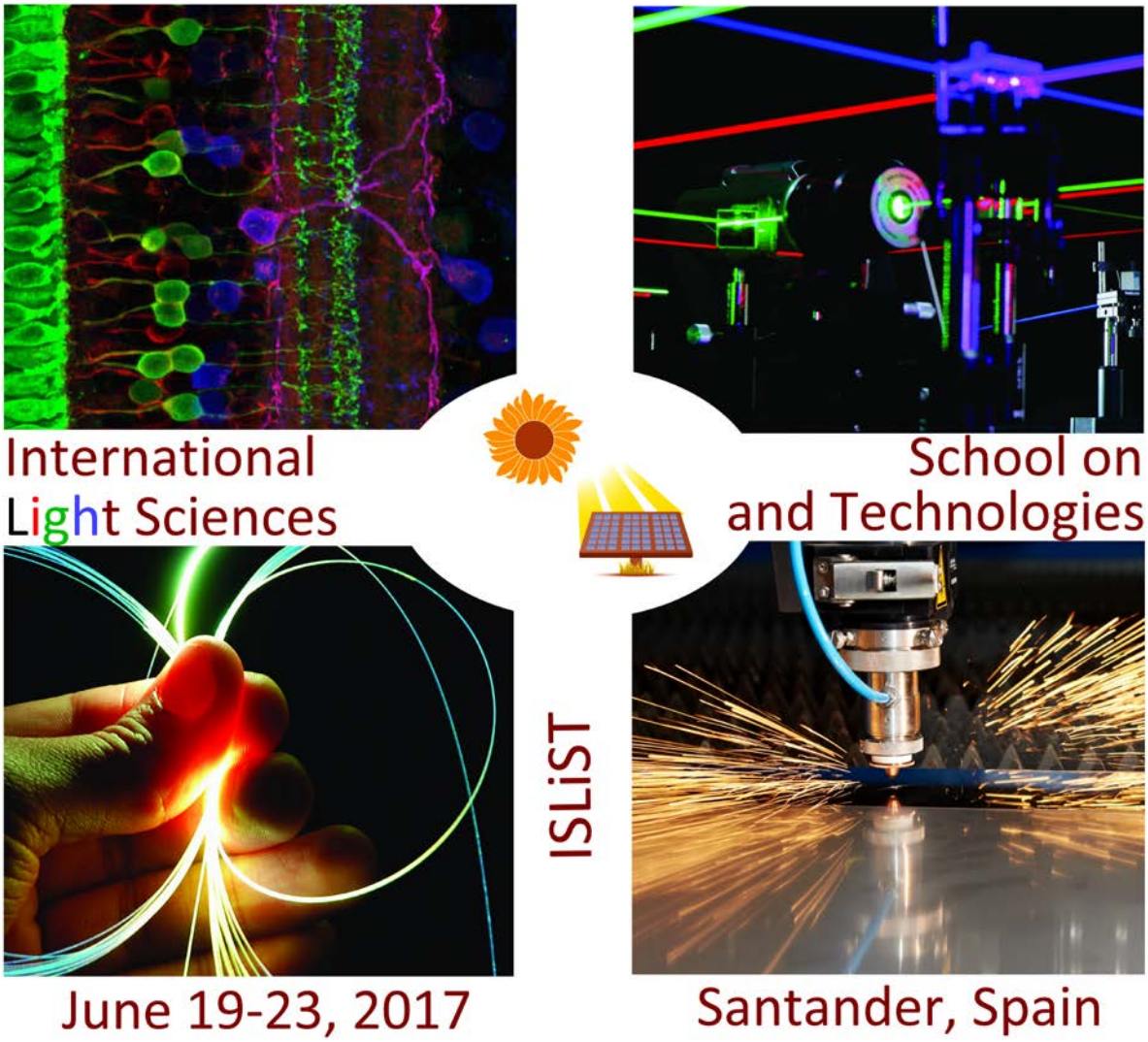
UIMP
Universidad Internacional
Menéndez Pelayo



Core: Light in Energy and Environment

DIRECTOR:
José Miguel López Higuera
Professor in Electronics and Photonics
Head of the Photonic Engineering Group
University of Cantabria

SECRETARIO:
Jesús Mirapeix Serrano
Photonic Engineering Group
University of Cantabria
e-mail: jesus.mirapeix@unican.es

SPONSORS

COLLABORATORS

Summary

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, opened up 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 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 Energy and Environment*** is the core of this 2017 edition.

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.

Sixteen (16) **highly renowned** professors (including the Nobel Laureate Shuji Nakamura) and researchers from the most prestigious worldwide institutions and, as well, presidents of the 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 snack and drinks) will be an optimum time to networking.

In this edition, the UIMP has distinguished Prof. **Nakamura** with its **Doctor Honoris Causa (Honorary Doctorate)**. This prestigious honor will be given at a solemn ceremony to be held in the Royal Hall of the Palace of Magdalena at Thursday noon, June 22, 2017.

To be able to reach this ambitious program this International School of UIMP is supported by several sponsors: **Gobierno de Cantabria**, **Fundación ACS,** the **Optical Society of America, OSA** and **ENSA.**

It is also supported by several collaborators such as: **SPIE**-the International Society for Optics and Photonics; the Spanish Optical Society, **SEDOPTICA**; **AMBAR Telecommunications**, **Alava Engineers**, **Fyla Lasers**, **B-Phot Brussels Photonic Team, OZ Optics, Lasing, INNOVA Scientific**, **Hotel Santemar** and the **Photonics Engineering Group** of the University of Cantabria.

Without these Sponsors and Collaborators, this top quality school and the 33 International Student Grants (assigned to students from over 18 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!

International School on Light Sciences and Technologies **ISLiST**

June 19-23, 2017, Santander, Spain

Goals

To actualize and improve the knowledge of ***scientists, professionals and technicians***; to contribute in the education and to enhance the motivation of ***PhD students***; to offer an ideal frame for ***networking***. It is also a great opportunity to ensure that policymakers, politicians and citizens in general terms will be made aware of the problem-solving potential of Photonics.

Overview

The event will be developed from Monday (June 19, 2017) to Friday (June 23, 2017). The first two and half days will be focused on key subjects concerning Light in Energy and Environment and the associated impact on the society. The rest of the week will be focused on the review of the current situation and the identification of challenges and trends in several key areas where Photonics will play roles of paramount importance. Two round-tables will also take place. The first one (Wednesday morning) to analyse challenges of light technologies in the Energy and Environment area (this year's edition core) and the second one (Friday), to analyse the needs to reach an efficient and effective education and training of the human resources in a Key Enabling Technology (KET) in general and in particular on Photonics.

General Schedule

Time	Monday 19th	Tuesday 20st	Wednesday 21nd	Thursday 22rd	Friday 23th
9:30		Prof. **Eli Yablonovitch** Univ. of California at Berkeley, USA.	**Jan Denneman** Global and Industry Lighting Associations, Philips Lighting, Netherlands	Prof. **Shuji Nakamura** ***Nobel Laureate*** Univ. of California at Santa Barbara, USA	9:10 Prof**. Eric Mazur** Harvard University USA
10:15	**Opening Remarks**				
10:40	**Coffee Break**	**Coffee Break**	**Coffee Break**	**Coffee Break**	**Coffee Break**
11:00	Prof. **Roel Baets** Ghent University Belgium	Prof**. Christian Sattler** Inst. of Solar Research Germany	**Round Table I** *Light on Energy and Environment Challenges* Professors: **Luque, Yablonovitch, Sattler, and Jan Denneman** Moderator: **Prof. López-Higuera**	Prof. **Sir David Payne** University of Southampton UK	10:25 **Round Table II** *Education on KET´s* Profs.**Nakamura, Payne, Mazur, Secretary of State for Education (Spain) (TBC)** Moderator: **Prof. López-Higuera**
12:10	Prof**. López-Higuera** Univ. of Cantabria Spain	Prof. **Christian Pedersen** Technical Univ. of Denmark Denmark		12:00 Prof. **Nakamura Doctor Honoris Causa Ceremony**	12:15 **Diploma Delivery** 12:30 **Closing Remarks**
13:30 15:00	**Lunch**	**Lunch**	**Lunch**	**Lunch**	
15:30	Prof.**Antonio Luque** Inst. of Solar Energy Spain	Prof. **Adolfo Comeron** Univ. Polytechnic of Catalonia Spain	Prof**. Eric Mazur** Harvard University USA	16:15-17: 15 h Prof. **Pablo Artal** Univ. of Murcia, Spain	
16:40	Prof. **G. Konstantatos** ICFO Spain	Prof. **Jérome Faist** Inst. Of Quantum Electronics Switzerland	Prof. **Javier Solis** CSIC Spain	17:25 Prof. **López-Higuera** Univ. of Cantabria Spain	
			17:55 ISLIST-2017 FAMILY PHOTO		
			18:05 Santander Council Reception		

PROGRAM

Monday, 19

Why Light matters for Energy and Environment?

10:15 h
Opening Ceremony

10:40 h / **Break**

11:00 h / Opening Invited Talk
The future of compact and low cost spectroscopy: Advanced spectrometers on Silicon Photonics
Prof. Roel Baets
Director of Center for Nano- and Biophotonics Ghent University IMEC Department of Information Technology, Belgium.

12:10 h / Invited Talk
Light in Energy and Environment
Prof. José Miguel López-Higuera,
Head of Photonic Engineering Group, Universidad de Cantabria, Spain

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

Afternoon: **Photovoltaic clean Energy**

15:30 h / Invited Keynote
Photovoltaics for highly efficient energy conversion and storage
Prof. Antonio Luque,
President of Institute of Solar Energy of Polytechnic University of Madrid, Spain.

16:40 h / Invited Talk
Nanophotonics and colloidal quantum dots for more efficient solar cells
Prof. Gerasinos Konstantatos,
Head of Functional Optoelectronic Nanomaterials Group, ICFO, Barcelona, Spain.

Tuesday, 20

Morning: **Light in efficient clean Energy**

9:30 h / Invited Keynote

A Great Solar Cell Also Needs to Be a Great LED: Electro Luminescent Refrigeration

Prof. Eli Yablonovitch,

Director of NSF Center for Energy Efficient Electronics Science University of California, Berkeley, USA

10:40 h **/ Break**

11:00 h / Invited Talk

Solar Fuels and Electricity by using Sunlight concentrating Systems

Prof. Christian Sattler

Director Department of Solar Chemical Engineering Aerospace Center´s Institute of Solar Research, Germany

12:10 h / Invited Talk

Diode Laser LIDARs for renewable energy generation

Dr. Christian Pedersen

Head of Optical Sensor Technology Group, Technical University of Denmark, Denmark.

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

Afternoon*:* **Light in Environmental measurements**

15:30 h / Invited Talk

LIDAR Systems for air atmospheric probing: principles and trends in aerosol vertical profiling

Prof. Adolfo Comerón

Head of Optical Remote Sensing Group, Polytechnic University of Cataluña, Spain.

16:40 h / Invited Talk

Laser Frequency Comb and their application on spectroscopic sensing of environmental Pollutants

Prof. Jérome Faist,

Director of Quantum Optoelectronic Group Institute for Quantum Electronics ETH Zurich, Switzerland

Wednesday, 21

Morning: Light in efficient lighting and Challenges

9:30 h / Invited Keynote

The strategic roadmap of the European and Global Lighting Industry driven by LEDs and Intelligent Lighting Systems

Mr. Jan W. Denneman
President Global Lighting Association and **Vice-President** of Lighting Europe and Philips Lighting, Eindhoven, Netherlands

10:40 h / **Break**

11:00 h / Round Table I:

Light on Energy and Environment: Challenges to face

Prof. Antonio Luque, **President** of Institute of Solar Energy of Polytechnic University of Madrid, Spain.
Challenges on highly efficient energy conversion and storage.

Prof. Eli Yablonovitch, **Director** NSF Center for Energy Efficient Electronics Science University of California, Berkeley, USA
Challenges on PV cells.

Prof. Christian Sattler, **Director** Department of Solar Chemical Engineering, Aerospace Center Institute of Solar Research, Germany
Challenges on harnessing the light with solar concentrator systems.

Mr. Jan W. Denneman, **President** Global Lighting Association and **Vice-President** of Philips Lighting, Eindhoven, Netherlands.
Challenges on highly efficient lighting devices.

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

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

Afternoon: Light in nanometamaterials and Materials Processing

15:30 h / Invited Keynote

Less is More: Extreme Optics with Zero Refractive Index

Prof. Eric Mazur
Director of Applied Physics at Harvard University, USA. **2017 OSA President.**

16:40 h / Invited Talk

Femtosecond-laser induced compositional changes for photonics applications

Prof. Javier Solis
Director of the Department of Non-linear, Ultrafast and Nano-scale Photonics, Instituto de Optica-CSIC, Madrid

17:55 h ISLIST Family Photo

18:05 h / Special Event

Santander Council Reception

The Santander 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 future lighting and communications

9:30 h / Invited Keynote

The born of High Efficient Blue LEDs and Future Lighting

Prof. Shuji Nakamura

2014 Nobel Prize
2008 Prince Asturias Award
University of California Santa Barbara, USA.

10:35 h / **Break**

10:50 h / Invited Keynote

Light based Communications beyond the Fibre capacity crunch in the XXI century

Prof. Sir David Payne

Director Optoelectronic Research Centre (ORC), University of Southampton, UK.

12:00 h / Special Event

Shuji Nakamura Doctor Honoris Causa Solemn Ceremony

UIMP will confer the Doctor Honoris Causa distinction to Prof. Shuji Nakamura by unanimous agreement of its Governing Council, which wants to recognize his relevant contributions to the Sciences and Technologies of Light.

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

Afternoon: Light in Medicine

16:15 h / Invited Talk

Light science and technology for a better vision

Prof. Pablo Artal

Director Optical Laboratory **of** Optical and Nanophysics Research Centre**,** Universidad de Murcia**,** Spain

17:25 h / Invited Talk

The healing power of light: Photodynamic Therapy

Prof. José Miguel López-Higuera,

Head of Photonic Engineering Group, Universidad de Cantabria, Spain

Friday, 23

Education on Light Sciences and Technologies

9:10 / Invited keynote

Innovating Education to Educate Innovators

Prof. Eric Mazur

Director of Applied Physics Department at Harvard University, USA. **2017 OSA President**

10:05 h / **Break**

10:25 h / Round Table II:

Education and Training on a Key Enabling Technology: Photonics

Prof. Shuji Nakamura, 2014 Nobel Prize, Prince Asturias Award, Materials Department, University of California Santa Barbara, **USA**
Lessons on education and training on a KET from Experiences of a Nobel Laureate at Japan and USA

Prof. Eric Mazur, 2017 **OSA President**, Director, Applied Physics Department, Harvard University, **USA**
OSA actions to promote the education and the insights gained from education Innovator at Harvard University

Prof. Sir David Payne, Director, Optoelectronic Research Centre (ORC), University of Southampton, **UK**
Insights gained from UK education system and from ORC at University of Southampton

Mr. Marcial Marín, Education and Universities **State Secretary** of **Spain**
The Spanish position on Education for Key Enabling Technologies

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

12:15 h

Diploma Delivery

12: 30 h

Closing Remarks and Announcement of ISLiST 2018

Abstracts/Bios

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

Invited Speaker	Talk	Biography

Prof. Shuji Nakamura

Nobel Laureate,2014
Prince Asturias Award

University of California Santa Barbara, USA

June 22/9:30 h
Invited Keynote

June 23/10:25
Round Table II

The born of High Efficient Blue LEDs and Future Lighting

In 1970's and 80's, an efficient blue and green light-emitting diodes (LED) were the last missing elements for solid-state display and lighting technologies due to the lack of suitable materials. By that time, III-nitride alloys was regarded the least possible candidate due to various "impossible" difficulties. However, a series of unexpected breakthroughs in 1990's totally changed people's view angle.

Finally, the first high efficient blue LEDs were invented and commercialized at the same time of 1993. Nowadays, III-nitride-based LEDs have become the most widely used light source in many applications. The LED light bulbs are more than ten times efficient than incandescent bulb, and they last for 50 years! At their current adoption rates, by 2020, LEDs can reduce the world's need for electricity by the equivalent of nearly 60 nuclear power plants.

Prof. Nakamura is from Ehime, Japan. He obtained his B.E., M.S., and Ph.D. degrees in Electrical Engineering from the Univ. of Tokushima, Japan. He joined Nichia Chemical Industries Ltd. in 1979. He spent a year at the Univ. of Florida as a visiting research associate in 1988, and started the research of blue LEDs using group-III nitride materials the following year. In 1993 and 1995, he developed the first group-III nitride-based blue/green LEDs. He also developed the first group-III nitride-based violet laser diodes (LDs) in 1995. He has received a number of awards, including the MRS Medal Award (1997), the IEEE Jack A. Morton Award, the British Rank Prize (1998) and the Benjamin Franklin Medal Award (2002). He was elected as a member of the US National Academy of Engineering (NAE) in 2003, received the Finnish Millennium Technology Prize in 2006, the Prince of Asturias Award from Spain in 2008, the Harvey Prize of Israel Inst. of Technology in 2010, and the Nobel Prize in Physics in 2014. Since 2000, he is a professor in the Materials Department of the Univ. of California Santa Barbara. He holds more than 200 patents and has published more than 400 papers in this field.

Prof. Roel Baets

Director

Center for Nano and Biophotonics, Ghent University, IMEC Department of Information Technology, Belgium

June 19 / 11:00 h
Invited Opening Talk

Silicon photonics beyond transceivers: key technology for sensing

Over the past years silicon photonics has become a game-changing technology for high speed transceiver products in telecommunication and datacommunication. But the application of the technology in sensing and life science may have an even larger impact in the future. In this talk the potential as well as the challenges of silicon photonics in life science applications will be addressed and illustrated with various examples. Focus will be particularly on spectroscopic sensing, either through on-chip absorption spectroscopy in the mid IR or through Raman spectroscopy in the visible or near IR. The development of new flavours of silicon photonics geared towards the new wavelength ranges in these applications will also be addressed, including the activities in the European pilot line projects PIX4life and MIRPHAB.

Prof. Roel Baets is full professor at Ghent University (UGent). He is also associated with IMEC. He has management responsibilities within the Photonics Research Group of UGent, the Center for Nano- and Biophotonics (NB Photonics) of UGent, the international Erasmus Mundus MSc program in Photonics and the joint UGent-IMEC research program on silicon photonics.

Roel Baets received an MSc degree in Electrical Engineering from Ghent University in 1980 and a second MSc degree from Stanford University in 1981. He received a PhD degree from Ghent University in 1984. From 1984 till 1989 he held a postdoctoral position at IMEC (with detachment to Ghent University). Since 1989 he has been a professor in the Engineering Faculty of UGent where he founded the Photonics Research Group. From 1990 till 1994 he has also been a part-time professor at the Technical University of Delft and from 2004 till 2008 at the Technical University of Eindhoven.

Roel Baets has mainly worked in the field of integrated photonic components. He has made contributions to research on semiconductor laser diodes, guided wave and grating devices and to the design and fabrication of photonic ICs, both in III-V semiconductors and in silicon. As part of a team of 7 professors he leads the Photonics Research Group at UGent. With about 80 researchers this group is involved in numerous national and international research programs. The silicon photonics activities of the group are part of a joint research initiative with IMEC. Roel Baets is also director of the multidisciplinary Center for Nano- and Biophotonics (NB Photonics) at UGent, founded in 2010.

Roel Baets was co-founder of the interuniversity UGent-VUB MSc programme in Photonics and of the international Erasmus Mundus MSc programme in Photonics, of which he chairs the Board.
Roel Baets is a grant holder of the Methusalem programme of the Flemish government and of the European Research Council (ERC advanced grant). He is a Fellow of the IEEE of the EOS and of the OSA.

Prof. J M López-Higuera

Head

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

June 19 / 12:10 h
Invited Talk

Round Tables I &II moderator

Doctor Honoris Causa
Laudation Speaker

Light in Energy and Environment

Light Science and Technologies (Photonics) now touches almost every area of our lives, and its contributions to both power generation and energy conservation can be expected to grow considerably through the 21st century. Photonics is essential in the conversion of sunlight to electrical, thermal, and chemical energy. It also makes an important and significant contribution to reducing energy consumption through more efficient lighting, displays, communications and as well with impact on the environment as a key monitoring tool.

In this talk, after a brief mention of what should be understood as the Photonics Field and the key light properties concerning the power generation and energy and environment conservation, we will go into the potential uses of light based technologies in Energy and Environment. Several significant cases will be presented and discussed in the presentation. After that, the attendees will be aware of the significant impact of Light Sciences and Technologies on power generation and energy and as well environment conservation along this first quarter of the 21st century.

Prof. López-Higuera is the founder and head of the Photonics Engineering Group of the University of Cantabria, CIBER-BBN of IS 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 90 of them as manager.

He has contributed with more than 700 research publications including 20 patents closely related to optical and fiber techniques for sensors and instrumentations. He has worked as an editor and co-author of four R&D international books, as a co-editor of several conference proceedings and Journals and he has been the director of 17 PhD theses. He is co-founder of three technology-based companies.

Prof. López-Higuera is a Fellow of OSA, Fellow of SPIE, Senior of IEEE and a Member of the Royal Academy of Medicine of Cantabria.

Prof. Antonio Luque

President

Institute of Solar Energy
Universidad Politécnica de Madrid, Spain

June 19 / 15:30 h
Invited Keynote

June 21 /11:00
Round Table I

Photovoltaics for highly efficient energy conversion and storage

Traditional silicon solar cells, of efficiencies below 20%, are today produced so cheap that can even compete, in appropriate locations, with coal power plants. It can be ensured that photovoltaics will play a central role in the enormous increase of power capacity required by the increasing welfare extending worldwide. But solar electricity is, by nature, intermittent. The next challenge is storage.

The latent heat of fusion of silicon is very high, of 0.5 kWh/kg. Furthermore not-purified silicon is one of the cheapest materials, about $2/kg. In this way one of the cheapest methods of energy storage is melting silicon. The high melting point of silicon, 1410° C, has discouraged engineers for using it but for the photovoltaic technology this is an advantage. The heat of the molten silicon can be recovered with photovoltaic cells operating in the thermophotovoltaic (TPV) mode.

High efficiency solar cells must be used for it. Multijunction cells have converted the sunlight (at 5504° C) with efficiency of 46%. InGaAsSb/GaSb cells may be used for manufacturing TPV devices with a practical efficiency of 41%. In this way the molten silicon storage may be as cheap as the re-pumping hydropower, today the cheapest in extended use. Novel concepts in solar cells could even exceed the efficiency mentioned.

Prof. Luque (b. 1941) is Dr. Engineer in Telecommunication. Emeritus Chair Professor of Electronic Technology at the Polytechnic University of Madrid, since 1970, in which he honoraryly presides the Institute of Solar Energy, he founded in 1979. His research activity is mainly devoted to the photovoltaic conversion of solar energy. He invented the bifacial cell in 1976. This cell was fabricated by Isofotón, a company he created in 1982, and has been present in more than 50 countries. More recently (1997) Prof. Luque has proposed the new intermediate band solar cell —a concept that might overcome the fundamental efficiency limitations of conventional solar cells— and has been working in developing this concept. He has also been involved in Concentrator Photovoltaic Research and he inspired the creation of the Institute for Concentrator Photovoltaic Systems in Castilla La Mancha, whose Scientific Advisory Board he chairs and in Silicon ultrapurification research as former CEO of the university-industry joint company CENTESIL for a pilot plant in this sector. He has published many papers, one with more than 1000 citations (WOK h-index 37) as well as some books and holds over 20 patents. He has obtained, among others (twice), the Spanish National Prize for Technology (1989 and 2003), granted by the King of Spain, the Alexander-Edmond Becquerel Prize in PV research, granted by the EC (1992) and the William Cherry Award to PV research granted by the IEEE (2006) and the Karl Böer Solar Energy Medal of Merit (2015), granted by the University of Delaware. He is Member of the Royal Academy of Engineering of Spain (since 1995) and to the Russian Academy of Sciences (since 2005), Doctor Honoris Causa by tree Spanish Universities (Carlos III and Jaen, both 2005 and Málaga 2016) and Member of Honour of the Ioffe Institute of St Petersburg (since 2002).

Prof. G. Konstantatos

Head

Functional Optoelectronic Nanomaterials Group
ICFO
Barcelona, Spain

June 19; 16:40 h

Invited Talk

Nanophotonics and colloidal quantum dots for more efficient solar cells

Solution Processed Quantum Dot solar cells offer a unique platform for third generation low cost solar cells in view of their facile solution processability, bandgap tenability and exquisite control of their optoelectronic properties by engineering at the atomic and supra-nanocrystalline level. At the same time they offer additional photonic engineering opportunities and challenges given the form factor and optical properties of colloidal quantum dots. In this talk I will summarize the progress made in the recent years in the field of colloidal quantum dot solar cells by several groups around the world and also highlight some examples on the role that nanophotonics can play in further boosting their performance

Prof. Konstantatos is currently an ICREA professor at the Institute of Photonic Sciences in Barcelona, Spain leading the group of functional optoelectronic nanomaterials. He got his Ph.D. in electrical and computer engineering from the University of Toronto, ON, Canada in 2008. He has been the recipient of the MIT TR35 Spain award in 2012 and the Fresnel Prize 2013 for his salient contributions in the field of colloidal quantum dot optoelectronics. In 2016 he was awarded an ERC Consolidator Grant to develop new environmentally friendly semiconductors for thin film solar cells. He has authored more than 50 journal publications (12 of which in Nature family journals) and his work has been cited more than 7500 times (Google scholar).

Prof. Eli Yablonovitch

Director

NSF Center for Energy Efficient Electronics Science University of California, Berkeley, USA

June 20 /9:30 h
Invited Keynote

June 21 /11:00
Round Table I

A Great Solar Cell Also Needs to Be a Great LED: Electro Luminescent Refrigeration.

We now know that the photovoltaic cell and the LED are really the reciprocal of one another. The slogan: "A Great Solar Cell Also Needs To Be A Great LED" has produced to all the new solar cell efficiency records.

Very efficient light emitting diodes (LED's), surprisingly, do actually become cold as they operate, since LED light carries away entropy. This cooling requires superb LED efficiency, which is enabled by 2d photonic crystal patterning, for luminescence extraction.

What if the electrical output of a photovoltaic cell drives an LED, and the LED light in turn drives the photovoltaic cell? You might fear that it would become a perpetual motion machine. Instead it becomes a heat engine in which a small amount electricity can efficiently provide refrigeration, or conversely a small temperature difference can generate electricity. Such an electro-luminescent heat engine, in which photons are the working fluid, can be more efficient than the competing science, thermo-electrics, in which electrons are the working fluid.

Prof. Yablonovitch introduced the idea that strained semiconductor lasers could have superior performance due to reduced valence band (hole) effective mass. With almost every human interaction with the internet, optical telecommunication occurs by strained semiconductor lasers.

He is regarded as a Father of the Photonic BandGap concept, and he coined the term "Photonic Crystal". The geometrical structure of the first experimentally realized Photonic bandgap, is sometimes called *"Yablonovite"*.

In his photovoltaic research, Yablonovitch introduced the 4(n squared) (*"Yablonovitch Limit"*) light-trapping factor that is in worldwide use, for almost all commercial solar panels.

His mantra that "a great solar cell also needs to be a great LED", is the basis of the world record solar cells: single-junction 28.8% efficiency; dual-junction 31.5%; quadruple-junction 38.8% efficiency; all at 1 sun.

Prof. Yablonovitch is elected as a Member of the National Academy of Engineering, the National Academy of Sciences, the American Academy of Arts & Sciences, and is a Foreign Member of the Royal Society of London. He has been awarded the Buckley Prize of the American Physical Society, the Isaac Newton Medal of the UK Institute of Physics, the Rank Prize (UK), the Harvey Prize (Israel), the IEEE Photonics Award, the IET Mountbatten Medal (UK), the Julius Springer Prize (Germany), the R.W. Wood Prize, the W. Streifer Scientific Achievement Award, and the Adolf Lomb Medal. He also has an honorary Ph.D. from the Royal Institute of Technology, Stockholm, & the Hong Kong Univ. of Science & Technology, and is honorary Professor at Nanjing University.

Eli Yablonovitch is the Director of the NSF Center for Energy Efficient Electronics Science (E^3S), a multi-University Center headquartered at Berkeley. He received his Ph.D. degree in Applied Physics from Harvard University in 1972. He worked for two years at Bell Telephone Laboratories, and then became a professor of Applied Physics at Harvard. In 1979 he joined Exxon to do research on photovoltaic solar energy. Then in 1984, he joined Bell Communications Research, where he was a Distinguished Member of Staff, and also Director of Solid-State Physics Research. In 1992 he joined the University of California, Los Angeles, where he was the Northrop-Grumman Chair Professor of Electrical Engineering. Then in 2007 he became Professor of Electrical Engineering and Computer Sciences at UC Berkeley, where he holds the James & Katherine Lau Chair in Engineering.

Prof. Christian Sattler

Director

Department of Solar Chemical Engineering

Aerospace Center´s Institute of Solar Research,
Germany

June 20 / 11:00 h
Invited Talk

June 21 / 11:00
Round Table I

Solar Fuels and Electricity by using Sunlight concentrating Systems

The production of electricity and fuels by concentrated solar radiation is an option for efficient large scale processes.

The radiation can either be used to replace fossil fuels for heating established processes like steam or dry reforming of methane. Or at higher temperature to drive thermochemical cycles for water or CO2 splitting into hydrogen, oxygen and CO. Presently most of the technologies are developed with high flux solar simulators. However some scale-up demonstrations on solar towers have been operated. The concentrator systems, mainly heliostat fields, are similar to installations for power production. However the chemical reactions require a different heating regime. Therefore a special optics and control systems have to be developed to achieve the very high temperatures necessary to carry out thermochemical cycles constantly and homogeneously in the whole solar receiver.

The presentation will give an overview of the concentrating solar fuel production processes. It will give insight in how to design the required heliostat fields, secondary optics, and control systems.

Prof. Sattler is head of the Department of Solar Chemical Engineering of the German Aerospace Center's Institute of Solar Research. He is also professor for solar fuel production at the Technical University of Dresden. The main area of his work is the production of fuels especially hydrogen by solar thermo- and photochemical processes. He serves as vice president of the research association N.ERGHYa member of the European Joint Technology Initiative for Fuel Cells and Hydrogen and is the national representative to tasks of the IEA's SolarPACES and Hydrogen Implementing Agreements

Dr. Christian Pedersen

Head

Optical Sensor Technology Group
Technical University of Denmark

June 20 / 12:10 h
Invited Talk

Diode Laser LIDARs for renewable energy generation

A main consideration in the development of wind turbines for renewable energy is metrology issues. Efficient and accurate wind velocity sensing, including turbulence mapping and wake detection systems are central for the optimisation of a wind turbine and its lifetime. Traditional cup and sonic anemometers require either meteorological masts or installation in the wake produced by the rotor blades obstructing the measurement quality. In contrast, LIDAR technology offers a unique possibility for remote wind sensing; however traditional LIDARs are not well suited for individual wind turbine installation due to production cost. Replacing costly fibre laser assemblies with diode laser technology offers a solution to this LIDAR challenge.

Both technical and entrepreneurial aspects of diode laser-based wind LIDARs for turbine control will be presented.

Dr. Pedersen is Head of Programme, Group Leader (Optical Sensor Technology) of DTU Fotonik, Department of Photonics Engineering

Christian Pedersen heads a group of 14 researchers and technicians focusing on optical sensor technology. The primary focus is mid-IR upconversion imaging and detection, semiconductor LIDARs for remote sensing and industrial sensors. Christian has previously worked in two start-up companies. In 2008 he joined DTU Fotonik in Denmark.

Prof. Adolfo Comerón

Head

Optical Remote Sensing Group; Remote Sensing Laboratory (RSLab).
Universidad Politécnica de Cataluña, Barcelona, Spain.

June 20 / 15:30 h
Invited Talk

LIDAR Systems for Air atmospheric probing: principles and trends in aerosol vertical profiling

Laser radar or lidar (acronym of light detection and ranging) extends the classical radiofrequency radar techniques to the infrared, visible and ultraviolet spectral ranges and makes use of the relatively strong interaction between electromagnetic radiation at these short wavelengths and atmospheric constituents (molecules and particulates) to obtain range-resolved information about the state of the atmosphere.

The talk will present the principles underlying different types of lidar for atmospheric probing, and the optoelectronic setups of lidar instruments, to focus on advanced systems for aerosol vertical profiling, which are being networked at continental scales to determine the properties and transport patterns of suspended particles in the atmosphere (aerosols) and their effects on air quality, weather and climate

Prof. Comerón holds a Telecommunication Engineering degree from Universidad Politécnica de Barcelona (now Universidad Politécnica de Cataluña – UPC-BarcelonaTech) and doctorates from University Paris-XI, Orsay, France and Universidad Politécnica de Barcelona. He is a professor with the Department of Signal Theory and Communications of UPC, involved in teaching electromagnetics-related topics. His current focus of research is on free-space optical communications and lidar systems for atmospheric probing. He has co-authored more than 60 papers in peer-reviewed scientific journals. He is a SPIE and IEEE member and was elected member of the International Coordination-group on Laser Atmospheric Studies (ICLAS) for the 2004-2010 term. He co-chairs the Remote Sensing of Clouds and the Atmosphere conference within SPIE Remote Sensing.

Prof. Jérome Faist

Director

Quantum Optoelectronic Group
Institute for Quantum Electronics
ETH Zurich, Switzerland

June 21 / 16:40 h
Invited Talk

Laser Frequency Comb and their application on spectroscopic sensing of environmental Polutants.

The quantum cascade laser has demonstrated the ability to provide gain over a very broad wavelength range, and has found may applications for sensing based on arrays of single frequency lasers or as external cavity lasers. Recently, we have shown that such broadband devices, when operated in continuous wave, emit as a coherent optical comb in which the phase relation between the comb modes corresponds approximately to a FM modulated laser. These new comb lasers enables the fabrication of a dual comb spectrometer based on a quantum cascade laser that offers a broadband, all solid-state spectrometer with no moving parts and a ultrafast acquisition time. We demonstrate a spectrometer and its first proof-of-principle applications, as well as new integrated dual-comb devices.

Prof. Jérôme Faist was born in Geneva, and obtained his Bachelor and Ph.D. in Physics, in the group of Prof. F.-K Reinhart from the Swiss Institute of Technology in Lausanne in 1985, 1989 respectively. After a post-doc in IBM Rueschlikon (89-91), he joined F. Capasso's group in Bell Laboratories in 1991 where he worked first as a post-doc and then as a Member of Technical Staff. From 1997 to 2007, he was professor in the physics institute of the University of Neuchâtel. In 2007, he became professor in the institute for quantum electronics of the ETH Zurich.

Jan W. Denneman

President
Global Lighting Association

Vice-President Lighting Europe

Vice-President
Industry Association, Philips Lighting, Netherlands

June 21 /9:30 h
Invited Keynote

June 21 / 11:00
Round Table I

The strategic roadmap of the European and Global Lighting Industry driven by LEDs and Intelligent Lighting Systems

In the last decades the world has seen significant changes with respect to lighting. The 3rd photo-receptor in the human eye has been discovered, giving scientific evidence that light not only provides vision, it makes people also perform and feel better.

The industry have seen two disruptive technology developments. Light Emitting Diodes (LEDs) developed to a stage in which they will replace all conventional light sources. And LEDs get integrated in Intelligent Lighting Systems. The industry is now moving into the direction of system solutions and better lighting quality.

The world has many challenges, and a couple are very relevant to the lighting industry: the globalization, climate change and demographic changes.

The challenges the lighting industry have to cope with are the digitalization, new applications of intelligent lighting systems and healthy buildings. The value of lighting moves from energy efficiency to quality of life and well-being.

This all requires paradigm shifts for all stakeholders: the industry, customers and users as well as politicians and regulators

Jan W. Denneman, Since 1976 he has been working for Philips Lighting in several roles in product development, business development, product management, marketing, sustainability and governmental affairs. In his current role, he manages Philips Lighting worldwide activities in industry associations and consortia.

In 2001 he became a member of the Board of Directors and President of the European Lamp Companies Federation - the major discussion partner for the European Union on all issues concerning light sources. In 2015, he was elected as President of LightingEurope.

Because the huge changes in the lighting world of LEDs and Connectivity require also new approaches in standardization, he took the initiative to create new alliances like Zhaga and The Connected Lighting Alliance in which he serves as Board member.

In 2007 Jan took the initiative to create the Global Lighting Forum and in March 2012, he has been elected as President of the Global Lighting Association, a cooperation between peak lighting industry associations worldwide, like CALI, NEMA, LightingEurope, ELCOMA, JLMA, Lighting Council, TLFEA, ABILUX, KILT, MELA etc.

June 21 / 11:00 h, Round Table I:

Light on Energy and Environment: Challenges to face

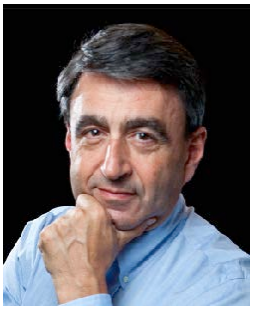
Prof. Antonio Luque, **President** of Institute of Solar Energy of Polytechnic University of Madrid, Spain.
Challenges on highly efficient energy conversion and storage

Prof. Eli Yablonovitch, **Director** NSF Center for Energy Efficient Electronics Science University of California, Berkeley, USA
Challenges on PV cells

Prof. Christian Sattler, **Director** Department of Solar Chemical Engineering, Aerospace Center Institute of Solar Research, Germany
Challenges on harnessing the light with solar concentrator systems

Jan W. Denneman, **President** Global Lighting Association and **Vice-President** of Philips Lighting, Eindhoven, Netherlands.
Challenges on highly efficient lighting devices

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



Prof. Eric Mazur

2017 OSA President

Director/Dean

Applied Physics at Harvard University, USA

June 21 /15:30 h
Invited Keynote

Less is More: Extreme Optics with Zero Refractive Index

Nanotechnology has enabled the development of nanostructured composite materials (metamaterials) with exotic optical properties not found in nature. In the most extreme case, we can create materials which support light waves that propagate with infinite phase velocity, corresponding to a refractive index of zero. This zero index can only be achieved by simultaneously controlling the electric and magnetic resonances of the nanostructure. We present an in-plane metamaterial design consisting of silicon pillar arrays, embedded within a polymer matrix and sandwiched between gold layers. Using an integrated nano-scale prism constructed of the proposed material, we demonstrate unambiguously a refractive index of zero in the optical regime. This design serves as a novel on-chip platform to explore the exotic physics of zero-index metamaterials, with applications to super-coupling, integrated quantum optics, and phase matching.
http://mazur.harvard.edu/search-talks.php?function=display&rowid=2668

Prof. Eric Mazur is the Balkanski Professor of Physics and Applied Physics and Dean of Applied Physics at Harvard University, Member of the Faculty of Education at the Harvard Graduate School of Education, and President 2017 of the Optical Society. Mazur is a prominent physicist known for his contributions in nanophotonics, an internationally recognized educational innovator, and a sought after speaker. In education he is widely known for his work on Peer Instruction, an interactive teaching method aimed at engaging students in the classroom and beyond. In 2014 Mazur became the inaugural recipient of the Minerva Prize for Advancements in Higher Education. He has received many awards for his work in physics and in education and has founded several successful companies. Mazur is Chief Academic Advisor for Turning Technologies, a company developing interactive response systems for the education market. Mazur has widely published in peer-reviewed journals and holds numerous patents. He has also written extensively on education and is the author of Peer Instruction: A User's Manual (Prentice Hall, 1997), a book that explains how to teach large lecture classes interactively, and of the Principles and Practice of Physics (Pearson, 2015), a book that presents a groundbreaking new approach to teaching introductory calculus-based physics.Mazur is a leading speaker on optics and on education. His motivational lectures on interactive teaching, educational technology, and assessment have inspired people around the world to change their approach to teaching. Read More

Prof. Javier Solis

Head

of the Department of Non-linear, Ultrafast and Nano-scale Photonics, Instituto de Optica-CSIC
Madrid

June 21 / 16:40 h
Invited Talk

Femtosecond-laser induced compositional changes for photonics applications

In 1996, two seminal papers from the groups of K. Hirao and E. Mazur independently demonstrated the feasibility of using femtosecond (fs) lasers for modifying the optical properties of a small volume inside the bulk of a transparent material. The magnitude of the refractive index change achievable is typically though below 10-2 (associated to density or polarizability changes, defects, photochemical effects, damage…). In spite of this, fs-laser structuring has been used for producing a wide variety of photonic (and also micro-fluidic) devices ranging from simple passive waveguides to waveguide-integrated lasers or photonic lanterns.

During the first part of the talk I will describe the fundamentals of this direct writing technique, its main advantages and limitations, as well as a number of relevant application examples. In the second part I will describe the use of controlled, local compositional changes produced by fs-laser processing to generate high contrast, refractive structures for photonics applications.

Prof. Solis is Research Professor at the Institute of Optics (IO) of the National Research Council of Spain (CSIC) where he is presently Head of the Department of Non-linear, Ultrafast and Nano-scale Photonics. He has also been Director ((2003-2008) and Deputy Director (2000-2003) of the IO. Since 1992 he is responsible of the Ultrashort Laser Pulse Laboratory of the Laser Processing Group.
At present his research interests include: laser-matter interaction, laser processing for optical applications, ultrafast laser micro- and nano-structuring of materials, ultrafast dynamics, non-linear optics. He has published more than 160 research papers in international research journals in these topics. Prof. Solis is member of OSA and MRS, among other research societies.

Prof. Sir David Payne

Director

Optoelectronic Research Centre (ORC), University of Southampton, UK

June 22 / 10:50 h
Invited Keynote

June 23 /10:25
Round Table II

Light based Communications beyond the Fibre capacity crunch in the XXI century

Prof. Sir David Neil Payne CBE FRS FREng is a leading Professor at the University of Southampton and Director of the Optoelectronics Research Centre. A world class pioneer of technology, his work has had a great impact on telecommunications and laser technology over the last forty years. The vast transmission capacity of today's internet results directly from the erbium-doped fibre amplifier (EDFA) invented by David and his team in the 1980s. His pioneering work in fibre fabrication in the 70s resulted in almost all of the special fibres in use today including fibre lasers which are currently undergoing rapid growth for application in manufacturing and defence. David has made numerous leading contributions to many diverse fields of photonics and is widely acknowledged as an inventor of key components. Currently, his main research interest is high-power fibre lasers. With US funding, he led the team that broke the kilowatt barrier for fibre laser output to international acclaim and now holds many other fibre laser performance records. An original member of the Highly Cited Researchers (USA) he is honoured as one of the most referenced, influential researchers in the world. He has published over 650 Conference and Journal papers and is a frequent plenary and invited speaker at major international optics conferences. As an entrepreneur David's activities have led to a cluster of 11 photonics spin out companies in and around Southampton - helping to boost the local economy. He founded SPI Lasers PLC, which has recently been purchased by the Trumpf Corporation of Germany for $40M. Recently elected Chairman of the Marconi Society and to the Russian Academy of Sciences, David is a fellow of the Royal Society and the Royal Academy of Engineering. He became a Commander of the British Empire in the 2007 New Years Honours list. In addition he has been awarded the top American, European and Japanese prizes in photonics. Recent awards include the Marconi Prize in 2008 and the 2007 IEE Photonics Award the first to be awarded to a person outside the USA. Most recently, in 2010, David received the AILU (Association of Laser Users) Award for his pioneering work with fibre lasers.

Prof. Pablo Artal

Director

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

June 22 / 16:15 h
Invited Talk

Light science and technology for a better vision

The human eye is a simple optical system but well adapted to the requirements of our visual system. A better optical knowledge has allowed to develop new technological solutions to improve vision. In this lecture, I will review the main optical properties of the eye and how they affect our visual capabilities, together with the use of adaptive optics technologies that permitted to see the retina with high resolution and also to develop new instruments for visual testing. I will also present several recent results obtained in my laboratory, ranging from the nature of the movements of the crystalline lens to new electro-optical systems to correct cataracts or presbyopia."

Prof. Artal received his Ph.D. degree in Physics from the University Complutense of Madrid, and was a post-doctoral fellow at the Institut d'Optique, Orsay, France and a senior researcher at the Instituto de Optica in Madrid. He is since 1994 full Professor of Optics at the University of Murcia, Spain. He spent several periods doing collaborative research in laboratories in Europe, Australia and USA

He is a fellow member of the OSA, ARVO (gold category) and EOS. He received the prestigious 2013 Edwin H Land medal award in recognition of his scientific contributions to the advancement of diagnostic and correction alternatives in visual optics. He is the recipient of the exclusive “ERC advanced grant” in 2013. He received the “Rey Jaime I” award for applied research in 2015. He has published more than 170 reviewed papers that received 7700 citations (h-index: 45), presented more than 150 invited talks in international meetings and around 150 seminars in different research institutions. He is also a co-inventor of 22 international patents in the field of Optics and Ophthalmology.

He has pioneered highly innovative advances in the methods for studying the optics of the eye and has contributed substantially to our understanding of the factors that limit human visual resolution. Dr. Artal is a pioneer in exploring the human eye with new technologies and designed new ophthalmic corrections. Several of his proposed solutions and instrument are currently in use in the clinical practice. For example, he co-invented intraocular lenses correcting for the corneal spherical aberration that provides improved quality of vision to millions of patients over the world. Dr. Artal is the founder of Voptica SL a spin-off company developing the concept he invented of adaptive optics vision analyzers and a co-founder of Visiometrics SL. He has been the mentor of many graduate and post-doctoral students. His personal science blog is followed by readers, mostly graduate students and fellow researchers, from around the world. He has been editor of the Journal of the Optical Society of America A and the Journal of Vision. He is the editor of the Handbook of Visual Optics

Prof. J M López-Higuera

Head

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

June 22 / 17:25 h
Invited Talk

The Healing Power of Light: Photodynamic therapy

Light Science and Technologies now touches almost every area of our lives including the healing and health care one. To provide the health and care services required in this period of live, new breakthroughs and new cost-effective methods for improved diagnosis, and therapy are very welcome.

In this talk, we will explore the heling power of light based therapies to overcome cancer, pre-cancer and chronic diseases by using the Photodynamic Therapy.

After the clarification of what can be understood as Photodynamic Therapy and how it does work, several significant cases will be presented and discussed in the presentation. After that, the attendees will be aware of the of healing power of this light based therapy and its significant impact on the modern medicine of XXI century.

Prof. López-Higuera is the founder and head of the Photonics Engineering Group of the University of Cantabria, CIBER-BBN of the Instituto de Salud 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 90 of them as manager.

He has contributed with more than 600 research publications including 19 patents closely related to optical and fiber techniques for sensors and instrumentations. He has worked as an editor and co-author of four R&D international books, as a co-editor of several conference proceedings and Journals and he has been the director of 16 PhD theses. He is co-founder of three technology-based companies.

Prof. López-Higuera is a Fellow of OSA, Fellow of SPIE, Senior of IEEE and a Member of the Royal Academy of Medicine of Cantabria, Spain.

Prof. Eric Mazur

Director/Dean

Applied Physics at Harvard University, USA
2017 OSA President

June 23 / 9:15-10:05 h
Invited Keynote

June 23 / 10:25 h
Round Table II

Innovating Education to Educate Innovators

Can we teach innovation? Innovation requires whole-brain thinking — right-brain thinking for creativity and imagination, and left-brain thinking for planning and execution. Our current approach to education in science and technology, focuses on the transfer of information, developing mostly right-brain thinking by stressing copying and reproducing existing ideas rather than generating new ones. I will show how shifting the focus in lectures from delivering information to team work and creative thinking greatly improves the learning that takes place in the classroom and promotes independent thinking.

http://mazur.harvard.edu/search-talks.php?function=display&rowid=2669

Prof. Eric Mazur is the Balkanski Professor of Physics and Applied Physics and Dean of Applied Physics at Harvard University, Member of the Faculty of Education at the Harvard Graduate School of Education, and President 2017 of the Optical Society. Mazur is a prominent physicist known for his contributions in nanophotonics, an internationally recognized educational innovator, and a sought after speaker. In education he is widely known for his work on Peer Instruction, an interactive teaching method aimed at engaging students in the classroom and beyond. In 2014 Mazur became the inaugural recipient of the Minerva Prize for Advancements in Higher Education. He has received many awards for his work in physics and in education and has founded several successful companies. Mazur is Chief Academic Advisor for Turning Technologies, a company developing interactive response systems for the education market. Mazur has widely published in peer-reviewed journals and holds numerous patents. He has also written extensively on education and is the author of Peer Instruction: A User's Manual (Prentice Hall, 1997), a book that explains how to teach large lecture classes interactively, and of the Principles and Practice of Physics (Pearson, 2015), a book that presents a groundbreaking new approach to teaching introductory calculus-based physics.Mazur is a leading speaker on optics and on education. His motivational lectures on interactive teaching, educational technology, and assessment have inspired people around the world to change their approach to teaching.Read More

June 23 / 10:25-12:10 h, Round Table II:

Education and Training on a Key Enabling Technology: Photonics

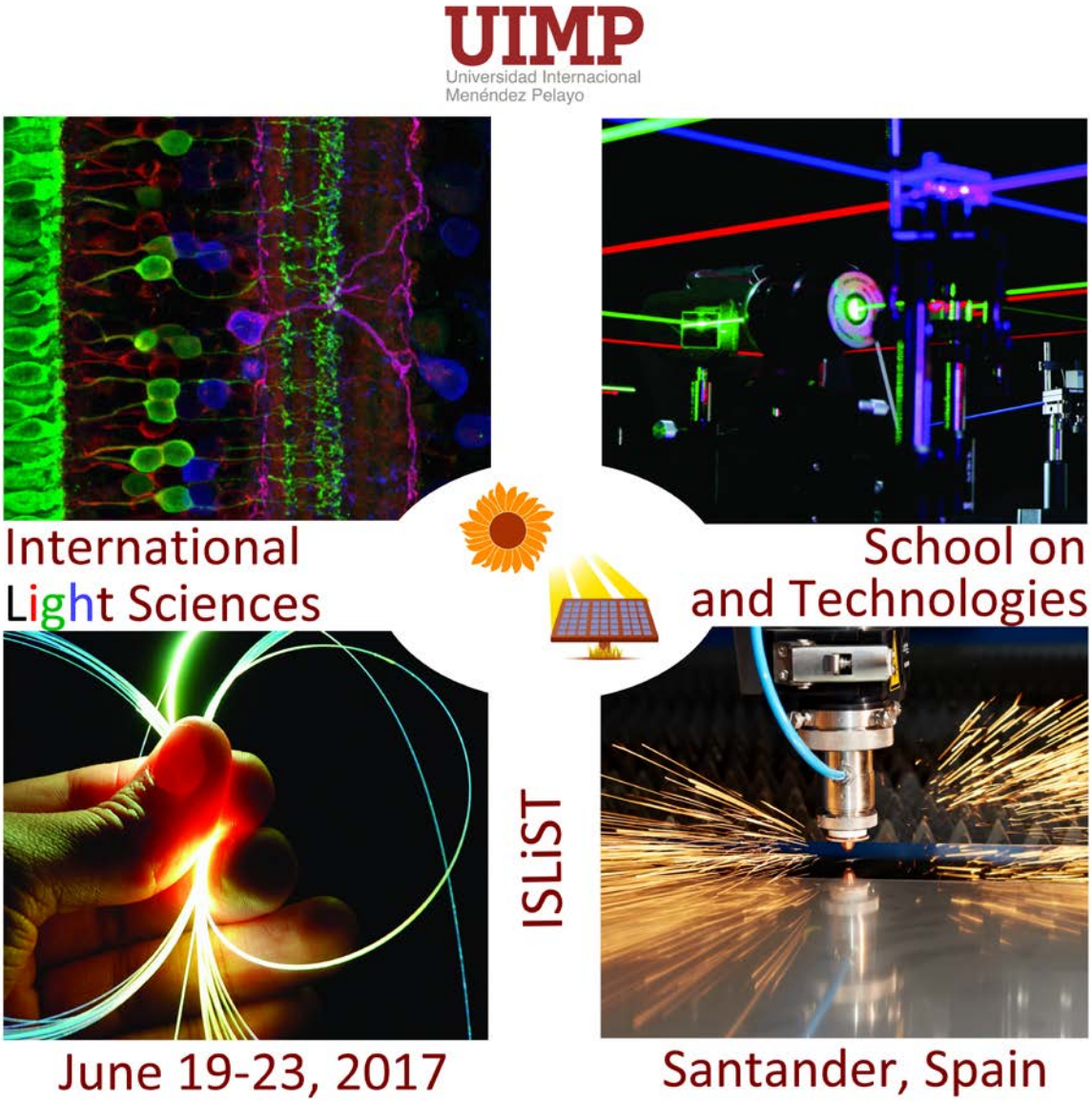
Prof. Shuji Nakamura, 2014 Nobel Prize, Prince Asturias Award, Materials Department, University of California Santa Barbara, **USA**
Lessons on education and training on a KET from Experiences of a Nobel Laureate at Japan and USA

Prof. Eric Mazur, 2017 **OSA President**, Director, Applied Physics Department, Harvard University, **USA**
OSA actions to promote the education and the insights gained from an education Innovator at Harvard University

Prof. Sir David Payne, Director, Optoelectronic Research Centre (ORC), University of Southampton, **UK**
Insights gained from UK education system and from ORC at University of Southampton

Mr. Marcial Marín, Education and Universities **State Secretary** of **Spain**
The Spanish position on education concerning Key Enabling Technologies

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


UIMP
Universidad Internacional
Menéndez Pelayo
International
Light Sciences
School on
and Technologies
ISLiST
June 19-23, 2017
Santander, Spain

NOTEBOOK

June 19 / 11:00 h / **Prof. Roel Baets**

silicon photonics beyond transceivers: key technology for sensing

NOTES:

June 19 / 12:10h / **Prof. JM López-Higuera**
Light in Energy and Environment

NOTES:

June 19 / 15:30 h / **Prof. Antonio Luque**

Photovoltaics for highly efficient energy conversion and storage

NOTES:

June 19 / 16:40 h / **Prof. G. Nonstantatos**

Nanophotonics and colloidal quantum dots for more efficient solar cells

NOTES:

June 20 / 9:30 h / **Prof. Eli Yablonovitch**

A Great Solar Cell Also Needs to Be a Great LED: Electro Luminescent Refrigeration

NOTES

June 20 / 9:30 h / 11:00 h / **Prof. Christian Sattler**

Solar Fuels and Electricity by using Sunlight concentrating Systems

NOTES:

June 21/ 12:10 h / **Dr. Christian Pedersen**

Diode Laser LIDARs for renewable energy generation

NOTES:

June 20 / 15:30 h / **Prof. Adolfo Comerón**

LIDAR Systems for Air atmospheric probing: principles and trends in aerosol vertical profiling

NOTES:

June 20 / 16:40 h / **Prof. Jérome Faist**

Laser Frequency Comb and their application on spectroscopic sensing of environmental Pollutants

NOTES:

June 22 / 9:30 h / **Mr. Jan W. Denneman**

The strategic roadmap of the European and Global Lighting Industry driven by LEDs and Intelligent Lighting Systems

NOTES:

June 11:00 h / **Round Table I:**

Light on energy and environment: Challenges to face





NOTES:

June 21 / 15:30 h / **Prof. Eric Mazur**

Less is More: Extreme Optics with Zero Refractive Index

NOTES:

June 21 / 16:40 h / **Prof. Javier Solis**

Femtosecond-laser induced compositional changes for photonics applications

NOTES:

June 22 / 9:30 h / **Prof. Shuji Nakamura / Nobel Laureate 2014**
The born of High Efficient Blue LEDs and Future Lighting

NOTES:

June 22 / 10:50 h / **Prof. Sir David Payne**

Light based Communications beyond the Fibre capacity crunch in the XXI century

NOTES:

June 23 / 16:30 h / **Prof. Pablo Artal**

Light science and technology for a better vision

NOTES:

June 22 / 17:25h / **Prof. JM López-Higuera**
The Healing Power of Light: Photodynamic therapy

NOTES:

June 21 / 9:15 h / **Prof. Eric Mazur**

Innovating Education to Educate Innovators

NOTES:

June 10:25 h / **Round Table II:**

Education on a Key Enabling Technology (Photonics)





NOTES: