

Press Release

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Young Researchers Honored for Innovative Theses in Photonics

Applied Photonics Award 2026: These are the Winners

JENA | From light pollution measurement devices to quantum technology and AI-based quality control: On September 15, young researchers were honored with the Applied Photonics Award 2026 for their contributions to cutting-edge topics in applied photonics. The award recognizes outstanding scientific theses and is organized annually by Fraunhofer IOF.

Emerging research topics that focus on key future fields in applied photonics and address specific environmental and societal challenges: On September 15, the Applied Photonics Award was once again presented to four early-career researchers for their outstanding theses in the field of applied photonics. The Young Researchers' Award, organized by the Fraunhofer Institute for Applied Optics and Precision Engineering IOF, was presented during Photonics Day Jena by Prof. Dr. Andreas Tünnermann, Institute director of Fraunhofer IOF, together with Evelina Šanta-Kahle, Head of the Quantum Technology Division at the German Federal Ministry of Research, Technology and Space (BMFTR) and member of the Applied Photonics Award jury.

A panel of experts, consisting of representatives from academia and industry, had previously selected the winning theses. In 2026, three theses were honored in the categories of bachelor's, master's, and doctoral dissertations. In addition, one thesis was awarded the Jury Prize for Innovative AI-Applications in Photonics.

The winners of the 2026 Applied Photonics Award are:

Best Bachelor's Thesis (€1,000)

Emily Böttner (Hamburg University of Applied Sciences): "Usability of Simple Multispectral Sensors for Measuring Artificial Nighttime Light Using the Oppla Light Master IV as an Example"

Artificial lighting and the resulting light pollution are becoming an increasing burden on the environment. To assess and mitigate this light pollution, measurements are taken at lighting installations; these require specialized knowledge and high-quality equipment to determine the actual environmental impact. These resources are not always available. As a result, measurements are often performed by laypeople using low-cost illuminance meters. Incomplete data sheets and a lack of information on measurement uncertainties and quality classes further complicate a reliable evaluation of the measurement results.

In her bachelor's thesis, Emily Böttner examines the usability and quality of an inexpensive measuring device that is frequently used in municipalities. She identified the device's operating principles and examined in detail how the displayed values behave under various spectral irradiance distributions. In addition, several tests were conducted to determine whether the measuring device could be classified into a quality class for illuminance meters in accordance with the DIN 5032-7 standard. The results of this research provide clear guidelines on the key factors for selecting and operating such devices. The award winner also highlights the potential of the built-in multispectral sensors for future, high-precision measurements.

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Best Master's Thesis (€2,000)

Girish Karthik (Friedrich Schiller University Jena): "Towards Electro-optically Tunable Quantum Sources of Light in Thin-Film Lithium Niobate"

The practical application of quantum technology requires compact and reliable optical components. One example is the integration of atomic quantum systems into existing fiber-optic networks. The rubidium-atom-based quantum network nodes required for this operate with light at 780 nm, whereas wavelengths around 1560 nm are suitable for low-loss transmission over long distances. Therefore, photons must be converted from 780 nm to 1560 nm without losing their quantum properties. This quantum frequency conversion has already been successfully demonstrated. However, compact, chip-integrated, and flexibly tunable systems are still lacking for practical applications.

In his master's thesis, Girish Karthik developed a compact, chip-based, and electrically controllable quantum frequency converter. The converter is based on photonic integrated circuits made of thin-film lithium niobate, known as TFLN-PICs. By applying electrical voltages, the operating frequency of the device can be precisely adjusted. This allows the converter to be flexibly tuned to different telecommunications channels.

The key advantage of this approach lies in the combination of compact chip integration, precise frequency control, and dynamic adjustability. This creates an important technological foundation for directly coupling atomic quantum nodes with standardized fiber-optic infrastructure in the future and for building scalable quantum networks. In addition to communication and computing, applications in biomedicine are also conceivable.

Best Dissertation (€3,000)

Dr. Marc Christ (Ferdinand-Braun-Institut (FBH) Berlin): "Micro-integrated optical systems, additive manufacturing, and vacuum integration for atomic quantum sensors"

Quantum technology is a key area of innovation for a wide variety of applications. In particular, atomic quantum sensors are of interest for applications in navigation, medicine, and industrial measurement technology, where low-maintenance and reproducibly manufacturable systems are required. These sensors can measure with extreme precision, but doing so requires a highly controlled interaction between laser light, atoms, and miniaturized optics.

In his dissertation, Marc Christ developed a technology platform that enables key photonic and atom-optical components of quantum sensors to be constructed in a way that makes them significantly smaller, more robust, and suitable for use in a vacuum. The platform combines high-precision microintegration, additively manufactured and functionalized technical ceramics, and the qualification of materials and processes—all of which are essential for operation under demanding conditions. This transforms alignment-intensive laboratory optics into

a transferable platform for integrated quantum sensors. He demonstrated and validated the performance of the approach using several demonstrators.

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The technology platform is already being used today for next-generation quantum sensors and atomic quantum systems. These include compact optical atomic clocks and optical reference modules for precise time and frequency measurements, as well as optically pumped magnetometers. Fields of application like Earth observation and resource exploration may also benefit in the long term.

Jury Prize for Innovative AI-Applications in Photonics (€1,000)

Janis Stosiek (Ernst Abbe University of Applied Sciences, Jena): "AI-Based Temporal Multimodal Contamination and Corrosion Analysis for Quality Assurance in Aerospace Production"

Quality inspection is of central importance, particularly in the aerospace industry. Even the smallest defects, contaminants, or signs of corrosion can have serious consequences. To date, the assessment of contamination, corrosion, and coatings on numerous components has been performed primarily by hand. The results depend heavily on the experience of the inspectors and can vary accordingly.

As part of his bachelor's thesis, Janis Stosiek developed software that uses artificial intelligence and photonic imaging techniques to inspect component surfaces for contamination and corrosion. This complements manual visual inspection with a fast, objective, and reproducible analysis.

The combination of photonics and artificial intelligence opens up new possibilities for automated and reliable quality control. Defects and changes on component surfaces can be detected early, components can be evaluated more precisely, and their service life can potentially be extended. At the same time, costly failures can be avoided. Thus, the developed technology contributes to greater safety, a more efficient use of resources, and future viability of industrial quality assurance.

The Applied Photonics Award 2026

The Applied Photonics Award was presented for the ninth time this year. The award ceremony took place once again as part of Photonics Days Jena, a networking and career event for students and doctoral candidates in the fields of optics and photonics, organized by Fraunhofer IOF in cooperation with the Max Planck School of Photonics. The 2026 Applied Photonics Award was presented with the kind support of VDI – the Association of German Engineers, the Thuringian State Development Corporation (LEG), and the companies JENOPTIK and TRUMPF.

About Fraunhofer IOF

The Fraunhofer Institute for Applied Optics and Precision Engineering IOF in Jena conducts application-oriented research in the field of photonics and develops innovative optical systems for controlling light - from its generation and manipulation to its application. The institute's range of services covers the entire photonic process chain from opto-mechanical and opto-electronic system design to the production of customer-specific solutions and prototypes. At Fraunhofer IOF, about 500 employees work on the annual research volume of 40 million euros.

For more information, please visit: www.iof.fraunhofer.de/en.html

About the 2026 Applied Photonics Award

Organized by Fraunhofer IOF, this award for early-career researchers honors outstanding theses in the field of applied photonics. The institute conducts applied research in the fields of optics and photonics. As key technologies, these disciplines contribute to solving upcoming challenges facing society, the economy, and industry.

For more information, visit : <https://www.applied-photonics-award.de/en.html>



Fig. 1 The winners of the Applied Photonics Award 2026 together with the laudators Evelina Šanta-Kahle (right) and Andreas Tünnermann. (left) © Fraunhofer IOF



Abb. 2 Emily Böttner – Winner „Best Bachelor’s Thesis” © Fraunhofer IOF



Abb. 3 Girish Karthik – Winner „Best Master’s Thesis” © Fraunhofer IOF



Abb. 3 Dr. Marc Christ – Winner „Best Dissertation” © Fraunhofer IOF



Abb. 4 Janis Stosiek – Winner “Jury Prize for Innovative AI-Applications in Photonics” © Fraunhofer IOF

The Fraunhofer-Gesellschaft, headquartered in Germany, is one of the world’s leading organizations for applied research. It plays a major role in innovation by prioritizing research on cutting-edge technologies and the transfer of results to industry to strengthen Germany’s industrial base and for the benefit of society as a whole. Founded in 1949, the Fraunhofer-Gesellschaft currently operates 75 institutes and research units throughout Germany. Its nearly 32,000 employees, predominantly scientists and engineers, work with an annual business volume of 3.6 billion euros; 3.1 billion euros of this stems from contract research.

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