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Editorial



NICOLAS BONOD

Editor-in-Chief

Photonics, a Science of Precision and Accuracy

The history of science teaches us how numerous scientific breakthroughs were achieved by increased precision and accuracy. It also highlights how pushing forward the limits of precision and accuracy opens the way to novel research fields and applications.

The story of optical frequency combs is the story of an optical spectroscopy method, which was developed to overcome the limits that were reached by conventional methods in atomic spectroscopy. This technique based on phase-locked lasers, initiated in the 1970's, turned out to be a major scientific breakthrough. Its importance was highlighted in 2005 when the Nobel Prize in Physics was awarded to J. L. Hall and T. W. Hänsch "for their contributions to the development of laser-based precision spectroscopy, including the optical frequency comb technique". Articles of this special feature unveil the richness of this method and its huge potential for pushing forward measurement limits in terms of precision and accuracy. The fast development of this technology also benefited from the remarkable work of photonic companies, which managed to implement the most advanced lasers and optical techniques into ergonomic devices providing reliable and commercial sources of optical frequency combs. Another field associated with excellence and precision is that of optical glass, whose development revolutionized optics. 2022 was declared on May 18th 2021 a United Nations International Year of Glass, and the zoom of this issue is dedicated to this event. Optical glass has deeply broadened our horizons, from

the solar system and beyond with the development of telescopes, to the nano/micro world, in the solid state and in life sciences, with the constant progress achieved in optical microscopy. It has also brought communications to a new era by connecting billions of peoples with optical fibers. All these technologies have pushed the efficiency of optical glass to new standards with extremely precise polishing, structuring and transparency. The long and rich history of optical glass is far from being concluded since the soar of micro and nanotechnologies, a science of precision and accuracy, is spurring exciting and original concepts for tailoring light propagation through meta-optics.

This international issue inaugurates the publication of the section "Lab work" devoted to original optical set-ups aimed at learning optics and photonics through experiments. And what better topic than the emblematic experiment on the violation of Bell's inequalities to inaugurate this section? The authors explain how the EPR paradox, long considered a "Gedankenexperiment", has now become a very exciting lab work in order to introduce quantum concepts and related technologies to students.

The preparation of this issue was marked by the invasion of Ukraine by Russia. The international scientific community has been deeply saddened by this attack on a sovereign country, which severely violates international laws. I warmly thank all the scientific societies that clearly and promptly condemned the invasion of Ukraine by Russia, and in particular our partners SFO, SFP, EOS and EDP Sciences.



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SFO forewords



ARIEL LEVENSON

President of the French Optical Society

“Morally as well as physically, the first of human rights is the right to light.”

“Au moral comme au physique, le premier des droits de l’homme, est le droit à la lumière”

Proses philosophiques, Victor Hugo

The United Nations International Year of Light in 2015 was a global success in celebrating the many ways that light impacts society. The desire to ensure its legacy led UNESCO to proclaim a permanent annual International Day of Light, and this coming edition in 2022 will also be an occasion to remember our dear friend and colleague Costel Subran who passed away in January. Costel was a passionate organizer of International Day of Light activities in France, and as he would say, Light must go on!

Among the many International Day of Light events in France, I wish to highlight the development of laser teaching kits by the SFO Education Commission intended for outreach, especially at secondary schools. These will be freely distributed to accompany dissemination projects, and please contact the Education Commission for details. Let the light penetrate everywhere!

And...Let the sunshine in! From 4-8 July, the SFO Congress will take place in the Côte d’Azur. OPTIQUE Nice 2022 will bridge the academic and industrial communities, with outstanding plenary speakers including: Alain Aspect, Sophie Brasselet, Rémi Carminati, Jean Dalibard, Frédérique de Fornel, Jérôme Faist, Philippe Goldner, Aurélie Jullien, Sophia Kazamias and Philip Russell. The congress also includes tutorials, SFO Club thematic sessions, and 50 industrial and pedagogical exhibition stands. In addition, to celebrate the International Day of Light several events are planned:

- an exhibition of Low Cost Innovation in Optics organized by the SFO Optics and Physics without Borders Commission, targeted to help promote

optics in countries and regions where access to science and technology can be difficult

- a workshop on gender equality organized by the SFO Gender Equality Commission, which aims to develop realistic and efficient actions to address this important issue
- a Scientibus hosted by the SFO Education Commission and the REOD Network, which will showcase a range of exciting experiments to school students

2022 is also the International Year of Glass, and Glass and Light marry well in the SFO Club for Guided Optics (JNOG) that recently joined with the Optical Fibers and Networks Club to better combine the academic and industrial communities in a reinforced JNOG.

In this Photoniques issue celebrating Bell’s Inequality experiments, I would like to warmly congratulate our colleague Alain Aspect for his nomination as Honorary Member of OPTICA, a highly deserved and prestigious recognition.

It is a pleasure to share this international edition of Photoniques with the European Optical Society, and I would like here to affirm SFO’s full support of EOS’s declaration against military intervention in Ukraine. Our thoughts go out to our Ukrainian colleagues and their families, and all whose safety has been jeopardized. They can be assured of our solidarity: нехай вони будуть впевнені в нашій солідарності. At the same time, we know that our many Russian colleagues are equally concerned, and we look forward to the time in the hopefully near future where international science can once again show the way towards peace.

Photoniquement vôtre
Ariel Levenson
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