

## **Report to Council and Commission Chairs Meeting & the General Assembly of IUPAP**

IUPAP C17: Commission on Laser Physics and Photonics  
*On-line, 15 - 19 October 2021*

The 2018-2021 triennial, which became a quadrennial due to the pandemic, actually started jovially for our commission, with the first celebrations of the International Day of Light on 16 May, commemorating the first successful operation of the laser in 1960 by physicist and engineer, Dr. Theodore Maiman. This was followed by the sensational news on the 2018 Nobel Prize in Physics, awarded to Prof. Donna Strickland, Prof. Arthur Ashkin and Prof. Gérard Mourou, three physicists in Laser Physics and Photonics. The award to Prof. Strickland was especially rejoicing, being the first Physics prize in more than 50 years to be awarded to a woman physicist. It also spotlighted the fact that we still need to improve gender equality in physics and applied physics. The quadrennial also brought to light many inequalities in society, including racial inequalities (such as those leading to the Black Lives Matter movement and hate crimes due to the pandemic). We hope that IUPAP will continue to work on eliminating such inequalities in our communities.

### **ACTIVITIES, EVENTS & NEWS**

#### **1.1. UNESCO's International Day of Light (<https://www.lightday.org/>) by J. Dudley**

For over ten years, a global partnership of scientific societies and other organizations has worked with the United Nations Educational and Scientific Organization (UNESCO) to raise public awareness of the importance of science for sustainable development, structured around the particular theme of light science and optical technologies. This partnership led to the proclamation of the year 2015 as the United Nations International Year of Light, and the recognition since 2018 of the UNESCO International Day of Light (IDL), celebrated every year on 16 May. IUPAP has been a high-level Endorsing Partner of both these initiatives since their inception, and members of the C17 commission play an active role in both the global organization and participation and running of grassroots activities.

Since its inauguration in 2018, the International Day of Light has been one of the highlights of the international science calendar. The IDL Inauguration in Paris on 16 May 2018 saw a remarkable opening ceremony that combined artistic light shows with lectures from Nobel laureates, leading scientists and – with help from the Russian Physical Society and the Russian Academy of Sciences – we were able to obtain a recorded message from the International Space Station. In 2019, a special conference with the theme of Illuminating Education was held at the International Centre for Theoretical Physics (ICTP) and was notable for a keynote speech delivered by a member of C17 (Professor Cather Simpson). There was also excellent participation by students from developing countries who were attending other courses at ICTP during the same period.

Although such high-profile events are important for political visibility, local grassroots events are the core of the IDL mission. The summary data for the four IDL observances since 2018 yield more than 1500 events taking place in 80 countries. The audience reached (physical participation as well as media and social media etc.) is estimated as over a million. Even during the COVID pandemic, the IDL in 2020 and 2021 have seen over 650 events take place, although many of course were held in hybrid or online formats.

A particular feature of IDL celebrations in 2021 was a campaign with UNESCO to encourage supporters of science worldwide to affirm appreciation for science via a public pledge of “Trust in

Science.” The aim here is to discuss and develop effective techniques to explain how science works, and how to improve science communication. Amongst 4500 signatories worldwide include Nobel and Breakthrough laureates, UNESCO prizewinners, CEOs, representatives from scientific societies and academies, together with scientists and students from nearly 100 countries.

The success of the campaign led the theme of Trust in Science to be included in the official message for the International Day of Light provided by UNESCO Director-General Audrey Azouley. As stated in her message: “Trust remains a fundamental condition for science to serve the public interest. This is also why this edition of the International Day of Light is focused on this crucial theme. The situation surrounding vaccines is a striking illustration of this. Without trust and transparency, scientific progress, however necessary and exceptional, is regarded with suspicion and mistrust and becomes the target of rumour-mongers.” The support of IUPAP and the broader IDL community has been essential in allowing the optical science community to contribute positively to this debate on the international stage during 2021. The first-ever UNESCO’s International Day of Light (IDL) was held on 16 May 2018. The general ambition of IDL is to expose young minds, particularly high-school students, to advancements in optics and photonics, through open houses in all major institutions, to stimulate these young brains to start imagining innovations in science and technology. Supporting developing nations, and disadvantaged groups within developed nations, to achieve a similar exposure for high-school students via means that can be resourced and implemented where the children live, can be a positive approach. The connection of IDL aims to the United Nations Sustainable Development Goals, which connects directly with IUPAP’s mission.

C17 wishes to play an essential role in raising awareness of IDL, its programs and events through the international reach of our channels and networks. Members have been strongly encouraged to support IDL by organizing events as an additional responsibility specific to our commission. Below are some examples of IDL events in 2018, in which C17 and its members were involved or were badged as a C17 conference:

- Light and Life: A Student Photo Contest (<http://www.phy.iitb.ac.in/en/content/light-and-life-student-photo-contest>) (organized by P. Vasa, member of C17)
- European Photonics Roadshow on Agriculture and Food (<http://www.photonicsroadshow.eu/events/2018-04-05-florence>), 16 - 17 May 2018, Florence, Italy (R. Pini, Secretary of C17, involved in the organization)
- FOTONICA 2018 (<https://convegni.aeit.it/fotonica/>), 23-25 May 2018, Lecce, Italy (R. Pini, Secretary of C17, involved in the organization)
- Photonics North (<http://www.photonicsnorth.com/en>), 5-7 June 2018, Montreal, Canada (badged as C17 conference after solicitation by T. Ozaki, Chair of C17)
- C. Simpson, member of C17, Deputy Chair of the New Zealand National Committee for IDL
- T. Ozaki, Chair of C17, Member of the Canadian National Steering Committee for IDL

## 1.2. Nobel Prize in Physics 2018

The Nobel Prize in Physics was announced on the 1 Oct. 2018, awarding three researchers "for groundbreaking inventions in the field of *laser physics*", Prof. Arthur Ashkin "for the optical tweezers and their application to biological systems", and Prof. Gérard Mourou and Prof. Donna

Strickland "for their method of generating high-intensity, ultra-short optical pulses". This announcement has thrilled our Commission's community, not just for it recognizing their accomplishments in Laser Physics, but also for the Physics Prize being awarded to a woman since it last went to Maria Goeppert-Mayer in 1963, and only the third winner, with the first awarded to Marie Curie in 1903. Our Commission believes that this is evidence that women remain underrepresented and underrecognized in STEM fields. To commemorate this outstanding achievement, in the December 2018 issue of the IUPAP Newsletter, P. Vasa, C. Simpson and T. Ozaki wrote a short article titled "Donna Strickland: A graduate student, a researcher and a Nobel laureate", while the Working Group 7 "International Committee on Ultrahigh Intensity Lasers" wrote a piece titled "Gérard Mourou – First chairman of IUPAP's Working Group 7".

### **1.3. Predatory conferences**

In Sep. 2018, our Commission received an application for IUPAP endorsement from a conference to be held in Nov. 2018. After having a look at the conference website and doing some online research, it has turned out that this conference is one of the recently frequent predatory ("fake") conferences (see, for example, [this article in Physics Today](#)). Naturally, our Commission unanimously did NOT support IUPAP's endorsement of this conference. In addition, discussions among our Commission members started, noting that protecting scientists from such predatory conferences and journals is one of the important missions of IUPAP. Ideas about how this could be accomplished were also discussed. Proposals included the IUPAP maintaining a list of conferences and journals that are NOT predatory, or IUPAP having a different category that recognizes a conference as legitimate (without the need for the conference organizers to request endorsement and provide conference reports. However, this may be confused with or perturb applications for IUPAP endorsement). Given the recently increasing number of predatory conferences and journals, our Commission proposes that IUPAP discuss methods to shield physics researchers from such predatory conferences and journals.

### **1.4. C17 Annual Meetings**

C17 holds annual meetings to discuss commission matters, in-person before the pandemic, and virtually during the pandemic. The 2018 C17 Annual Meeting was held on the 9 Oct. 2018 in Vilnius, Lithuania, hosted by one of our members, Prof. Gintaras Valušis of the Center for Physical Sciences and Technology (FTMC), Lithuania, one day before the start of the Conference on Advanced Properties and Processes in Optoelectronic Materials and Systems (APROPOS 16, 10-12 October 2018). The 2019 Meeting was held on the 5 Sep. 2019 in Carthage, Tunisia, during the OPTISUD topical meeting. The 2020 Meeting was postponed due to the pandemic, but the 2021 Meeting was held virtually on 22 July 2021. We would like to note that attendance was significantly improved by adopting virtual modes, owing largely to the improvement in videoconferencing technology. For example, a member tried to attend the Annual Meeting virtually pre-pandemic, but had to abandon his attendance due to the poor quality of the connection.

Points that were discussed during these Annual Meetings include IUPAP Conference support, the Young Scientist Prizes, articles for newsletters, associate memberships and slates, and joint conferences & coordinations with other IUPAP groups.

### **1.5. Young Scientist Prizes**

C17 awards the Young Scientist Prizes biannually. There are usually two prizes, one for “Fundamental Aspects” and the other for “Applied Aspects”. In 2019, we decided to exceptionally give out three prizes to the next researchers, due to the high quality of the candidates:

- Dr. Sergey Kruk (‘Fundamental Aspects’), Australian National University, “For his groundbreaking contributions to the study of topological states of light at the nanoscale, particularly for his pioneering work on nonlinear and nonreciprocal effects in photonic nanostructures”.
- Dr. Jinyang Liang (‘Applied Aspects’), Institut national de la recherche scientifique, “For his outstanding contributions that apply coded-aperture optical imaging to ultrafast visualization and ultra-precise modulation of laser beam/pulse profiles”.
- Dr. Alireza Marandi (‘Applied Aspects’), Caltech, “For contributions to nonlinear photonics, particularly his pioneering work on computing with networks of OPOs and demonstration of optical Ising machines, as well as half-harmonic generation of mid-infrared frequency combs.”

These awardees have published articles in the IUPAP newsletter to describe their research.

## **1.6. Coordinating efforts between C17 and the International Commission for Optics**

The Chair of C17 (T. Ozaki) had a discussion with the President of the International Commission for Optics (ICO), Prof. Roberta Ramponi (Istituto di Fotonica e Nanotechnology, Italy), on how C17 and IUPAP could increase collaborations with ICO. The discussion included the following topics:

### 1.6.1. Associate Member of C17 representing ICO

C17 currently welcomes Prof. John Harvey (U. Auckland, New Zealand) as an Associate Member representing ICO. The mandate of Prof. Harvey is until the end of 2022.

### 1.6.2. First C17-ICO Joint Topical Meeting: OPTISUD

As an IUPAP supported type D conference, the topical meeting on OPTics and applications to SUSTainable Development (OPTISUD), jointly organized and supported by IUPAP (C17) and the International Commission for Optics (Affiliated Commission AC1), was held from the 4 – 7 Sep. 2019, in Carthage, Tunis, Tunisia. The chair of the conference was Prof. Mourad Zghal of the École Supérieure des Communications de Tunis (SUP’COM), Université de Carthage. In line with the spirit of this meeting, it welcomed students and researchers from four continents and 19 countries, including 7 from the African continent (Algeria, Cote d’Ivoire, Egypt, Morocco, Senegal, South Africa and Tunisia). From C17, Roberto Pini, Arkadiusz Wójs and Tsuneyuki Ozaki gave invited presentations. The meeting covered various subjects surrounding optics, photonics and laser physics with applications to sustainable development, including quantum information, advanced materials, microscopy and spectroscopy. During the conference, a round table was held to discuss how photonics could contribute to economic and sustainable development, especially in developing countries. There were also many oral presentations by students and postdocs, mostly from African countries or of African origin. Student awards were given to the four best oral presentations, and the winners were: First prize, Ms. Maha Bouhadida (U. Paris-Saclay, France); Second Prize, Mr. Amor Gueddana (U. Carthage, Tunisia); Third Prize, Ms. Akoba Rashidah (iThemba Labs, South Africa) and Ms. Zienab Abel Fatah (Cairo U., Egypt).

The joint meeting was also fruitful in that we had the chance to discuss potential collaborations between C17 and ICO. It also gave members of C17 a perspective on ICO and the type of research that its members carry out. We found that research by ICO members tends to be more application-oriented, while that of C17 leans toward fundamental research. That said, both groups cover both basic and applied physics, and ICO also includes many research involving lasers and photonics, and not just optics. As such, we see strong possibilities of collaborations, such as joint meetings and prizes.

There were interests in continuing the OPTISUD conference series, which both C17 and ICO strongly encouraged. Information was transferred that the deadline for IUPAP support for 2021 conferences is 1 June 2020. However, the pandemic has delayed the next conference until the situation improves.

#### 1.6.3. Supporting ICO's efforts to become a full union

ICO has been working on the idea of becoming a full union on its own. The president of ICO, Prof. Roberta Ramponi, has discussed with C17, and especially T. Ozaki on the possibility of C17 supporting this effort. Capitalizing on these discussions, ICO drafted a version of a Memorandum of Understanding (MoU) that outlines potential areas of collaborations between IUPAP and ICO. This MoU has been presented to the Executive Council of the ICO and has been approved, after which it was sent by Prof. Ramponi to the Executive Council of IUPAP for consideration. Potential commissions that could be involved are not only C17, but also C13 (Physics of Development) and C15.

## APPENDICES

### Appendix A - Officers and Members of C17 (as of October 2021)

#### Officers:

**Chair:** Tsuneyuki Ozaki (2014) (2017)

Email: ozaki@emt.inrs.ca

**Vice-Chair:** Qihuang Gong (2011) (2014) (2017)

Email: qhgong@pku.edu.cn

**Secretary:** Roberto Pini (2014) (2017)

Email: roberto.pini@cnr.it

**Past Chair:** Deborah Kane (2011) (2014)

Email: deb.kane@mq.edu.au

#### Members:

Kai-Mei Camilla Fu (2017)

Email: kaimeifu@uw.edu

Alexey Kalachev (2017)

Email: a.a.kalachev@mail.ru

Kathy Lüdge (2017)

Email: kathy.luedge@tu-berlin.de

Andre Luiten (2017)  
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Kevin F. MacDonald (2017)  
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Ci-Ling Pan (2011) (2017)  
Email: clpan@phys.nthu.edu.tw

M. Cather Simpson (2017)  
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Yoshiro Takahashi (2017)  
Email: yitk@scphys.kyoto-u.ac.jp

Gintaras Valušis (2017)  
Email: gintaras.valusis@ftmc.lt

Parinda Vasa (2017)  
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Arkadiusz Wójs (2014) (2017)  
Email: arkadiusz.wojs@pwr.edu.pl

**Associate Members** (mandate until the end of 2022):

Nicholas P. Bigelow (representing the Joint Council on Quantum Electronics)

John Harvey (representing the International Commission for Optics)

John Dudley (representing the International Year of Light legacy)