least the last 500,000 years. In the last two centuries, though, civilization has become addicted to the combustion of fossil fuels in their multiple forms, which has brought well-known negative consequences.

In the 21st century, modern renewables have come to the rescue. Despite having matured a decade later than wind energy, photovoltaic (PV) energy now features over 2 TW of global installed capacity and will reach 8 TW by 2030. About 45% of the global PV capacity is installed on rooftops, with major differences between regions/countries, depending on land availability, policy incentives, etc. While traditional stakeholders are betting on centralized PV, distributed PV offers advantages to customers and local communities.

This talk will review the current panorama of PV technology, the drivers and barriers for centralized and distributed developments and the prospects for PV to become the main source of electricity worldwide.

The challenge is to transform a fossil-based global system, that wastes 2/3 of primary energy, into a decarbonized one, where electricity will provide 80% of the final energy and the light of sun will provide 80% of electricity.

Prof. **Antonio Gómez Expósito**, is the Endesa Chair Professor at the University of Seville, Spain, and a Distinguished Visiting Professor at Tsinghua University, China. He has coauthored over 370 publications, including 18 books and monographs about Circuit Theory and Power Systems. He is a Fellow of the IEEE and past editor of the IEEE Transactions on Power Systems. Currently, he serves as Vice Editor-in-Chief of the Journal of Modern Power Systems and Clean Energy. He has received many recognitions, such as the IEEE/PES Outstanding Power Engineering Educator Award (2019), the Golden Insignia granted by the Spanish Association for the Development of Electrical Engineering (2013) and the Research and Technology Transfer Award, granted by the Government of Andalusia (2011). In 2013 he co-founded the startup Ingelectus, now employing 25 engineers, and was elected the same year a member of the Royal Sevillian Academy of Sciences. Since 2018 to 2020 he was with the Board of Managers of the Spanish TSO (REE).

MONDAY END

Prof. Pierluigi Mancarela

Australian Director
USA-UK-Australia Global Centre in climate change and Clean Energy co-lead with Johns Hopkings University (USA) and Imperial College London, UK.

Invited Talk
Tuesday, June 17/9:30 h

Round Table I
Tuesday, June 17/15:30 h

Running a PV-based net-zero grid in 2025: modeling and experiences form the Australian "real-wold lab"

With deeper and deeper penetration of variable renewable energy sources (RES) and distributed energy resources (DER) across the world, new challenges are emerging in terms of their grid and market integration. In this lecture we will illustrate these challenges from a techno-economic perspective, with focus on security, reliability and resilience requirements when operating power systems and markets with ultra-deep penetration of RES and DER, and with the support of real experiences from Australia, and particularly South Australia, which has already exhibited net-zero grid operation in the past couple of years. We will do then an approach to they modelling inside the currents deep uncertainties. Then we will discuss several technical, commercial and regulatory solutions and opportunities that are being deployed or considered, ranging from widespread adoption of both highly distributed and large-scale batteries to the development of "clean super-power" plans based on green hydrogen investment

Prof. **Mancarella** is the Chair Professor of Electrical Power Systems at The University of Melbourne, Australia, and Prof. of Smart Energy Systems at The University of Manchester, UK.

Pierluigi's research interests include techno-economic modelling of low-carbon grids, multi-energy systems, energy system planning under uncertainty, and reliability and resilience of future networks. He has been involved in/led more than 100 research projects worldwide, has been actively engaged with energy policy in the UK, Europe and Australia, and is author of several books and of over 400 research publications and reports.

Pierluigi is a Fellow of the IEEE; an IEEE Power and Energy Society Distinguished Lecturer; a Senior Editor of the IEEE Transactions on Power Systems; an Editor of the IEEE Transactions on Energy Markets, Policy and Regulation; the Convenor of the Cigre C6/C2.34 WG on "Flexibility provision from distributed energy resources"; and the inaugural Chair of the WG on Energy of the IEEE European Public Policy Initiative.

Pierluigi was awarded the 2017 *veski* Innovation Fellowship by the Victorian Government for his "FlexCity" project on multi-energy urban virtual power plants, and an international Newton Prize 2018 for his UK-Chile Newton-Picarte project on power system resilience. He also led the Melbourne Energy Institute's work "Power system security assessment of the future National Electricity Market" for the Australian Chief Scientist's "Finkel Review".

Prof. Ivan Gordon

Director
Department at IMEC, Professor at Hasselt and Delft Universities.

Invited Talk
Tuesday, June 17/11:00 h

Photovoltaic Solar Cell Technologies: State-of-the-Art, Challenges and Opportunities

In this presentation, an overview will be given of the main technologies and materials currently used in the photovoltaic (PV) industry, as well as an overview of the main scientific challenges to further improve these technologies and to take photovoltaics into the Terawatt era. In 2024, around 500 GW of PV panels were produced, shipped and installed worldwide. More than 95% of these panels use crystalline-silicon wafers as the active solar cell absorber material. Hence, a big part of the presentation will deal with the history, the current status and the main R&D challenges of crystalline silicon photovoltaics. Finally, crystalline-silicon based tandem solar cells will be shown to be the way forward to overcome the theoretical and practical efficiency limits of single-junction silicon solar cells.

Professor Dr. **Ivan Gordon** is currently the director of IMOMEC, a Belgian materials research laboratory belonging both to IMEC and Hasselt University. He is also part-time professor in Digital Photovoltaics at the Delft University of Technology in the Netherlands and Editor-in-Chief of the international scientific journal Solar Energy Materials and Solar Cells. Since January 2016, he is the coordinator of the joint program on Photovoltaics of the European Energy Research Alliance (EERA) and a steering committee member of the European Technology and Innovation Platform Photovoltaics (ETIP-PV).

Prof. Jordi Martorell

Head
Organic nanostructured Photovoltaics, ICFO, Barcelona, Spain

Invited Talk
Tuesday, June 17/12:10h

Nano-photonics to raise the upper limit for Energy Conversion in Solar Cells

Single junction semiconductor solar cell devices can convert sunlight into electrical energy with a relatively low upper limit efficiency established by Shockley and Queisser many years ago. Different intrinsic energy loss mechanisms such as thermalization, below bandgap transmission or Boltzmann losses limit the power conversion efficiency of such photovoltaic devices to less than 33.2%. Overcoming thermalization or below bandgap losses has been widely explored following different strategies such as the tandem or multiple junction approach. However, Boltzmann losses have been largely overlooked for several different reasons which partially relate to a low fluorescence quantum yield in the majority of the photovoltaic materials used, and the challenge to obtain configurations simultaneously effective in trapping photons emitted by the photovoltaic material but also in capturing sun photons. It has been proposed that an adequate nano-structuration of the solar cell architecture may lead to an upper limit conversion efficiency slightly higher than 42%. I will discuss the design and fabrication of nano-structures which are effective in limiting radiative recombination without significantly altering sun photon absorption. I will also present routes to implement them in perovskite or organic solar cells.

Jordi Martorell (JM) is professor at UPC and since 2005 he is also head of the organic nano-structured photovoltaics group at ICFO. JM focused his research into the experimental study of new optical configurations to shape the properties of photonic materials. In 2011 JM took a major turn in his research activities and began to consider novel photonic concepts applied to the energy field. Since then, JM coordinated several European Commission projects focused on the study of the role played by optics or photonics in the transformation of sun energy into other forms of energy such as, for instance, electricity or solar fuels to store chemical energy. In 2013 proposed a novel nanophotonic configuration for high efficiency transparent solar cells which in 2020 led JM's research group to report a world record performance for such kind of solar cells devices. This led to co-founding Vitsolc, a spin-off company with the mission to fabricate and commercialize transparent organic modules. Currently, JM's research is focused on exploring novel nano-photonic configurations guided to inhibit emission photons while raising the upper limit for energy conversion efficiency in solar cells.

Afternoon, Tuesday, June 17 / 15:30 h- 17:35

Round Table I

Light in Energy: Challenges and Opportunities:

Dr. Cavada, **President and CEO,** Chief Executive Officer, Mitssubishi Power for Europe, Middle East and Africa, UK.
By Mitsubisshi Power on the Decarbonization Road-Map.

Prof. Sattler, **Director** of German Aerospace Center, vice-president of Hydrogen Europe Research association, Germany.
or on using concentration solar power for Green Fuels real production.

Prof. Campbell, **President** MCM Consultants, director Emeritus, Lab. For laser Energetics, University of Rochester, USA
To reach the technology for a Laser Fusion Energy real exploitation

Prof. Mancarela, **Australian Director** of USA-UK-Australia Global Centre in climate change and Clean Energy co-lead with Johns Hopkings University (USA) and Imperial College London, UK.
to reach effective and efficient Energy Storage technologies .

Prof. Gómez Expósito, Director of "Endesa Red" Chair, University of Sevilla, Spain.
for the Stability and Resilience of the electric power system with massive penetration of renewables.

Moderator: Prof. JM López-Higuera, Director ISLiST

TUESDAY END

Prof. Michael Campbell

President
MCM Consultants, co-Director of Fusion Engineering Institute, UCSD

Invited Talk
June 18/9:30 h

Round Table I
June 17/15:30 h

Laser driven Fusion Energy

The need to decarbonize central power production and the recent demonstration of fusion ignition and scientific gain greater than one at the National Ignition facility has renewed interest in Inertial Fusion Energy (IFE). The presentation will both summarize the present state of fusion physics, and the challenges and opportunities for a program focused on IFE.

Although none of the current facilities are equipped for implosion experiments, there is ample scope for research in areas critical to Inertial Fusion Energy (IFE), including: Laser-plasma interaction physics, foam target physics, novel approaches to fusion, development of rep-rated diagnostics, an also target fabrication and fielding technologies. This presentation will not only highlight the challenges facing IFE but also explore how public Organizations such as the USA LaserNetUS can significantly contribute to the finally commercializing fusion energy.

Prof. Campbell is an internationally known expert in inertial fusion, high-energy-density physics, high-power lasers and their applications, and advanced energy technologies including Generation IV nuclear fission reactors and biofuels. He has won numerous awards including the Department of Energy's E. O. Lawrence Award, the American Nuclear Society's Edward Teller Award, the American Physical Society's John Dawson Award (twice), the Department of Energy's Excellence in Weapons Research Award, and the Leadership Award and Distinguished Career award from Fusion Power Associates. He is a Fellow of the American Physical Society and Optica.

Campbell retired in April 2022 from the University of Rochester where he was the Director of the Laboratory for Laser Energetics (LLE). For his contributions to the LLE, Rochester, and fusion research, he recently was given honorary Doctorate by the University. Campbell now consults with a focus on fission energy, fusion and high-power lasers and their applications. He has received his degrees from the University of Pennsylvania, Princeton University, and the University of Western Sydney. Campbell is presently a Professor of Practice at UCSD, Adjunct professor at UN-Reno and is President of MCM Consultants.

Prof. Carlos Algora

Head
III-V Semiconductors Group, Solar Energy Institute, Universidad Politécnica de Madrid, UPM, Spain

Invited Talk
Wednesday,
June 18/11:00h

Photovoltaic laser power converters for Power-by-light Systems

PhotoVoltaic Laser Power Converters (PVLPCs) are the core element of Power-by-Light (PBL) systems which are basically made up of a power laser, an optical fibre and a PVLPC. PBL allows the safe transfer of power in situations where the direct use of electrical energy to power electronic equipment is either not possible or not recommendable. The first PBL system was built in 1978 but it has been only recently when PBL systems are having an outburst with continuous efficiency improvements, creation of start-ups, big companies entering the business, etc.

This talk provides an overview of the functionalities of PBL systems together with a brief outlook on the history of PVLPCs. A detailed comparison among the different typologies of PVLPCs in terms of efficiency, delivered power, voltage, temperature effects and manufacturability are carried out, highlighting their advantages and disadvantages depending on the application. PVLPCs are the most efficient PV devices, which are approaching to efficiencies of 70%.

We finally point out the main aspects limiting the efficiency of PVLPCs and possible ways to circumvent them.

Prof. Algora received a Ph.D. degree in Physics in 1990 by the Universidad Complutense de Madrid, Spain. He joined the Solar Energy Institute (IES) of the Universidad Politécnica de Madrid (UPM) in 1985 where he is a Chair Professor from 2008. From 1996 he has been the head of the III-V Semiconductors Group devoted to the modelling, physics, technology, characterization and reliability of III-V photovoltaic converters and other materials such as Germanium and graphene. Together with his team, he reached in a GaAs single junction solar cell the highest efficiency at 1000 suns (26.2% in year 2000) and the world record for a GaInP/GaAs dual junction solar cell (32.6% at 1030 suns in 2008). The applications, towards Prof. Algora are oriented his research, are the terrestrial and space solar cells, photovoltaic laser power converters for power-by-light and thermophotovoltaic converters.

He has been the main researcher of more than 60 R&D projects including several EU and ESA projects. He has published around 350 scientific papers in scientific journals and conference proceedings and has authored several book chapters. He holds 9 American and Spanish patents and has been the supervisor of 15 doctoral theses.

In 2009 he received the First Edition of the Research Award Prize of the Universidad Politécnica de Madrid.

Prof. Carlos Molpeceres

Director
Centro Láser, and deputy vicerrector of **Universidad Politécnica de Madrid**, Spain

Invited Talk, Wednesday, June18/12:10h
Round table II,Thursday, June 19/ 15:30 h

Laser Technology in Photovoltaics

Lasers have been used in microelectronic and photovoltaic (PV) industry for decades but, more recently, laser processing has appeared as a key enabling technology to improve efficiency and to reduce production costs in high efficiency solar cells fabrication.

In this presentation we will discuss the present role of laser technology in the photovoltaic industry, both in cell and module manufacturing with specific examples of wafer and cell processing and contact formation in silicon PV technologies, monolithic interconnection in thin film technologies and solutions for soldering and encapsulation in module fabrication. In addition, we will discuss the impact of laser technology in the present and future development of Building Integrated Photovoltaics (BIPV), and area in which lasers offer outstanding solutions for product customization.

Finally, we will present the impact that laser-based advanced manufacturing techniques, and in particular those based in ultrafast laser processing, are having in the present research of cutting-edge concepts that will define the photovoltaics of the future.

Prof. Molpeceres is Deputy Vice-rector for Research Centers and Institutes at Universidad Politécnica de Madrid, the largest and oldest Technical University in Spain. Full Professor at Department of Applied Physics and Materials Engineering, he was Director of the Laser Center UPM (www.upmlaser.upm.es) from 2016 to 2024. He is also PI of the UPM Research Group Advanced Laser-Based Manufacturing mainly focused in the development of laser micro and nano processing of materials.

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.

Mr. Mikel Bengoa

General Director
Coherent España.

Invited Talk , Wednesday June 18/15:30 h

Laser technology in Advanced Batteries fabrication

The transition from internal combustion engines to electrical power drives in the automotive industry is facing several challenges and opportunities for laser material processing applications.

The presentation will introduce the new demands the e-Mobility transformation is generating, with a special focus on battery mass production, and the strategies that have been followed to overcome those demands from a laser design perspective.

Mr. Mikel Bengoa is and Industrial Engineer with an executive Master in Marketing and Sales Management.

He has more than 30 years' experience in developing and implementing laser material processing applications for a variety of industries like automotive, white goods, flexible packaging, machine tools and medical devices.

During his career he was holding different responsibilities in areas such as technical, sales and finally managing director.

In the currents, he is Sales Manager Industrial Laser Sources South Europe in the company COHERENT Inc.

Prof. C. Caucheteur

Head of Advanced Photonic Sensors Unit, University of Mons, Belgium

Invited Talk, Wednesday june 18/16:40 h

Multimeasurand Advanced Optical fiber Sensor systems for real time Battery Monitoring

After an introduction to the technology, we will review the progress obtained in the use of fiber Bragg grating sensors for the operando monitoring of batteries. We will focus on both physical parameters (temperature, strain, pressure, …) and chemical parameters (refractive index, gas, …) sensing.

Christophe Caucheteur is a Professor at the University of Mons (UMONS), Belgium and Research Director at the F.R.S-FNRS, Belgium. He is the head of the Advanced Photonic Sensors Unit (APS), recipient of an ERC Starting Grant in 2011, and specializes in photonics and optical fiber sensors based on Bragg gratings. He is also the founder of a spin-off company, B-SENS, since 2016.

17:55 h **VIII-ISLIST Family Photo**

18:05 h / Special Event

Santander Council Reception

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

WEDNESDAY END

Prof. Tong Sun

Head
of Sensors Engineering Group, Sensors Research Centre, City University of London, UK

Invited Talk, Thursday June 19/9:30 h

Round table II, Thursday June 19/15:30 h

Monitoring wasrewater treatment infrastructure using Optical Fibre Sensors

Wastewater treatment infrastructure plays a crucial role in modern society. It ensures the safe disposal and treatment of waste materials, preventing environmental pollution and protecting public health. Its integrity is of critical importance for meeting the challenges of a rapidly changing world.

To address this urgent need, the team at City St George's, University of London have embarked on a series of research projects, funded by Sydney Water in Australia. It includes the field deployment of photonic sensors in a wastewater treatment plant, sewer pump stations and sewer rising mains for early detection of possible structural failures.

This presentation gives an overview of this joint adventure of researchers from City and from Sydney Water. It covers the concept of sensor designs, their field implementation followed by their data analysis and visualisation which helps to trigger engineering interventions to prioritise wastewater asset maintenance.

Professor Tong Sun, OBE, FREng, was awarded BEng, MEng and DEng in Precision Instrumentation from Harbin Institute of Technology (HIT), China in 1990, 1993 and 1998 respectively and PhD in Applied Physics at City University London in 1999.

Tong Sun is Professor of Sensor Engineering at City St George's, University of London and leads research in developing and applying optical fibre sensors and instrumentation to address topical industrial problems.

She was recognised in 2018 Queen's Birthday Honours List by the award of an OBE for services to engineering and was a Royal Academy of Engineering Research Chair until 2024. In 2020 she was elected Fellow of the Royal Academy of Engineering in the UK.

Prof. Miguel González

Head
of Photonics Engineering Group of University of Alcalá de Henares, Madrid, Spain.

Invited Talk
Thursday 19/11:00 h
Round table II
Thursday 19/15:30h

Fiber Distributed Sensing in Energy and Environment applications

Distributed optical fibre sensors are increasingly used in the monitoring of large critical energy infrastructures such as large pipelines and power cables. Unlike traditional sensor networks, distributed sensing systems convert a conventional optical fibre cable into a vast array of virtual sensors that can measure strain and temperature changes along its entire length. This talk will review the basic principles and limitations of these sensors, and will provide evidence showing that monitoring of the environment can also be performed with these system, with a level of spatiotemporal detail that is unprecedented in any other monitoring tool for these purposes.

Miguel Gonzalez-Herráez (Senior Member, OSA) is currently a Full Professor in Photonics at the University of Alcala (Spain). His research interests are primarily related to distributed optical fiber sensing systems. He is the author or co-author of >150 journal papers and >200 conference contributions.

He has received several important recognitions to his basic research activity and technology transfer contributions in this area, including the European Research Council Starting Grant, the "Miguel Catalan" Prize given by the Regional Government of Madrid, and the "Agustin de Betancourt" prize of the Spanish Royal Academy of Engineering.

Prof. Christian Pedersen

Head
of Optical Sensors Group, Technical University of Denmark, Denmark.

Invited Talk
Thursday
June 19/12:10 h

Round table II
Thursday
June 19/15:30 h

AI assisted aquatic LiDARs for remote sensing of the ocean

The global community is facing ever increasing challenges in maintaining clean and healthy ocean water (or coastal water). Aquatic monitoring is challenging due to the sheer vastness of the ocean, covering 71% of the earth's surface and due to it's inhospitality, being aquatic. These two circumstances make autonomous LiDAR instrumentation promising. One important health indicator is the diversity and abundance of zoo and phyto plankton, since these constitute the lowest layer in the aquatic food chain. Further, spatially resolved in situ monitoring of plankton can provide insights on the impacts of climate change on aquatic ecosystems due to their vital role in the biological carbon pump. In situ optical tools unlock high-resolution measurements of sub-millimeter specimens, but state-of-the-art underwater imaging techniques are limited to fixed and small close-range volumes, requiring the instruments to be vertically dived.

Here, a novel scanning multispectral confocal light detection and ranging (LiDAR) system for short-range volumetric sensing in aquatic media is introduced. The deployment of this photonic platform alongside AI models overcomes the complex and subjective task of manual plankton identification and enables non-intrusive sensing from fixed vantage points, thus constituting a unique tool for underwater environmental monitoring.

Prof. Pedersen received his MSc from Technical University of Denmark (DTU) in 1991. In 1995, he received his Industrial PhD from the Department of Physics within the field of nonlinear optics and solid-state lasers. From 1996 to 2004, he worked in two start-up laser companies. From 2005 to 2008, he headed the Optical Sensor Technology programme at Risø National Laboratory. In 2008, Risø National Laboratory became a part of DTU. Since then, he has been employed by DTU Electro, Department of Electrical and Photonics Engineering, appointed professor in 2019 within the field of photonics sensors.

Afternoon, Thursday 19/15:30-17:45 h

Round Table II.

Light on environment and manufacturing: Challenges to face and Opportunities

Prof. Sun, **Head** of Sensors Engineering Group, Sensors Research Centre, City University of London, UK
to reach reliable OFS for environmental applications.

Prof. Pedersen, **Head** of Optical Sensors Group, Technical University of Denmark, Denmark.
multimodal lIDAR based sensing technology to monitorize underwater life

Prof. González, Head of Photonics Engineering Group of University of Alcalá de Henares, Madrid, Spain.
To reach reliable fiber distributed sensors for Energy and Environment

Prof. Molpeceres, Director of Laser Centre, and deputy vicerrector of **Universidad Politécnica de Madrid**, Spain.
On laser manufacturing.

Moderator: Prof. JM López-Higuera, Director ISLiST

THURSDAY END

Prof. Christian Pedersen

Head

of Optical Sensors Group, Technical University of Denmark, Denmark.

Invited Talk
Thursday 20/9:30 h

Atmospheric LIDAR sensing for a green transition

Wind LiDARs. The ability of coherent detection LiDAR systems to obtain spatially resolved measurements of atmospheric wind velocity from remote locations has been applied to a growing number of applications such as characterization of wind farms, determination of wind turbine power curves, aircraft wake vortices, and true airspeed. Historically, LiDAR products remain relatively bulky and expensive, and have thus been primarily limited as scientific instruments.

To address the need for a more industrial lidar solution, we have developed a compact and low-cost system wind LiDAR based on a tapered semiconductor laser source. The LiDAR system is commercialized for improved wind energy harvesting of wind turbines.

A second example involves environmental LiDAR gas sensing using direct laser absorption spectroscopy (DLAS) in stand-off configurations. Using the fine spectrum of typical greenhouse gases, such as CH_4, CO_2 and N_2O, high precision sensing is possible under field conditions. Sensing accurately and fast in combination with drones provides a way forward for sensing the total emission factor (i.e how many kg of gas per hour is emitted) of large industrial facilities enabling legislation to be enforced as well as optimization of the plant.

Prof. Pedersen received his MSc from Technical University of Denmark (DTU) in 1991. In 1995, he received his Industrial PhD from the Department of Physics within the field of nonlinear optics and solid-state lasers. From 1996 to 2004, he worked in two start-up laser companies. From 2005 to 2008, he headed the Optical Sensor Technology programme at Risø National Laboratory. In 2008, Risø National Laboratory became a part of DTU. Since then, he has been employed by DTU Electro, Department of Electrical and Photonics Engineering, appointed professor in 2019 within the field of photonics sensors.

Prof. José Miguel López-Higuera

Emeritus Professor

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

Closing Talk
June20/11:00 h

Round Tables I &II moderator

Cleaning environments with Energetic Germicidal Photons

Environments free of pathogen microorganisms (bacteria and viruses) are of paramount importance humans´ and pets' healthy lives.

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.

Today, are well known the germicidal properties of energetic photons in the range of ultraviolet light (UV). Germ-deactivating properties, known as germicidal UV radiations, can be used for the deactivation of germs harmful to health, both contained in surfaces, in fluids, including liquids and gases.

In this lecture after a review the current state of the art of the UV-radiations interaction with pathogens and also with humans´ tissues, we will propose the key parameters for deactivation of pathogens harmful to humans´ health. Then, technical germicidal strategies and devices will be proposed.

Finally, a germicidal system developed by the author during the COVID-19 pandemic will be presented for a better illustration and understanding of the core of this lecture by the school participants.

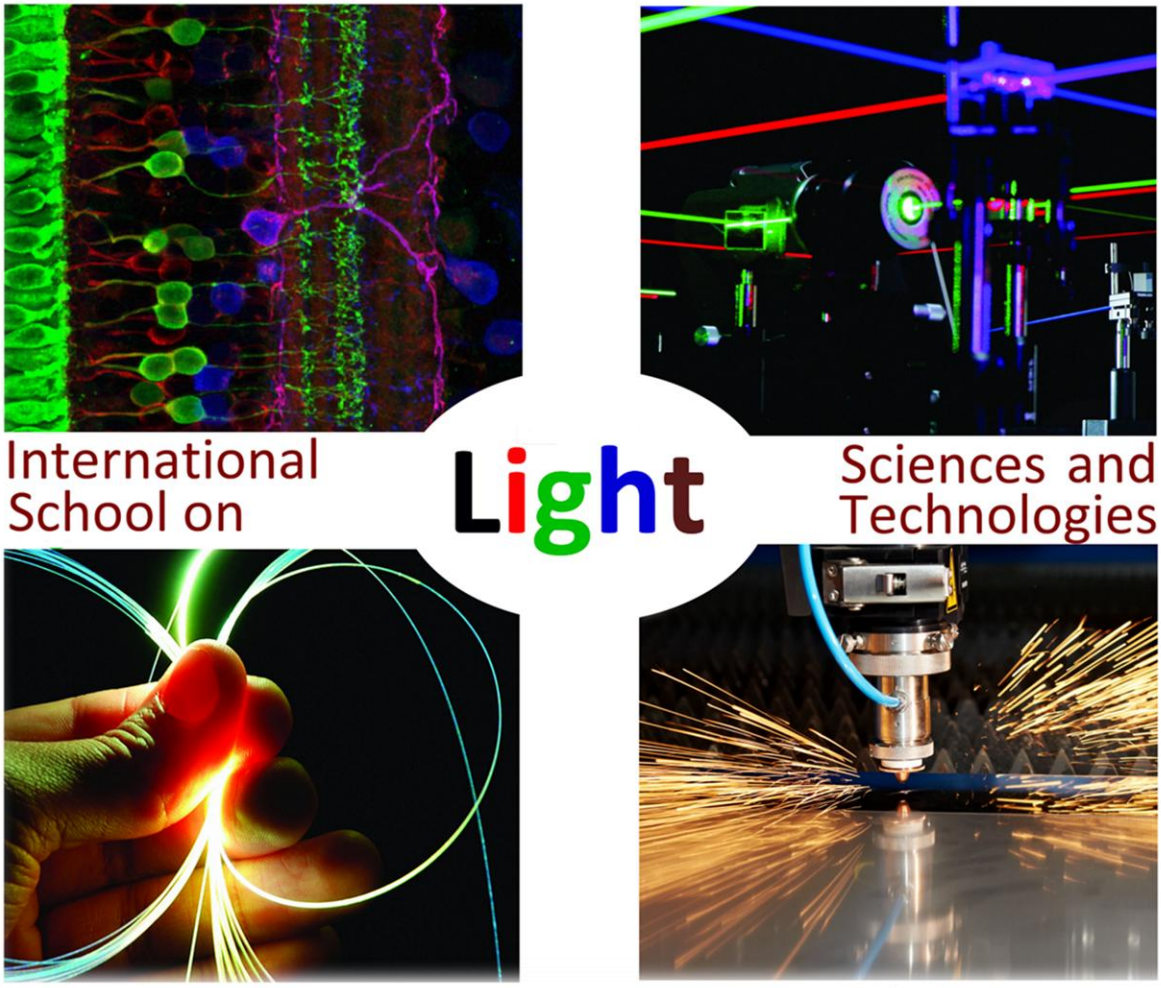
Prof. López-Higuera is the founder and head of the Photonics Engineering Group of the University of Cantabria, CIBER-BBN of Institute of Health Carlos III and IDIVAL of Hospital Universitario Marqués de Valdecilla, Spain. He is also the founder and Director of ISLIST at UIMP.

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 including the Health and Medicine one. He has worked in a wide range of R&D&i projects (more than 150), acting in more than 110 of them as manager or Principal Investigator.

He has contributed with more than 990 research publications, 26 patents and also directed 22 PhD theses. He has worked as an editor and co-author of four R&D international books, as invited editor and 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.

ISLiST / UIMP
Universidad Internacional Menéndez Pelayo



VIII-ISLIST

NOTEBOOK

June 16 / 11:00 h / **Dr. Cavada**

The pillars of the decarbonization: impacts on the development of a new world

NOTES:

June 16 / 12:10h / **Prof. Sattler**

Concentrating Solar heat for power generation and chemical processes: current trends

NOTES:

June 16 / 15:30-16:00 h / **Mr. Moya**

GREEN and BLUE H2 production in Cantabria: Besaya H2 project

NOTES:

June 16 / 16:00-16:30 h /**Prof. Vidal Pascual**

GREEN and BLUE H2 production in Cantabria: Bahía H2 Offshore project

NOTES:

June16 / 16:40 h / **Prof. Gómez Expósito**

The photovoltaic revolution: from the age of fire to the age of light

NOTES:

June 17 / 9:30 h / **Prof. Mancarela**

Running a PV-based net-zero grid in 2025: modeling and experiences from the Australian "real-wold lab

NOTES:

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

Photovoltaic Solar Cell Technologies: State-of-the-Art, Challenges and Opportunities

NOTES:

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

Nano-photonics to raise the upper limit for Energy Conversion in Solar Cells

NOTES:

June 17/15:30 h / **Round Table I:**

Light in Energy: Challenges to face and Opportunities






NOTES:

June18/ 9:30 h / **Prof. Campbell**

Laser Driven Fusion Energy

NOTES:

June 18 / 11:00 h / **Prof. Algora**

Photovoltaic laser power converters for Power-by-Light Systems

NOTES:

June 18 / 12:10h / **Prof. Molpeceres**

Laser Technology in Photovoltaics

NOTES:

June 18 / 15:30 h / **Mr. Bengoa**

Laser technology in Advanced Batteries fabrication

NOTES:

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

Multimeasurand Advanced Optical fiber Sensor systems for real time Battery Monitoring

NOTES:

June 19 /9:30 h / **Prof. Sun**

Monitoring wastewater treatment infrastructure using Optical Fibre Sensors

NOTES:

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

Fiber Distributed Sensing in Energy and Environment applications

NOTES:

June 19/ 12:10 h / **Prof. Pedersen**

AI assisted aquatic LiDARs for remote sensing of the ocean

NOTES:

June 19/15:30 h / Round Table II:

Light on environment and laser fabrication: Challenges to face and Opportunities



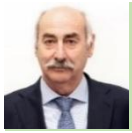


NOTES:

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

Atmospheric LIDAR sensing for a green transition

NOTES:



June 20 / 11:00 h / **Prof. López-Higuera/closing Talk**

Cleaning environments with Energetic Germicidal Photons

NOTES: