

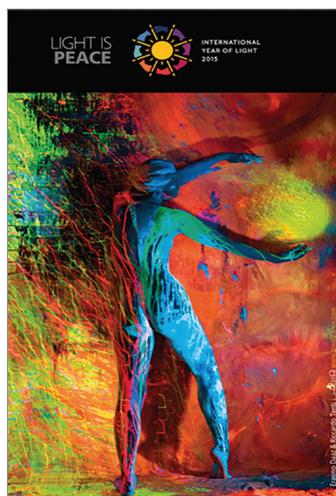


# NEWSLETTER

COMMISSION INTERNATIONALE D'OPTIQUE • INTERNATIONAL COMMISSION FOR OPTICS

## The 2015 International Year of Light

**A resilient and creative approach to counter sustainability challenges.**



Light is Peace, © Erasmio Daaz / LPWA.

Light science is a fascinating field. Found at the base of countless discoveries affecting many other fields in the basic and applied sciences, as well as beyond, it is a major developmental driver on many levels, in all spheres, for all societies, with its impact ever-extending. Light and light-based technologies are indeed becoming increasingly central as we advance further into the 21st century. This is especially true when we address the 17 Sustainable Development Goals (SDGs) of the 2030 Agenda<sup>1</sup>, recently adopted by the United Nations General Assembly and relevant for every state, country and region on Earth.

In this context, the 2015 International Year of Light and Light-based Technologies – of which we recently celebrated the closing ceremony on 4–6 February 2016 in Merida (Yucatan), Mexico – forms an important link in the chain working for change, to meet the objectives of the SDGs. As a precursor for change, the Year made clear that many solutions to local and global challenges, including in science education, food security, existing and newly emerging diseases, natural disasters, energy needs, poverty eradication and climate change, actually do exist, and are based on practical and cost-effective light-based technologies. LEDs for instance will play a vital role in lowering energy consumption, conducive to the reduction of carbon dioxide emission on the global level, in line with the Paris Agreement on Climate Change adopted during the recently held COP21.

Undeniably, the social and economic development of several regions currently facing critical issues depends on the sustainable and inclusive management, sharing and conservation of their human and natural resources. In the long term, light science, as a proven trigger for innovation and a central lever for sustainable development, is an entry-point to tackle these daunting and complex challenges. It brings technological innovations and solutions to address the crux of contemporary matters in order to build more resilient and inclusive societies.

There are many examples that illustrate what this actually means and how small steps can lead to the eradication of poverty and to dealing with related issues, reaching the achievement of the SDGs. One example of concrete applications



Closing ceremony of the IYL in Merida, Mexico, © Salvador Gutierrez Niño / DGDC UNAM.

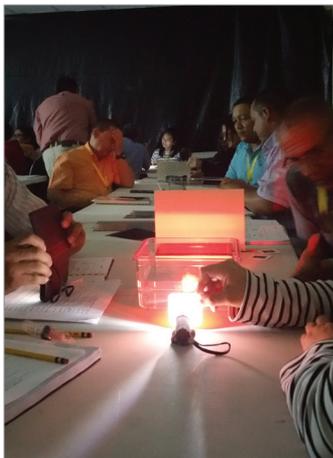
of light-related technologies for societal development is in agriculture: advanced cameras on planes or drones can map soil and vegetation density and, in measuring how light from lasers is reflected from crops and soil, can be used to monitor evaporation and guide irrigation decisions.

Light-based technologies are also key to understanding and combating climate change, whether it be by measuring the global carbon-dioxide distribution or the use of solar-based solutions for renewable energy. Closely related to the need for energy is the availability of lighting. Countries that have the lowest levels of electrification also have the highest levels of poverty. Light after sundown for over 1.5 billion people is only possible through kerosene lamps or candles, neither of which offers a healthy, viable solution<sup>2</sup>. Poor-quality lighting has dramatic, negative impacts on health, as well as on educational opportunities, hindering the possibility to become scientifically empowered citizens. It also has a serious impact on income generation for workers who are unable to further their activity at night. An important activity of the International Year of Light, for instance, was to promote the use of portable solar-powered high-brightness LED lanterns in regions where there is no energy infrastructure. Furthermore, light-based technologies exploiting fibre-optic technology, such as the internet and smartphones, are common in the everyday lives of people living in affluent areas of the world, but it is also clear that they offer practical solutions to many challenges in sustainable development.

<sup>1</sup> For further information with respect to the UN SDGs:

<https://sustainabledevelopment.un.org/sdgs>

<sup>2</sup> WHO report states that 4.3 million people a year die prematurely as a result of household air pollution  
[www.who.int/mediacentre/factsheets/fs292/en/](http://www.who.int/mediacentre/factsheets/fs292/en/)



ALOP participants observing the scattering of light; ALOP workshops in Latin America and Mauritius; and Prof. V. Lakshminarayanan (Vengu) showing a lens used as a model of the eye, © ALOP Indonesia, March 2015.



experimentations in scientific fields

The ALOP Programme is an active learning pedagogy in basic sciences that aims to strengthen knowledge in optics and photonics, but it also primarily focuses on the actual process of learning. Developed through the UNESCO ALOP training manual, translated into several languages, the Programme introduces six targeted modules<sup>3</sup> explored among educators attending ALOP workshops. Enabling a shift from a teacher to a student-centered perspective, in terms of teaching and learning, the novelty lies in the fact that the workshops serve as places of experimentation, not only in technical, scientific terms, but also in terms of methodology and learning processes that are continuously improved based on former experiences. In this sense, the workshops, in different regions and at different times, complement each other, building and reflecting a truly global programme.

More generally, in the same way that it is useful at times to be reminded of the gift of light in order to further appreciate its value, it is crucial to turn to history and grow in awareness by recognizing the contribution of various civilizations to the development of light science. As a global society, the contribution to the development of light science by non-western civilizations deserves to be highlighted, especially in respect to polymaths from the Islamic Golden Age who are an anchor for modern science, represented by such figures as Al-Sufi, Ibn Bajja, and most prominently Ibn Al-Haytham (also known by Alhazen or Alhacen). Born around a millennium ago in present-day Iraq, Ibn Al-Haytham was a pioneering scientific thinker who made important contributions to the understanding of vision, optics and light. It is in this context that UNESCO hosted at its headquarters in Paris (14-15 September 2015) an international conference focusing on the accomplishments of the Islamic civilization in its Golden Age (extending from the 7th to the 13th centuries) and the life and works of Ibn Al-Haytham, whose pioneering *Book of Optics* (Kitāb al-Manāẓir) was published around 1000 years ago. That today we can turn to discoveries as true today as they were 1000 years ago is an important symbol to reassert that yesterday, today and tomorrow, light will always be at the heart of every individual life as well as lasting, sustainable developments for all societies.

It is often the case that the communities that can best take advantage of these technological solutions are not aware that these solutions exist. Bridging these gaps is an element of major importance, and the International Basic Sciences Programme (IBSP) of UNESCO, through the International Year of Light, has been fortunately positioned to bring different stakeholders together and share knowledge in relation to this.

Light science and technologies, through its instant appeal and relevance, is also an optimal theme for promoting cross-disciplinary science education. The Year increased awareness that quality research on light and related innovation contribute to ground-breaking findings that shape the society of tomorrow. These echo UNESCO's belief that in order to benefit from the fruits of building knowledge in the basic sciences, efforts in optics and photonics education are therefore evidently a central consideration.

Indeed, since 2005 and strengthened during the IYL, UNESCO's IBSP, the Abdus Salam International Centre for Theoretical Physics (ICTP) and the International Society for Optics and Photonics (SPIE) jointly implemented the Active Learning in Optics and Photonics (ALOP) Programme in various regions of the world, particularly in places where the educational resources are lacking. Since its inception, the workshops have served over 1500 teachers from more than 55 developing countries in Africa, Asia, and Latin America. Tackling challenges linked to science education and knowledge transmission at the roots, the ALOP programme serves as a remarkable basis for learning and curiosity-driven



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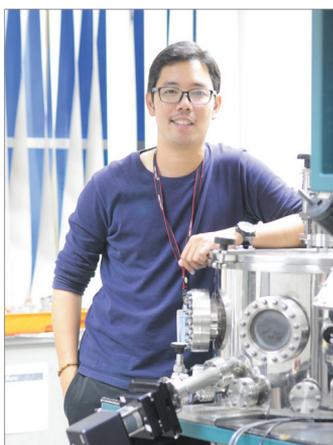
<sup>3</sup> Based on UNESCO's ALOP Training Manual, educators learn six optics and photonics modules; Geometrical Optics, Lenses and Optics of the Eye, Interference and Diffraction, Atmosphere Optics, Optical Data Transmission, and Wavelength Division Multiplexing.

# ICO/ICTP Gallieno Denardo Award 2016

Shared by Jehan Akbar (Pakistan) and Mati Horprathum (Thailand).



Dr Jehan Akbar.



Dr Mati Horprathum.

The ICO/ICTP Award Committee members, Mourad Zghal (Chair and ICO VP), Ahmadou Wagué (ICO VP), Joseph Niemela (ICO VP), Anna Consortini (ICO former President) and Mitcho Danailov, awarded the 2016 ICO/ICTP Gallieno Denardo Award to two researchers: Jehan Akbar of Pakistan and Mati Horprathum of Thailand.

Dr Jehan Akbar obtained his MSc in physics at the University of Peshawar, Pakistan, in 2007, and his PhD at the University of Glasgow, UK, in 2012 under the supervision of Dr Anthony E Kelly and Professor Catrina Coleman. He is currently an Assistant Professor of Physics at Hazara University Mansehra, KPK, Pakistan, and an ICTP Junior Associate. His research work is mainly related to development of semiconductor optical amplifiers and high-power mode-locked lasers.

Dr Akbar was awarded for “his breakthrough contributions in the design and fabrication of high performance semiconductor lasers and amplifiers as well as for promotion of research activities in optics and photonics in Pakistan”. Dr Akbar designed and fabricated a 40 GHz semiconductor mode-locked laser monolithically integrated with distributed Bragg reflector (DBR) and semiconductor optical amplifier (SOA), producing an average output power of 200 mW and peak power of 1.15 W (*Photonics Technology Letters*, Vol 25, Issue 3, 2013).

He also designed and fabricated a novel monolithic device for adjustable gain clamping in SOAs. The device consists of two tunable distributed Bragg gratings and a gain section and enables the gain of the SOA to be regulated. The gain could be controlled by adjusting the wavelength overlap of two Distributed Bragg Reflector gratings positioned at either side of the active region (*Journal of Light Wave Technology*, Volume 31, No 16, 2013).

Dr Akbar has recently developed Erbium doped and Ytterbium doped fibre mode-locked lasers for femtosecond pulses generation. Both these oscillators were mode-locked by nonlinear polarization rotation. The Er doped fibre mode-locked lasers were developed to be used for pump source for titanium sapphire laser crystal, which is used as seed laser for free electron laser.

He has received several national and international awards for his research contributions. Dr Akbar presented his research work in various leading international conferences held in Turkey, Italy, the UK, Japan, South Africa and the USA. His diverse research activities have led to high-impact publications and to new research directions followed by many other researchers. He has published 40 research papers in various international journals and conferences.



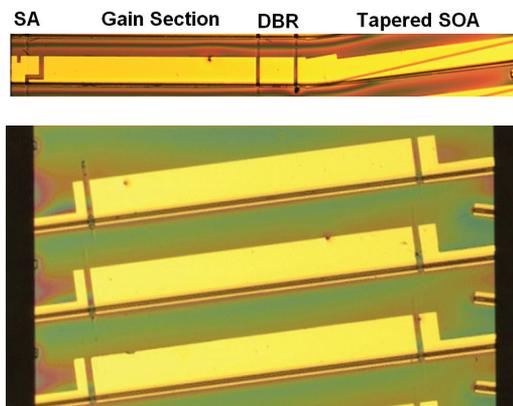
The award ceremony was attended by two former ICO presidents, the ICO secretary, and three current ICO vice-presidents. From left to right: María Luisa Calvo, Mourad Zghal, Angela Guzmán, Mati Horprathum, Jehan Akbar, Anna Consortini, Mitcho Danailov, Joseph Niemela, Ahmadou Wagué. Photo courtesy of ICTP, the Abdus Salam International Centre for Theoretical Physics.

His statement: “This unexpected recognition of my efforts gives me a sense of hope and big confidence. I will redouble my efforts in future for promotion of research activities and optics in Pakistan. I will enjoy doing so as I find great satisfaction in doing research and promoting science.”

Dr Mati Horprathum, a researcher with the National Electronics and Computer Technology Center, Thailand, was awarded for “his valuable contributions in the development of optical thin-film technology for innovative surface functionality as well as for his commitment in the diffusion of optical thin-film research in Thailand”.

Mati Horprathum received his BEd in science-physics in 2003 from Srinakarinwirot University and his MS and PhD in physics from King Mongkut's University of Technology Thonburi, Thailand in 2006 and 2009, respectively. Since 2006, he started his career with National Electronics and Computer Technology Center (NECTEC), Thailand. From 2006 to 2011, he worked with Photonic Technology Laboratory and was responsible for research in optical thin-film coatings, characterizations, vacuum coating systems based on physical vapour deposition, and co-ordination with other research groups in Thailand. In 2011, he received a postdoctoral fellowship supported by Japan National Project “the Funding Program for Next Generation World-Leading Researcher”. During the postdoctoral position, he worked at Laboratory of Atomic Scale Materials Processing, Institute of Scientific and Industrial Research (ISIR), Osaka University, Japan in the “Green Innovation Science” project, and was responsible for developments of growth

Top right: Schematic of the fabricated mode-locked laser monolithically integrated with DBR and SOA. Bottom right: Schematic of the fabricated monolithically integrated gain clamped SOAs.

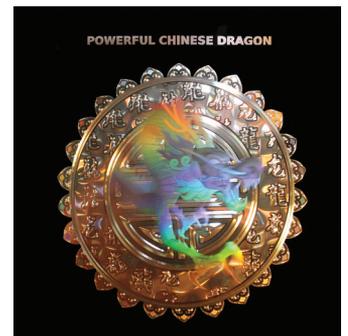
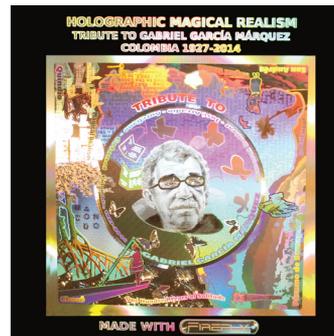


and alignment of uniform oxide nanowires and developments of nanostructures by top-down and bottom-up techniques. Since 2013, he has been a researcher at Optical Thin-Film Laboratory, NECTEC, Thailand. His current works involve thin-film and nanostructure areas, i.e., glancing-angle deposition, nano-micro-

electronics mechanic devices, surface-enhanced Raman spectroscopy (SERS), fabrications and characterizations of nanostructures, optoelectronic devices, electrochromic thin films, spectroscopic ellipsometry, vacuum designs, and thin-film characterizations. Through his career, his major interests are to utilize the optical thin-film and nanostructure technologies towards local industrial manufactures, as well as medical and environmental applications in Thailand. He also enjoys giving lectures in the optical thin-film and nanotechnology to undergraduate and graduate students, and engineers working on optical industries in Thailand. He has authored and co-authored more than 50 refereed journals, 100 proceedings, and has been a regular reviewer for 10 journals. He also holds two Thai patents, and nine Thai patent applications. In addition, he has also organized five international conferences and events in surface sciences, thin-film coatings, and sensors.

## Colombian company successful for second year

Colombian company receives awards for Excellence in Holography.



Left: “Colombian Ethnic Children” Hologram, winner of the 2014 “Best Origination” and “Best of Year” Excellence in Holography awards. Middle: “Holographic Magical Realism: Tribute to Gabriel García Márquez 1927–2014.” Upon 180-degree rotation of the hologram, the portrait of the Nobel prize-winning author dissolves into a portrait of one of the characters of his novels. Right: The “Powerful Chinese Dragon” Hologram displays an animated dragon symbolizing power, strength, wealth, and good luck.

For two years in a row, Combustión Ingenieros S.A.S, a Bogota, Colombia, based company specializing in holographic security labels, has received awards for Excellence in Holography from the International Hologram Manufacturers Association. The hologram “Colombian Ethnic Children”, designed by Colombian artist Diego Aguilar, shows representations of four different Colombian ethnic minority: Afro-Colombians from the Pacific Coast; the Nukak Maku, a tribe from the Amazon rainforest; the Rom, a group of nomadic clans; and the Raizales from the Caribbean islands of San Andrés and Providencia. Each of the children has a particular combination of colours and effects, such as kinetic effects, high-resolution micro-texts, Fresnel lenses, and encrypted images.

The 2015 “Best Origination” award was for the hologram “Holographic Magical Realism: a

Tribute to Gabriel García Márquez 1927–2014”. A second hologram, “Powerful Chinese Dragon” received a commendation. The Garcia Marquez hologram, competed against 52 holograms from different countries. Also designed by Diego Aguilar, this hologram is a tribute to the Colombian Nobel Prize winner in Literature. In upright orientation, the hologram shows a portrait of Garcia Marquez; when rotated 180 degrees, it shows the face of one of the characters in the author’s novels.

The hologram “Powerful Chinese Dragon”, which received a commendation, shows a carving-like dragon that is highlighted by a 3D animation. This hologram was designed as a tribute to China, the hosting country of the Excellency in Holography awards in 2015. In the Chinese culture, the Dragon represents power, strength, wealth and good luck.

# ICO award for the promotion of Optics & Photonics

**A legacy of the IYL 2015.** During the IYL 2015, the ICO created the ICO Award for the promotion of Optics & Photonics among young people in the ICO Territories. A first prize was awarded to the Spanish Society of Optics and Photonics, and two others to the Cuban Territorial Committee and to a high school in Italy, the L'IIS Cavazzi Pavullo, leader school of the European Project MoM (Matters Of Matter).

The L'IIS Cavazzi organized a one-day national science fair called "Amazing light" open to middle- and high-school students at national level. It will continue its activities beyond the IYL 2015 and is announcing the first National Science Fair dedicated to new materials and their experimental study, in particular materials that interact with light, related technologies and their potential impact on the sustainable development of the society. The fair is convened on the occasion of The Month of STEM 2016 and includes a special section dedicated to the best projects submitted by girls ([www.mattersofmatter.eu/matters-of-matter-1st-science-fair/](http://www.mattersofmatter.eu/matters-of-matter-1st-science-fair/)).

Further activities are the preparation of a science show within the Bergamo Science Festival 2016 and the Euro Science Show Conference 2017. The ICO will continue awarding annually this prize as part of the legacy of the IYL 2015.



First (top) and second (bottom) prizewinners in the one-day science fair "Amazing Light".

# ICO at the closing ceremony of the IYL 2015

**Held in Mérida, México on 4–6 February 2016.**

Members of the ICO Bureau and several ICO Territorial Committee Representatives attended the closing ceremony of the International Year of Light 2015 ([www.iyl2015closing.org/](http://www.iyl2015closing.org/)). The ceremony was held in the Convention Center of Mérida, México.

Invited lecturers included two Nobel prize-winners in physics, John Mather (2006) and Shuji Nakamura (2014), and many other distinguished scientists who offer a wide scientific panorama from a global perspective. The ceremony included a film and video festival, where a glimpse of world productions related to the IYL was provided, and a special Colloquium on artificial lighting intended as a forum for dialogue between architects, engineers, designers, manufacturers and entrepreneurs in the lighting industry, and the general public.

The ICO received 10 invitations for ICO delegates, which were distributed between ICO Bureau Members.

The ICO congratulates those who conceived the idea of an IYL and gives thanks to members of the ICO Territorial Committees and ICO Member Societies who worked hard throughout the year to make it a great success. In particular, we congratulate John Dudley, a member of



ICO representatives at the closing ceremony of the IYL 2015. From left: John Howell, Mourad Zghal, Seung Jong Park, Duncan T Moore, Yasuhiko Arakawa, Giancarlo Righini, Angela Guzmán, Joseph Niemela and Roberta Ramponi.

the editorial committee of the *ICO Newsletter*, on the tireless leadership that he provided, and Joseph Niemela, ICO vice-president, who oversaw the IYL Secretariat at the ICTP.

# Worldwide optical community celebrates OSA centennial



In February 1916, the Executive Council of the Rochester Association for the Advancement of Applied Optics discussed plans for the organization of a national US optical society. Three months later, the Rochester Section of the Optical Society of America (OSA) was created, and in December, less than a year after the first officially recorded discussion on the subject, the new professional society held its first meeting, at Columbia University, under the auspices of the American Association for the Advancement of Science. The history of this Society, and of its many achievements during the following 100 years, can be enjoyed at [www.osa.org/en-us/100/osa\\_history/1916/plans\\_floated\\_for\\_a\\_national\\_society/](http://www.osa.org/en-us/100/osa_history/1916/plans_floated_for_a_national_society/).

As part of the celebration of the 100th anniversary of its founding, OSA has created a centennial photo exhibit consisting of 100 iconic

images representing a century of achievements in optics and photonics and highlighting the role played by OSA in those achievements ([www.osa.org/en-us/100/osa100/](http://www.osa.org/en-us/100/osa100/)). OSA has also prepared a book on the subject, *OSA Century of Optics*, which can be downloaded from the OSA Centennial Bookshelf webpage.

OSA joined the ICO as an international member society in 1999, shortly after a change in the ICO's statutes allowed this category of membership. Since then, the ICO and OSA have frequently worked jointly on the promotion of optics and photonics worldwide.

The ICO Bureau will hold its 2016 annual meeting and help celebrate the OSA Centennial on the occasion of OSA's 100th annual meeting, *Frontiers in Optics 2016*, to be held 17–21 October at the Rochester Riverside Convention Center in Rochester, New York.

## Contacts

International Commission for Optics (e-ico.org).

### Bureau members (2014–2017)

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**Past-president** D T Moore

**Treasurer** J A Harrington

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### Associate secretary

G von Bally

### Vice-presidents, elected

J Harvey, F Höller, H Michinel,  
J Niemela, R Ramponi, S-H Park,  
J Zakrzewski, M Zghal

### Vice-presidents, appointed

Y J Ding, J C Howell, S Morgan,  
E Rosas, P Urbach, A Wagué,  
M J Yzuel

### IUPAP Council representative

C Cisneros

### Editor in chief

### Editorial committee

W T Rhodes, Florida Atlantic  
University; K Baldwin, Australian  
National University, Australia;  
J Dudley, Université de Franche-  
Comté, France



## Forthcoming events with ICO participation

Below is a list of 2016/17 events with ICO participation. For further information, visit the new ICO webpage at <http://e-ico.org/node/103>.

### 17–21 May 2016

#### International Conference on Applied Optics and Photonics 2016

Hanover, Germany

Contact: Eduard Reithmeier

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[www.imr.uni-hannover.de/](http://www.imr.uni-hannover.de/)

### 25–28 July 2016

#### International Symposium “Optics and its Applications” (OPTICS 2016)

Yerevan-Ashtarak, Armenia

Contact: Narine Gevorgyan

tel: +37493358613

[gnarine@gmail.com](mailto:gnarine@gmail.com)

<http://rau.am/optics2016/>

### 24–25 August 2016

#### 2nd International Seminar on Photonics, Optics and its Applications (ISPhOA 2016)

Legian-Kuta, Indonesia

Contact: Aulia Nasution

tel: +62 821 4226 1063

[isphoa2016@ep.its.ac.id](mailto:isphoa2016@ep.its.ac.id)

[www.isphoa2016.org](http://www.isphoa2016.org)

### 3–8 September 2017

#### 24th Congress of the International Commission for Optics (ICO-24)

Yokohama, Japan

Contact: Yasuhiko Arakawa

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[www.scj.go.jp/ja/event/ico2017](http://www.scj.go.jp/ja/event/ico2017)

Responsibility for the correctness of the information on this page rests with ICO, the International Commission for Optics; <http://www.e-ico.org/>. *President*: Prof. Yasuhiko Arakawa, Director, Collaborative Institute for Nano & Quantum Information Electronics, University of Tokyo, Japan, [arakawa@iis.u-tokyo.ac.jp](mailto:arakawa@iis.u-tokyo.ac.jp).

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