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Editorial



NICOLAS BONOD
Editor-in-Chief

Meta-optics

Opticians have long sought to control light by structuring matter. One early experiment was carried out in 1785 by David Rittenhouse, inspired by Francis Hopkinson's correspondence, who observed the phenomenon of dispersion by studying the transmission of light through periodically aligned hairs. "I was surprised to find that the red rays are more bent out of their first, direction, and the blue rays less; as if the hairs acted with more force on the red than the blue rays, contrary to what happens by refraction," wrote D. Rittenhouse, a visionary who anticipated that "By pursuing these experiments, it is probable that new and interesting discoveries may be made, respecting the properties of this wonderful substance, light, which animates all nature in the eyes of man". If sub-wavelength modulation no longer leads to diffraction, it still alters the properties of light; and this ability to manipulate the properties of light by structuring the surfaces of materials at a sub-wavelength scale opens up a vast field of investigation.

While the prefix *meta* in optics was inspired by earlier works on metamaterials, for which it expressed the desire to develop exotic properties in wave physics, the sudden rise of metasurfaces over the last decade certainly comes from the desire to take advantage of design approaches and nanotechnologies for both optical instrumentation and cutting-edge research. Optical metasurfaces have opened new paths to explore some of the most fundamental concepts of photonics but they also showed their ability to

replicate conventional optical functions such as wave plates, lenses, frequency conversion and spectral filters with very thin devices. The capacity of metasurfaces to address both fundamental and applied challenges by nanostructuring material surfaces has laid solid foundations for this new disciplinary field. The industrial sector is also quickly investing in this domain. The latter raises a large interest from very large industries while several startups have been created in recent years to manufacture and commercialize meta-optics, and partnerships between complementary actors in this industry have been established to boost research and innovation.

This issue focuses on Finland, a country that has made significant investments in photonics. Like other countries in Europe and worldwide, Finland launched flagship initiatives in 2019 to invest in interdisciplinary themes. These initiatives aim to tackle major societal challenges such as health, energy, and sustainable development, while fostering collaborations between academic and industrial actors to achieve international prominence. Finland recognized early on the potential of photonics to meet these criteria, leading to the funding of the Photonics Research and Innovation flagship, one of the six initiatives launched in 2019 for a duration of eight years. We are delighted to highlight countries that have chosen to prioritize photonics and showcase how investing in photonics creates an ecosystem that drives advancements in research, education, and industry to meet the challenges of tomorrow.



Table of contents

www.photoniques.com

N° 119

21 40 YEARS OF SFO The Nobels and light



41

On the prehistory
of optical metasurfaces

62

Twisted photons:
what is the orbital
angular momentum
of light?



NEWS

- 03 SFO/EOS forewords
- 04 Partner news
- 13 Research news
- 18 Crosswords
- 19 Interview

40 YEARS OF SFO

- 21 The Nobels and light

ZOOM

- 25 Photonics in Finland

LABWORK

- 31 I learned it through the hologram

PIONEERING EXPERIMENT

- 36 The first detection of an exoplanet that opened a new field in planetology

FOCUS: METASURFACES

- 41 On the prehistory of optical metasurfaces
- 46 Second order nonlinear optics in AlGaAs metasurfaces
- 52 Nanocrystal optoelectronics with structured photonic environments
- 58 Enabling new applications with flat optics

BACK TO BASICS

- 62 Orbital angular momentum

BUYER'S GUIDE

- 68 Beam Profilers

PRODUCTS

- 73 New products in optics and photonics

Advertisers

Aerotech	59
APE	19
Ardop	47
Comsol	57
Edmund Optics	IV ^o cov
Emberion	29

EPIC	11
Exail	61
HEF Photonics	15
IDIL Fibres Optiques	49
Imagine Optics	55
Laser Components	51
Light Conversion	17
Lumibird	63
Hamamatsu	23

Laser World of Photonics	14
MKS	II ^o cov
Opton Laser International	33, 65
Phasics	69
Photonics Finland	27
NKT Photonics	67
Sedi Ati	45
Silentsys	53
Spectrogon	43

Spectros	20
Sutter Instruments	39
Symétrie	41
Toptica	35
Trioptics	37
Wavetel / ETSC	71
Wavetel / Yokogawa	13

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SFO/EOS forewords



ARIEL LEVENSON

President of the French Optical Society

Let's celebrate together !

As this year 2023 recognizes 40 years since the creation of the French Optical Society (SFO), we have been delighted to learn of many other anniversaries also being celebrated!

1963 for example saw the foundation of the Laboratory of General Physics and Optics in Besançon in France (now part of the Institute FEMTO-ST), building on roots established in 1933 by Jean-Jacques Trillat (a disciple of De Broglie). In fact, the first SFO President in 1983 was Jean Bulabois from this laboratory (see *Photoniques* 37 and 118), and this issue includes an article by another member John Dudley who retraces the laser epic through stories of the Nobel Prizes. Another French institute celebrating a milestone this year is the Laboratoire de Physique des Lasers, Atomes et Molécules (PHLAM) in Lille which has its 25th birthday on June 16, 2023! PHLAM emerged through a nonlinear pathway under the guidance of the late Pierre Glorieux who pioneered important studies of chaos in lasers.

And of course the SFO's 40th anniversary coincides with 30 years of the European Optical Society! SFO has always been fully committed to the EOS alongside our sister societies, and our firm conviction is that being "United in diversity" makes us smarter and stronger. It is therefore a great pleasure to share this Edito page with EOS President Patricia Segonds who follows the endlessly engaged Gilles Pauliat.

What better celebration of these coinciding French and European anniversaries than the co-organisation of EOSAM 2023 in Dijon from 11-15 September. All are welcome to celebrate together the excellence of European photonics, and the human foundations on which it rests in both academia and industry through colleagues in research, development, and teaching. EOSAM will also allow us to benefit from the hospitality of our fantastic General Chairs Bertrand Kibler and Guy Millot (Institut Carnot de Bourgogne) and will showcase a remarkable programme of talks! Don't delay in making your plans to attend and see you there!

Photoniquement vôtre
Ariel Levenson
Directeur de recherche CNRS
Président de la SFO



PATRICIA SEGONDS

President of the European Optical Society

Let's meet at EOSAM !

As the new President of the European Optical Society (EOS), gathering 4000 members, it is a real pleasure to share this editorial with the President of the SFO, one of our 17 national optical societies (NOS). Together, we are organizing the next EOS Annual Meeting, EOSAM. It will be held from 11 to 15 September 2023, in the beautiful city of Dijon. Bertrand Kibler and Guy Millot (General Chairs), Emiliano Descrovi and myself (Program Chairs), Ariel Levenson (SFO President), Elina Koistinen (EOS Executive Director) and Florence Haddouche (SFO Executive Director), are working very closely to ensure that we meet the participants' expectations with the highest quality and novel research results in different fields of optics. Thus, exceptional plenary lectures will be given by Ursula Keller, Valentina Emiliani, Laura Na Liu, Thomas Ebbesen, Fabio Sciarrino and Jean-Pierre Wolf. Do not miss the tutorials taught by Sara Ducci, Sandrine Fort-Lévêque, Sébastien Bidault, John M. Dudley, Rüdiger Paschotta, Philippe Grelu, Oliver Föhnle, Julien Charton, and Roozbeh Shokri, to address the topics of EOSAM. These are silicon photonics and integrated optics (TOM1), adaptive and freeform optics (TOM2), biophotonics (TOM3), nanophotonics (TOM4), optical materials (TOM5), nonlinear and quantum optics (TOM6), optical frequency combs (TOM7), ultrafast optics (TOM8) and applications of optics and photonics (TOM9).

Focused sessions will cover specialty optical fibers, structured light, chiroptical phenomena, and machine-learning for optics and photonic computing for AI. Photonics21 has joined us to run the EU projects session and students are organizing the Early-Stage Researcher session. Students, new EOS Fellows, the EOS and the International Commission for Optics (ICO) prizes will be awarded.

Last but not least, the industrial mastering of optical technologies and systems (IMOTS), the optics podium organized with EPIC, and an exhibition aim to foster our relationship with industry. The Annual General Assembly will report on the work of our Executive Committee, Board of Directors and NOS Presidents. We hope to see you all in Dijon !

Patricia SEGONDS
Professor at Grenoble Alpes University
President of EOS

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