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Press release

## 2020 Jean Jerphagnon Award Emmanuel Hugot and Yoann Zaouter winners

Every year, researchers, students and industry representatives come together for the Jean Jerphagnon Award, which rewards innovation in the field of optics and photonics. This year, the jury and its president, Alain Aspect, have selected two winners. The ceremony was held as part of the Optics-Photonics Events for the Industry of the Future organized by Institut Mines-Télécom and the French Academy of Technologies. These events showcase technological innovations in a wide variety of optics industries. Two previous Jerphagnon Award winners, Nathalie Picqué from the Max-Planck Institute of Quantum Optics and Vincent Studer from the company Alvéole, gave presentations respectively on optical frequency comb spectroscopy and on microfluidics and optical imaging applied to neuroscience.

### The Jean Jerphagnon Award

The Jean Jerphagnon Award, organized by Institut Mines-Télécom and the French Academy of Technologies with support from Fondation Mines-Télécom, seeks to honor the memory and extend the work of Jean Jerphagnon, telecoms engineer, inventor and researcher, who died in 2005 after leading a distinguished career, from basic research to innovation, in the field of optics and photonics. This award in the amount of €12,000 per year, aims to promote technological innovation and the diffusion of optics and photonics in all fields of application by rewarding a researcher who has conducted cutting-edge research and effectively transferred it.

It is awarded to a researcher or engineer aged 40 or over who has led an innovative project:

- of high scientific value or high industrial potential
- that marks a milestone in his or her career
- comprising at least one optical or photonic element

On 7 July, the President of the Jury, Alain Aspect, professor at the Institut d'Optique and member of the French Academy of Technologies, presented awards to two winners who tied for first place. The jury was comprised of Jean-Louis de Bougrenet (IMT Atlantique), René Essiambre (Nokia Bell-Labs), Thierry Georges (Oxxius), Jean-Pierre Huignard (exThalesTRT), Caroline Kulcsár (Institut d'Optique Graduate school), Hervé Lefevre (iXBlue), Pascale Nouchi

(Thales Research & Technology), Pascale Senellart-Mardon (C2N-CNRS) and Jean-Louis Martin (Institut d'Optique Graduate school).

Technology transfer and innovations resulting from academic research are plentiful, as illustrated by the candidates for the Jean Jerphagnon Award, many of whom lead entrepreneurial projects. This award is intended to sit at the crossroads between research and industry. The Optics-Photonics Events for the Industry of the Future provide a natural setting for bringing together players in this field to discuss the state of the art and the major advances yet to come.

### **Emmanuel Hugot – Research on curved sensors**

The research of this astrophysicist, a CNRS research director at the Laboratory of Astrophysics of Marseille, focuses on manufacturing free-form optics (digital machining of optics), active optics, curved/free-form sensors, and using 3D printing methods.

Through his start-up CURVE, where he serves as scientific director, he developed the first industrial process for producing curved and free-form sensors. Curving sensors makes it possible to create lighter, more compact systems by limiting the addition of optical correction (lenses) by up to 50%. These sensors are more effective: the field of vision can be increased, image quality and homogeneity are improved; vignetting (darkening of the image at the edges) can be eliminated by design, and chromatism can be reduced. Applications are wide-ranging since imaging is pervasive in a variety of research and consumer devices: scientific, biomedical, on-board imaging (drones or spatial imagery to observe the earth environmental monitoring), smartphone photography, autonomous vehicles etc.

Following the transfer of expertise via CNRS-Innovation, Emmanuel Hugo was able to industrialize the manufacturing of curved sensors and therefore strengthen France's position in the optics industry in relation to Germany and the United States. The start-up CURVE is supported by the European H2020 project.

### **Yoann Zaouter – Ultrashort pulse lasers**

Over the past twenty-five years, the steady increase in scientific and industrial applications has sparked a search for ultrafast pulse laser sources that are more effective and reliable. The duration of light pulses from Yb lasers based on Ytterbium (Yb) technology is limited. Today, an increasing number of applications need faster pulses while maintaining the advantages of Yb sources.

In 2008, Yoann Zaouter joined Amplitude Laser's R&D department where he developed the first generation of ultrafast fiber laser architectures for industrial and scientific applications. These architectures are widely used in the semiconductor, consumer electronics and display industries as well as in the medical sector. Since 2009, he has headed a joint R&D laboratory between the company and the Charles Fabry Laboratory at the Institut d'Optique. His current research, for which he has won the 2020 Jean Jerphagnon Award, focuses on ultrafast and nonlinear optics.

He is interested in reducing the duration of pulses from industrial femtosecond lasers applied to the EUV (extreme ultraviolet radiation) generation. He is developing this new generation of ultrashort industrial laser sources, which are temporally-compressed, and applying them to the new generation of EUV radiation through the high harmonic generation (HHG) process. This new generation replaces the previously-used Ti-Sapphire amplifier chains, which no longer provide the necessary parameters (average power, repetition frequency, beam quality). There are promising scientific and industrial uses for which these temporally-compressed laser

sources will allow for a leap in technology. In the short term, he is working on two applications: time and angle resolved photoemission spectroscopy (tr-ARPES) for the scientific market and mask inspection for semiconductor photolithography for the industrial market. Yann Zaouter received a PhD in Laser, Matter and Nanoscience from the University of Bordeaux in 2005.



Two other finalists were in the running:

- Emmanuel Lhuillier works on developing colloidal nanocrystal-based optoelectronic components. In collaboration with the New Imaging Technologies (NIT) company, he is developing a new generation of low-cost infrared sensors with an active layer made from nanocrystals.
- Rémy BRAIVE, a lecturer at the University of Paris, specializes in the fields of nano-optomechanics. He conducts research on photonic crystals applied to the study of the effects of non-linear dynamics and photon-photon interactions in microwave oscillators.

Applications are now open for the 2021 Jean Jerphagnon Award and may be submitted until 21 October 2021.

### **2021 Optics-Photonics Events for the Industry of the Future organized by Institut Mines-Télécom and the French Academy of Technologies**

These events aim to inform the scientific community about changes and major challenges for industry in the field of optics and photonics to support the industry of the future. This year's edition was chaired by Jean-Louis de Bougrenet, professor at IMT Atlantique, and paid tribute to the award with presentations by two previous winners.

Nathalie Picqué, a researcher at the Max-Planck Institute of Quantum Optics, presented her work on frequency comb lasers for molecular spectroscopy.

She studies precision spectroscopy, molecular physics, and laser technology. She was the first to conduct research in the field of frequency comb spectroscopy over a wide spectral band, with her earliest experimental results in 2005. Her groundbreaking work, which was recognized and encouraged by the 2008 Jean Jerphagnon Award, is now attracting interest. Several teams are perfecting the techniques demonstrated by Nathalie Picqué in order to make precise, rapid and miniaturized spectroscopic instruments for applications ranging from basic research in

molecular physics to biomolecular and medical imaging. Working with her group, Nathalie Picqué continues to push back the frontiers of optical frequency combs, interferometry, and molecular spectroscopy.

Vincent Studer, co-founder of Alveole presented his system for Prototyping and Observing 3D Cellular Models.

He is a CNRS researcher at the University of Bordeaux's Institute for Interdisciplinary Neuroscience (IINS). His research focuses on the influence of the micro-environment on intra and inter-cellular mechanisms, with applications in cellular and medical biology, in particular in oncology, immunology and neurobiology. He is responsible for over 10 patents. In 2010 he co-founded the company Alvéole to commercialize his research, for which he won the 2017 Jean Jerphagnon Award.

### About the Academy of Technologies <http://www.academie-technologies.fr/>

Benefiting from the protection of the President of the Republic, the mission of the French Academy of Technologies is to make proposals and recommendations to public authorities and socio-economic players to help society make better use of technology.

As a think tank on industrial policy in France, it contributes to the governance of digital issues as an advisor on all matters related to technology and its impact on society, the environment and economic growth.

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### About IMT [www.imt.fr](http://www.imt.fr)

Institut Mines-Télécom is a French public higher education institution under the aegis of the Ministry of Economy, Finance and Recovery. It includes 8 engineering schools: IMT Atlantique, IMT Lille Douai, IMT Mines Albi, IMT Mines Alès, Institut Mines-Télécom Business School, Mines Saint Etienne, Télécom Paris and Télécom Sudparis, 2 subsidiary schools: EURECOM and InSIC and a network of strategic affiliated partners. Its activities in the fields of engineering and digital technology contribute to training engineers and managers, developing research partnerships, promoting innovation and supporting economic development. Always attentive to the economic world, IMT combines strong academic and scientific legitimacy, close corporate relations and strategic positioning in the key transformations of the 21st century: digital technology, industry, energy and ecology, and education. IMT is a founding member of the Alliance for the Industry of the Future and co-founder of the Franco-German Academy for the Industry of the Future with Technische Universität München (TUM). It is recognized by 2 Carnot Institute certifications for the quality of its partner-based research. Each year, IMT trains over 13,000 students, concludes nearly 70 million research contracts, and hosts some 70 start-ups in its incubators each year.

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