



NEWSLETTER

COMMISSION INTERNATIONALE D'OPTIQUE • INTERNATIONAL COMMISSION FOR OPTICS

The 23rd ICO General Assembly

ICO welcomes a new Bureau and RIAO as a new international society member.



Members of the ICO Bureau 2011–2014 and 2014–2017.

Santiago de Compostela, the city of pilgrims with its impressive cathedral and its famous botafumeiro, welcomed the participants to the 23rd ICO General Congress. In the words of its chair, Humberto Michinel, the conference program reflected the rich variety of phenomena to whose study we dedicate our lives and provided a glimpse into why we are so passionate about it. During the opening ceremony, special mention was made by M T Flores-Arias (scientific chair and optoelectronics section, Universidade de Santiago de Compostela) of the role and heritage of C Gómez-Reino (co-chair in memoriam). The conference opened with a plenary lecture by Alain Aspect, winner of the 1987 ICO Prize.

In the words of the conference chair, the conference theme, Enlightening the Future, “pointed to the need of preparing future generations of scientists to take over and explore fascinating new



Duncan T Moore (left) meets with the students.

aspects of light and its applications”. And indeed, a highlight of the Congress was provided by the plenary lectures given by the recipients of the Ernst Abbe and IUPAP Young Scientist prizes, Tobias Kippenberg (2013) and Nicholas Fang (2011), and by two awardees of the IUPAP Young Scientist Prize in Optics, Andrea Alú (2013) and Göery Genty (2011). For the first time, students attending the conference organized their own parallel activities and invited the ICO president, Duncan T Moore, to discuss with them ways in which they could integrate better with ICO’s work and also participate actively in the celebration of the International Year of Light 2015.

The General Assembly was attended by 64 official delegates from 33 ICO Territories and its six international member societies, along with a large number of observers. The General Assembly approved the proposed amendment to Article 1 of the ICO Statutes in order to include the word “photonics”, as transcribed in the *ICO Newsletter*, July 2014; the admission of the Iberian American Network of Optics (RIAO) as an international society member of ICO with the right to appoint a vice-president to the ICO Bureau; the Bureau proposal for updated Territorial Committees fees with a phasing timeline; a budget for the ICO Bureau to invest wisely in the celebration of the International Year of Light 2015; the proposal by Japan to celebrate the 24th ICO General Congress in Yokohama, Japan, 3–8 September 2017. The General Assembly also elected the members to the ICO Bureau 2014–2017 (see table opposite).

Participants at the conference had the opportunity to interact in many social activities held during the conference, including receptions hosted by the authorities of Santiago de Compostela and by SPIE and OSA. A tour of the region ended with an unforgettable concert of Galician Pipers at a castle in Vigo, the town of Humberto Michinel.

ICO Bureau 2014–2017	Bureau member	TC/member society
President	Prof. Yasuhiko Arakawa	Japan
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Secretary	Prof. Angela M Guzmán	Colombia
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Vice-president elect those in industry are marked with an *	Prof. John Harvey*	New Zealand
	Dr Franz Holler*	Germany
	Prof. Humberto Michinel	Spain
	Prof. Joseph Niemela	USA
	Prof. Seung-Han Park	South Korea
	Prof. Roberta Ramponi	Italy
	Prof. Jakub Zakrzewski	Poland
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	Prof. Yujie Ding	IEEE
	Prof. Ursula Gibson	OSA
	Prof. Stephen P Morgan	OWLS
	Prof. Eric Rosas	RIAO
	Prof. Paul Urbach	EOS
	Prof. Ahmadou Wagué	LAM Network
IUPAP Exec. Council delegate	Prof. Maria Yzuel	SPIE
	Prof. Carmen Cisneros	

The ICO Prize 2014 awarded to Martin Booth

Martin Booth is head of the Dynamics Optics and Photonics Group at the University of Oxford, UK.



The ICO Prize Committee, consisting of Roberta Ramponi (chair), Yasuhiko Arakawa, Zohra Ben-Lakhdar, Yujie Ding, Fernando Mendoza Santoyo, Maria J Yzuel, and Bingkun Zhou, awarded the 2014 ICO Prize to Prof. Martin Booth, University of Oxford, UK, “for his innovative and pioneering research on dynamic optical methods and new approaches to adaptive optics”.

Prof. Booth leads the Dynamic Optics and Photonics Group at the University of Oxford, UK. He has over 17 years of experience in research on optical and photonic engineering, specifically in the areas of active and adaptive optics for microscopy and photonic engineering. His research group is based jointly in the Department of Engineering Science and the Centre for Neural Circuits and Behaviour in Oxford.

Prof. Booth’s research primarily concerns the development of dynamic optical methods for a range of interdisciplinary applications. A major application is the use of adaptive optics for aberration correction in high-resolution microscopy. This technique, originally developed for astronomical telescopes, uses adaptive elements, such as deformable mirrors, to correct aberrations introduced by microscope specimens. Spatial variations in refractive index due to the structure of a specimen introduce aberrations that reduce the resolution and contrast of microscope images. Prof. Booth’s research has involved the development of new methods of phase measurement, wavefront sensing, and aberration control. This work has led to advances in biomedical imaging, including adaptive aberration correction in confocal, multi-photon and wide-field sectioning microscopy. By overcoming the effects of specimen induced aberrations, adaptive optical microscopes operate effectively in thick tissue specimens, where imaging capabilities were previously limited.

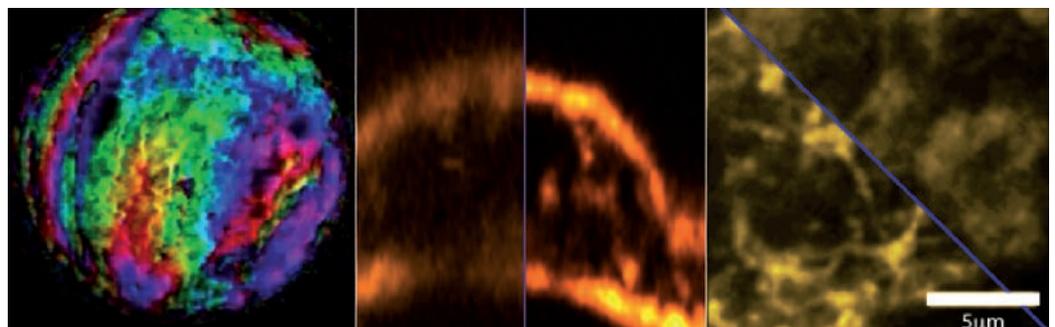
Recent research in collaboration with Yale University and the University of Cambridge has involved the development of adaptive compensation of aberrations for super-resolution microscopes. Specifically, Prof. Booth’s group has introduced the first feedback correction of specimen-induced aberrations in stimulated emission

depletion (STED) and single-molecule switching microscopes. This research is showing how adaptive optics can transform these microscopes from tools for imaging cells to effective methods for microscopy of thick tissue specimens.

His group has also made advances in dynamic optics for sub-micrometer scale laser fabrication systems. In the focusing of laser light inside transparent materials, spherical aberration is caused by refraction at the surface. Adaptive aberration correction overcomes this problem and enables diffraction limited focusing at depth. This technique is key to obtaining precision three-dimensional fabrication throughout the volume of materials. Further advances have been made in the dynamic parallelization of laser fabrication through holographic, refractive, and hybrid methods. These methods permit the control of hundreds or thousands of laser foci in parallel, increasing the speed of fabrication systems. Applications of these technologies have included photonic crystals, waveguide circuits for quantum optics, and diamond photonics.

Prof. Booth’s research career started in 1997 when he was a visiting student in the group of Prof. Stefan Hell at the Max Planck Institute of Biophysical Chemistry in Göttingen, Germany, where he worked on continuous-wave two-photon microscopy. His doctorate, obtained from the University of Oxford in 2001 and supervised by Prof. Tony Wilson, concerned the development of the first adaptive optical confocal microscope. In the same year, he was appointed a Junior Research Fellow at Christ Church, University of Oxford. From 2003–2008 he was a Royal Academy of Engineering/EPSC Research Fellow, following which he was an EPSC Advanced Research Fellow until 2013. He was then appointed to a Senior Research Fellowship before becoming Professor of Engineering Science in 2014. In 2012, he was awarded the “Young Researcher Award in Optical Technologies” from the Erlangen School of Advanced Optical Technologies at the University of Erlangen-Nürnberg, Germany, alongside a visiting professorship at the university. He is also co-founder and director of Aurox Ltd, a university spin-off company, and is a fellow of Jesus College, Oxford, UK.

Left: aberrated wavefronts from a *C. Elegans* specimen.
Middle: adaptive optics aberration correction in a third harmonic generation microscope.
Right: adaptive optics two-photon fluorescence microscopy of a fruit fly brain.



The ICO Galileo Galilei Award 2014

The award goes to Chandra Shakher, IIT Delhi, India, a leading researcher bridging academic research and industrial applications in India.



The ICO Galileo Galilei Award Committee, consisting of professors Zhou Bingkun (chair), G Von Bally, P K Buah-Bassuah, Y Ding, Min Gu, B P Pal, T Szoplik, V I Vlad, and I Yamaguchi, awarded the Galileo Galilei Award 2014 to Prof. Chandra Shakher, from the IIT Delhi, India, “For outstanding contributions to the field of holographic and speckle metrology, which were achieved under comparatively unfavorable circumstances”.

Chandra Shakher was born in Meerut, Uttar Pradesh, India, in December 1949. He received his MSc degree from Meerut University in 1970, his Master of Technology in applied optics from the IIT Delhi in 1976, and his PhD in physics from the Indian Institute of Technology Madras in 1980. A unique aspect of Prof. Shakher as an Indian professor is that he has the experience of working for both Indian industries and academia, and has led and promoted research and education of optical metrology by establishing a bridge between industries and academia in India. He served as scientist at Central Scientific Instruments Organization, Chandigarh, from November 1979 to May 1983. In May 1983, he joined Bharat Heavy Electricals Limited (BHEL), Corporate Research and Development Division, Hyderabad, as deputy manager. In March 1989, he joined the Instrument Design Development Centre (IDDC) of the IIT Delhi as Chief Design Engineer and subsequently was promoted to the position of professor in 1995.

He was director, National Institute of Technology, Hamirpur (Himachal Pradesh), India during 2002–2004. Currently, he is professor at the Instrument Design Development Centre, IIT Delhi, and he was a member of the Technology Business Incubation Centre in helping young scientists with the establishment of their own business.

The focus of his group has been on problems of practical engineering in non-destructive testing. Especially noteworthy is his work on the application of speckle shearing, Talbot, and Lau phase interferometry for the measurement of temperature and temperature profile of gaseous flames for combustion analysis.

He and his team have also developed a Digital Speckle Pattern Interferometry (DSPI) system with wavelet filtering for the measuring/monitoring of vibration of plates, outer casings of electric motors, computer hard discs and tweeters of music systems. The system is also used for the measurement of Young’s modulus of materials using plate vibrations. He has also designed and developed a DSPI system for the measurement of temperature of large size flames (20 cm × 20 cm).

Prof. Shakher’s awards and honors include: Fellowships of SPIE, and Indian National Academy of Engineering, the National Research Development Corporation Independence Day Award 1993, and a member of the editorial board of *Optics and Lasers in Engineering* (Elsevier).

ICO mourns the passing of Roberto Ortega (1946–2014)

A remarkable promoter of optics in Mexico.



Prof. Roberto Ortega Martínez was born in Mexico City. He obtained his BSc (physics) from the Universidad Nacional Autónoma de México (UNAM) where he began teaching even before he graduated. While at the UNAM, he was among the outstanding and enthusiastic students that took part in the social demonstrations of 1968 in Mexico.

His BSc dissertation, presented in 1971, included the design and construction of very low electronic noise amplifiers that were used for over a decade in the San Pedro Mártir based Observatorio Astronómico Nacional of the UNAM, OAN-SPM, in Mexico. He also collaborated with the installation of the control instrumentation, the photometric detection systems, and the physical infrastructure of the OAN-SMP 0.84 m and 1.5 m astronomical telescopes. After one and a half years at the Optical Sciences Center of the University of Arizona, OSC-UA, he joined the Facultad de Ciencias of the UNAM, FC-UNAM as instructor, and became FC-UNAM faculty in 1976. He obtained his MSc and PhD degrees from

the UNAM in 1976 and 1986, respectively. He also worked as associated senior researcher of the Instituto de Astronomía of the UNAM, IA-UNAM, from 1975–1982, where he participated in projects on stellar spectrometry, Michelson-Fourier interferometry, and in the electro-mechanical instrumentation installation and maintenance of several astronomical telescopes of the San Pedro Mártir and the Tonantzintla observatories.

In 1983, Prof. Héctor Domínguez, then general director of the former Centro de Instrumentos of the UNAM, CI-UNAM, (currently known as the Centro de Ciencias Aplicadas y Desarrollo Tecnológico of the UNAM, CCA-DET-UNAM), invited Prof. Ortega to establish an applied optics laboratory, a remarkable effort-consuming project if we consider the small number of optics scientists available at the UNAM in the 1971–1981 decade (a significant number of optics scientists left the UNAM in 1971 to establish the Instituto Nacional de Astrofísica, Óptica y Electrónica, INAOE, in Tonantzintla, and later in 1980, the Centro

de Investigaciones en Óptica, CIO, in Leon). In response to these conditions, Prof. Ortega immediately recruited several recognized independent researchers, and in 1984 he established the Laboratorio de Óptica Aplicada of the CI-UNAM (which later became the Departamento de Óptica y Microondas of CCADET).

At the CI-UNAM (and later CCADET-UNAM), Prof. Ortega developed several optical instruments and laser applications in the area of medicine for public hospitals and guided his students to develop laser spectrometers for non-linear optics research and laser applications to medicine (cardiology, odontology, ophthalmology and oncology). In 1995 he rose to the senior researcher level of the UNAM, and was granted the PRIDE D distinction, and became a member of the Sistema Nacional de Investigadores (SNI), where he reached the second highest level in 1998. In 1996 he secured funding from the UNAM and established the first Laboratorio de Óptica de Pulsos Ultracortos in Latin America,

to carry out research projects in photonics, non-linear optics, and ultra-fast optical phenomena, and devoted his research to the study of the optical self-correlation techniques used for ultra-short pulses characterization, as well as the FROG technique and associated Wigner function modelling. In 2006 he established the Laboratorio de Óptica no Lineal of CCADET. All of the laboratories established by Prof. Ortega are currently recognized as among the most important in Mexico.

Prof. Ortega strongly believed that optics was an illustrative field for young scientists and also that a piece of general culture needed to be appreciated by students at all educational levels. He was a remarkable promoter of optics in Mexico, committed to scientific and technological development. The Mexican optics and photonics community mourns his passing and expresses its condolences to his mother and friends in numerous solidarity messages. RIP.

Dr Martha Rosete, CCADET, UNAM

Contacts

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

Bureau members (2014–2017)

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CREOL, The College of Optics and Photonics, University of Central Florida, e-mail angela.guzman@creol.ucf.edu

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G von Bally

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J Zakrzewski, M Zghal

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E Rosas, P Urbach, A Wagué,
M J Yzuel

IUPAP Council representative

C Cisneros

Editor in chief A M Guzmán

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J Dudley, Université de Franche-Comté, France



Forthcoming events with ICO participation

Below is a list of 2014/15 events with ICO participation. For further information, visit the new ICO webpage at <http://e-ico.org/node/103>.

14–15 October 2014

International Seminar on Photonics, Optics, and its Applications (ISPhOA 2014)

Sanur, Bali, Indonesia

Contact: Aulia Nasution

tel: +6231 5947188

anasution@ep.its.ac.id, www.isphoa2014.org

14–17 October 2014

International Conference on Optics, Photonics & Photosciences (CIOFF)

Havana, Cuba

Contact: Angel Augier

tel: +537 8705707

aaugier@fisica.uh.cu

www.imre.oc.uh.cu/cioff/

9–20 February 2015

Winter College on Optics

Trieste, Italy

Contact: Joe Niemela

tel: +39-040-2240555

smr2691@ictp.it

8–12 April 2015

Discussions on Nano & Mesoscopic Optics (DINAMO-2015)

El Chalten, Argentina

Contact: Andrea Bragas

tel: +541145763426,

bragas@df.uba.ar

<http://dinamo2015.df.uba.ar/>

29 June – 2 July 2015

Education and Training in Optics and Photonics (ETOP 2015)

Bordeaux, France

Contact: Elisabeth Boéri

tel: +33 5 57 01 74 00

contact@etop2015.org

<http://etop2015.u-bordeaux.fr>

14–18 September 2015

Twelfth International Conference on Correlation Optics “Correlation Optics ’15”

Chernivtsi, Ukraine

Contact: Oleg V Angelsky

tel: +380372244730; fax: +380372244730

angelsky@itf.cv.ua

www.itf.cv.ua/corrop15/

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. *Associate Secretary*: Prof. Gert von Bally, Centrum für Biomedizinische Optik und Photonik, Universitätsklinikum Münster, Robert-Koch-Straße 45, 48149 Münster, Germany; bally@uni-muenster.de