

## Editorial

# Editorial for the Special Issue “Interdisciplinary Approaches and Applications of Optics & Photonics”

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The remarkable development of pure and applied research in the fields of optics and photonics in the past few decades has reinforced the need to position optics among the major fields of science that are considered to have remarkable, multi-fold impacts on everyday life and on our modern society.

Since 2011, the Portuguese Society for Optics and Photonics, SPOF (Sociedade Portuguesa para a Investigação e Desenvolvimento em Óptica e Fotónica), has successfully organized six editions of the International Conference on Applications of Optics and Photonics, or AOPs, in Portugal, celebrating the remarkable contribution of optics and photonics to the development of society and humankind by reviewing the state of the art and foreseeing the future evolution of this field, as well as by presenting the advancements achieved within it.

In an accessible environment, the Portuguese Optics and Photonics community has promoted the establishment of new projects for cooperation between researchers, as well as relationships with colleagues from around the world and global institutions, further contributing to the development of optics and photonics, and science and technology in general.

This Special Issue of the *Applied Science* journal, titled “Interdisciplinary Approaches and Applications of Optics & Photonics” and comprising 10 compelling research papers, clearly illustrates the importance of optics and photonics research in interdisciplinary fields.

In the first paper published, Hammes and co-authors address a topic of great relevance in materials science and engineering research for sustainable and global warming control. In particular, the authors explore the development and application of coaxial fibers embedded with PCMs, or Phase-Change Materials [1], for heat control and thermal regulation. Furthermore, in the materials engineering for sustainability [2] field, Srugaite and Krylova present the results of a study on the application of bismuth sulfide ( $\text{Bi}_2\text{S}_3\text{O}$ ) thin films on different types of textiles for photovoltaic solar energy harnessing. Rodríguez-Lamoso and Preu report on silicon nitride thin film deposition, via PECVD this time, for the production of a compact, high-reflectivity, tunable distributed Bragg reflector [3] for MEMS optical cavities. Li and coauthors developed a lattice design of an intermediate-energy electron storage ring with a 288 m circumference based on a double-bend achromat lattice structure for X-ray light sources to be used in materials research. Dias et al. present an enhanced solution to obstacle detection in railway tracks [4] by combining and matching long-range, real-time LiDAR [5] data with pre-existing data on track topography. Automated data processing is also used by Avital and co-authors in a different application: the classification of cognitive states obtained from gamma-band EEG signals processed with convolutional neural networks [6]. Sánchez-Lacambra et al. demonstrate that lighting conditions significantly influence visual acuity and reaction time, with white light enhancing performance



Received: 24 October 2025

Accepted: 11 November 2025

Published: 16 November 2025

**Citation:** Costa, M.F.M.; Franco, S. Editorial for the Special Issue “Interdisciplinary Approaches and Applications of Optics & Photonics”. *Appl. Sci.* **2025**, *15*, 12160. <https://doi.org/10.3390/app152212160>

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and red light impairing it, highlighting the importance of light environment design in visually demanding tasks [7]. Additionally, in the field of vision, and considering the increasing concerns about the impact of prolonged digital screen use [8,9], Martins et al. investigate whether extended exposure to screens, combined with COVID-19 infection, may result in permanent alterations to color vision. Martins et al. investigate whether prolonged screen exposure and COVID-19 infection can lead to permanent changes in color vision. Using standardized testing methods, they found no significant long-term effects, suggesting that color perception remains stable in young adults, despite increased digital demands and the presence of pandemic-related health challenges. Color is also addressed, from a different perspective, by Melgosa and co-authors: a colorimetric analysis [10] of the lights on Mars' surface [11] obtained from 3139 total spectral irradiances provided by the COMIMART model, is presented in their rather interesting paper. Gómez-Sarabia and Ojeda-Castañeda propose a new phase rendering technique that works under noncoherent illumination by cross-correlation from two suitably coded gratings, one which has a unit cell coded with the white and black versions of a Barker sequence and a second grating that is coded as Babinet's complementary of the first grating. Exploiting the link between the angular deviations of a beam and the optical implementation of cross-correlations, the technique is intended to be used in a new approach to the Lau interferometer [12], which the authors call the dark-field Lau interferometer.

The compilation of papers presented by this Special Issue of the *Applied Science* journal, titled "Interdisciplinary Approaches and Applications of Optics & Photonics", represents a major contribution to the development of optics and photonics, as well as applied science in general.

**Author Contributions:** Conceptualization, M.F.M.C.; writing—original draft preparation, M.F.M.C. and S.F.; writing—review and editing, M.F.M.C. and S.F. All authors have read and agreed to the published version of the manuscript.

**Conflicts of Interest:** The authors declare no conflicts of interest.

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