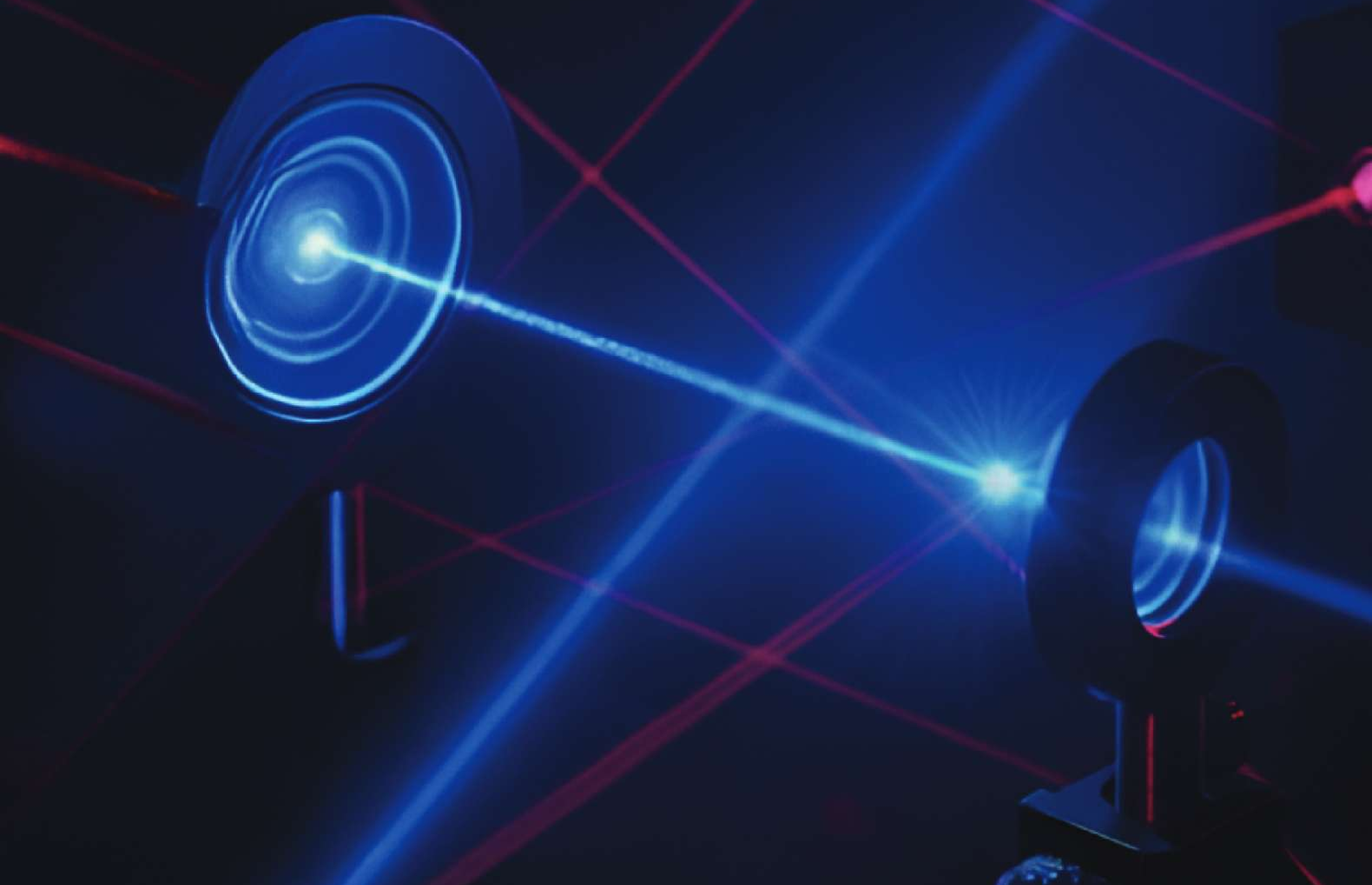
ISLOP2025

ABSTRACT BOOK

3rd International Summit on

Lasers, Optics and Photonics

May 05-06, 2025 | Amsterdam, Netherlands



Website:

https://optics.spectrumconferences.com/

FOREWORD

Dear Colleagues,

It is our pleasure to extend a warm invitation to all scientists, academicians, young researchers, business delegates, and students from around the globe to participate in the 3rd International Summit on Lasers, Optics and Photonics (ISLOP2025), scheduled to take place in Amsterdam, Netherlands from May 05-06, 2025.

ISLOP2025 will provide a platform to explore recent research and cutting-edge technologies, attracting a diverse and enthusiastic audience of young and talented researchers, business delegates, and student communities.

The primary objective of ISLOP2025, a gathering of scientists and engineers from across the globe to share and exchange groundbreaking ideas in the fields of Lasers, Optics and Photonics. The summit aims to foster high-quality research and international collaboration, facilitating discussions and presentations that are globally competitive and highlighting recent notable achievements in these fields.

We're looking forward to an excellent meeting with scientists from different countries around the world and sharing new and exciting results in Lasers, Optics, Photonics.

Organizing Committee Members

Rodriguez Frias	University of Alcala, Italy
Neil Collings	Envisics Ltd, UK
Dieter Schuoecker	TU Wien-Laser Technology, Austria
Armin Grasnick	IU International University, Germany
Xenia Bogomolec	CEO & Founder-Quant-X Security & Coding GmbH, Germany
Hideyuki Kanematsu	Suzuka College, Japan
Surya Gurunarayanan	Sr. Functional Architect-EUV Reticle Clamps, USA

Wavelength Selective Multi-focal Zone Plates for Large Field Autostereoscopy

Armin Grasnick
IU International University, Germany

ABSTRACT

Autostereoscopy technologies are often limited in viewing angle by the field of view of the micro-optic system positioned in front of the display. Previous work has shown that mounting a pane of diffractive parallax barriers closer to the pixel layer can extend the field of view. However, since diffractive optics are typically designed for a specific wavelength, the focal point varies for the primary wavelengths of an RGB display. Here, we leverage the wavelength-dependent diffraction properties of zone plates to partition broadband light into multiple discrete focal planes. We provide a detailed description of wavelength selective multi-focal zone plates, discuss possible design strategies, and analyze the associated trade-offs.In addition, we propose a simulation framework utilizing FFT-based Fresnel propagation to model the diffraction and focal behavior across the visible spectrum, thereby offering quantitative insights for optimizing design parameters.

BIOGRAPHY:

Armin Grasnick has been a distance learning professor for Augmented & Virtual Reality in the IT and Technology department since 2022. After studying technical optics, he began his professional career as a research assistant for the design of high-performance lenses. During the New Economy, he set up his own business with a start-up to develop 3D displays and subsequently founded other companies with a 3D/VR focus at home and abroad. In addition to his work in development and management, he completed his doctorate on autostereoscopic displays at the FernUniversitat in Hagen. Over the course of his professional life, he has registered several patents, written several specialist books on the subject of virtual reality and was awarded the Federal Cross of Merit for his achievements.

High Power Laser Technology for Area Printing® A Scalable Powderbed Metal Additive Manufacturing Method

Andrew Bayramian

Seurat Technologies, Inc., 255 Ballardvale Rd, Wilmington, MA 01887 USA

ABSTRACT

Seurat's Area Printing™ is an innovative metal additive manufacturing technology that will be significantly faster and more scalable than incumbent additive processes today. Area Printing modifies the traditional powder bed fusion printing process by projecting a pattern containing millions of pixels of light simultaneously onto a print bed and fusing a tile patterned area to the layer below in a single pulse. Area Printing is scalable in both tile areal size and speed without sacrificing print resolution. This technology uses lasers at two different intensity levels to first heat and melt the metal powder, then a much higher intensity pulse fuses this molten layer onto the layer below. Achieving high production rates requires scaling current laser technology in average power while maintaining brightness and beam quality. Current achievements and printer qualifications at Seurat will be presented along with a roadmap for scaling the lasers and printer systems to the higher production rates required to make additive the mainstream method for fabricating metal.

Keywords: Additive Manufacturing, Powderbed Fusion, High Power Lasers, Area Printing.

BIOGRAPHY:

Andrew Bayramian received his Ph.D. from the Department of Applied Science at University of California Davis in 2000 for research on a new laser gain medium. He then started a lengthy career at Lawrence Livermore National Lab from 2000-2018 scaling diode pumped laser systems in energy and average power for the purpose of driving fusion ignition or for driving secondary sources. His first assignment used the same gain material to build a scaled laser driver which was the first of its kind. In 2010 a new project called LIFE (Laser Inertial Fusion Energy) which aimed at a complete powerplant design including all aspects of lasers, targets, chamber, and balance of plant. Using lessons learned from the first system and technology advancements, he and his colleagues developed a compact and efficient laser design. In 2013 the opportunity arose to build a scale version of this laser as a driver for a short pulse beamline which is now installed at ELI Beamlines in Czechia. Andrew started as the Chief Scientist at Seurat Technologies in 2018 developing an additive manufacturing technology that is disruptive and could change how high-volume metal is fabricated. This work involves developing the lasers and architectures necessary to make this printing process function. He helped build the first technology demonstrator, a subscale printer, and finally a full-scale printer (5X productivity) with a second under construction. Andrew is a co-inventor of this technology that was developed in response to a need for specialized cooling tubes for LIFE.

Advanced 2D-materials Integrated Fibre Optic Biosensors

Dr. Xianfeng Chen
Associate Professor, School of Science and Technology
Nottingham Trent University, UK

ABSTRACT

In this talk, Dr. Chen will introduce optical fibre grating technologies including fibre Bragg gratings, long-period gratings, and tilted gratings, review the state-of-the-art on 2D nanomaterials and nanotechnologies, and present recent multidisciplinary research on nanophotonics for light-matter interface, label-free biosensing, and cancer diagnostic applications.

BIOGRAPHY:

Dr. Xianfeng Chen is an Associate Professor, Head of Biophotonics & Sensors Group at School of Science and Technology, Nottingham Trent University, United Kingdom. Dr Chen has over 20 years' research experience in the UK, leading multidisciplinary research in photonics, 2D-materials and biomedical sciences. He is PI/Co-I of over 20 grants from the UK, EU and US funding bodies. He has authored 4 books/chapters, filed 2 patents, and published more than 150 papers.

How Concentric Laser Beams can become the New Standard in Laser Processing Applications

Martijn Boerkamp

CTO and Co-founder of inPhocal, Netherlands

ABSTRACT

Lasers are heavily used in the industry for example for marking, cutting, welding or dicing and laser processing is a term for a broad range of technologies that can process materials by means of focused laser light. Focusing light creates the high energy density needed for processing the material, but also brings limitations. This is because light can only be focused over a very narrow distance, which puts a strict limit on the speed of processing and also how deep a laser can cut through materials. Novel beam shaping technologies extend the focus depth but this goes at the cost of laser energy.

inPhocal developed novel beam shaping technology that transforms a conventional Gaussian laser beam into a Concentric Laser Beam. Due to the unique characteristics of the Concentric Laser Beam the focus can be maintained over a very large distance and at the same time maintaining all of the energy inside the focus region. The technology can be applied to increase the speed of laser marking or by efficiently cutting through thick metal. It can efficiently cut wafers or apply laser welding with ultrahigh precision. Concentric Laser Beams can therefore become the new standard in laser processing applications.

BIOGRAPHY:

Martijn Boerkamp have a passion for science and technology. He had a leading role on new technology development for many years at institutes, big and small companies and startups. Martijn Boerkamp is currently setting up my own startup based on a great laser beam technology. In addition, he believes in better communication about science. And also work as a science journalist and regularly publish in newspapers and popular scientific magazine.

Developing Processes and Mechanisms to Enable the Use of CVC SiC® Optics in Laser Beam Control Systems

Walter Wrigglesworth III, William Fischer III

Wyzkyds Consulting, 300 E University Blvd STE 240, Tucson, AZ 85705, USA

ABSTRACT

Laser Beam Control Systems present unique challenges to the opto-mechanical engineer. Materials with high thermal conductivity, specific stiffness, and the ability to exhibit excellent surface optical characteristics are highly desired. Silicon Carbide has the potential to meet all of these requirements but presents its own challenges, such as nontraditional fabrication methods and mechanical mounting designs. Wyzkyds and ASCM have been developing processes and mechanisms to enable the use of Silicon Carbide in Laser Systems and improve traditional beryllium designs by mitigating health hazards and exhibiting lighter weight, better optical performance, radiation resistance, and thermal stability.

Chemical Vapor Composite Silicon Carbide (CVC SiC)® is ideal for use in various optical, structural, and chemical applications, including telescope optics, replication optics, mirror mounting structures, and beam steering. Optics fabricated on a polished substrate, such as Silicon Carbide (SiC), offer impressive thermal stability, strength, cost savings, and optical performance. The grain structure of CVC SiC mirrors does not require an overcoat of Ni before polishing, and therefore, they are inherently less susceptible to radiation effects. The CVC® material shows an equiaxial grain structure that occurs because of the re-nucleation of the seed particles. The equiaxial grain structure consequently results in remarkably stress-free material. Thus, CVC® SiC can be deposited to near net shape and machined to final dimensions with reduced fracture risk. This also allows for less machining and polishing, which is of considerable benefit due to the stresses placed on the thin, extremely fine structure of optical systems during the machining and polishing process. CVC SiC is not only more resistant to fracturing during machining and polishing but presents less risk due to the near-net shaping, which removes some of the machining needs. Wyzkyds and Advanced Silicon Carbide Materials (ASCM) have previously demonstrated that the optics made of beryllium for an existing telescope can be manufactured in Chemical Vapor Composite (CVC) SiC with equal or better performance. ASCM has manufactured materials suitable for optical use in thicknesses ranging from 1mm to 75mm and in diameters over 1.5 meters.

CVC SiC is particularly suited for optical applications due to the ease of deposition and the material's low mass/high stiffness. These properties leave CVC SiC as an excellent candidate for mirror material due to its survivability and the low inertia that it presents in adaptive-optic and steering mirror applications. CVC SiC also has favorable thermal tolerances compared to materials such as Beryllium with Nickel overcoating, and its shock and vibration tolerances are comparable.

Wyzkyds and ASCM have developed polishing, grinding, and near-net shaping capabilities suitable for high-precision optics manufacture in this material, including both conventional bonding and brazing techniques for structural compo-

nents and diffusion bonding for precision laser component manufacture. They have developed design techniques that maximize the performance improvements possible with CVC SiC, while minimizing cost, time/schedule, and rework. They are pleased to present this material's cutting-edge work and research.

Keywords: Beam Steering; Silicon Carbide; Optical Manufacturing; Precision Optics.

BIOGRAPHY:

Walter Wrigglesworth III , CEO Wyzkyds

Walt Wrigglesworth has pioneered optics and materials design for the past forty years. An expert in aerospace design, optical engineering, and manufacturing processes, Walt has spent much of his career leveraging new and emergent technologies, processes, and materials for private and government purposes. In the past decade, his company has received multiple phase II and III SBIR awards as well as first-tier subcontracts for optical design, modelling and simulation, optical component manufacture, materials design and integration, and sensor design, and has worked with U.S. government agencies such as NDA, Army, Navy, and SMDC, as well as major contractors such as Physical Sciences, Inc., Advanced Silicon Carbide Materials, Lockheed Martin Space, and Lockheed Martin Missiles and Fire Control.

Dr. William Fischer III

Dr. Fischer is the Director of New Business at Advanced Silicon Carbide Materials and an internationally recognized expert in the areas of ceramic research, development, and manufacturing process development for a variety of government applications, including reflective optical materials and systems. With over thirty years of experience in materials development, most of which involved SiC processing, Dr. Fischer has a long history of generating new and enabling technologies via the Small Business Innovative Research (SBIR) program and STTR programs. He has been the winner of over a dozen SBIR/STTR proposals from 2001-2008, including several Phase II projects from the Air Force, MDA, NASA, Navy, Army, SOCOM, and Army SMDC.

Nonlinear Ellipsometry and Reflectometry of Second Harmonic Generation: A New Tool for Photonics Materials

Dr. Simon Dubuis

CEO & Co-founder of NLOPTICS, France

ABSTRACT

The advent of breakthrough technologies such as 6G, artificial intelligence, and quantum computing is driving unprecedented demands in terms of power, speed, and processing capability. Meeting these challenges requires the integration of advanced materials—such as lithium niobate ($LiNbO_3$), and other advanced materials—particularly in the field of nonlinear optics. This branch of optics is gaining traction due to its wide range of photonic applications, including frequency conversion, optical modulation, and electro-optic effects. However, conventional characterization techniques often fall short when it comes to analyzing the complex properties of these emerging materials.

To address this gap, a novel optical characterization method— Nonlinear ellipsometry and reflectometry of Second Harmonic Generation (R-SHG)—has been developed. This polarization-resolved technique enables advanced probing of light–matter interactions at the microscale, offering unprecedented insights into surfacesor thin layersstructures, crystalline defects, directional anisotropies, and the distribution of residual static charges. R-SHG thus emerges as a powerful, non-destructive and surface-selective approach for the investigation of high-potential materials in photonics. Some significant examples will be shown in this presentation.

BIOGRAPHY:

Dr. Simon DUBUIS is the CEO and co-founder of NLOPTICS, a Bordeaux-based start-up leading in quality control of lithium niobate for advanced materials applications. He is a physical engineer specialized in photonics, and lasers. After a master's degree in optical fiber manufacturing for telecommunications, he worked at TeraXion in Canada as an Optics Specialist. In December 2024, he completed his PhD degree on nonlinear surface spectroscopy in Bordeaux, France. Today, he is leading NLOPTICS company's technological development and scientific strategy. His technical expertise and long-term vision enable NLOPTICS to remain at the forefront of innovation while meeting industrial requirements.

Potential Application of Multi E-Beam Direct Write Lithography for Photonic Integrated Circuits

Denis Shamiryan

Director of Operations-Keen Semiconductor, Netherlands

ABSTRACT

The advancement of integrated photonics (PIC) has catalyzed transformative applications across diverse fields, including telecommunications, LiDAR systems, and sensor technology. However, the current manufacturing landscape for PIC faces significant challenges, particularly when leveraging conventional UV lithography. These methods struggle to meet the stringent requirements for sub-100 nm resolution on wafers smaller than 300 mm in diameter. Additionally, the inflexibility and high mask costs associated with low-volume production hinder innovation and responsiveness in a rapidly evolving market.

In response to these challenges, Secure Foundry is developing a cutting-edge Multi E-Beam Direct Write (MEBDW) lithography machine. This novel approach combines high resolution (down to 32 nm half pitch) and exceptional flexibility, eliminating mask costs while accommodating wafer sizes ranging from 75 mm to 300 mm. While MEBDW offers lower throughput compared to traditional UV methods, its advantages in small and medium volume manufacturing make it an ideal solution for emerging applications in PIC technology.

This talk will explore the capabilities and potential of MEBDW lithography for the manufacturing of photonic integrated circuits, highlighting its impact on enhancing design freedom, reducing production costs, and accelerating time-to-market.

BIOGRAPHY:

Denis Shamiryan obtained his PhD in 2003 from Catholic University of Leuven, Belgium. He worked as Senior Scientist at Imec, Belgium, where he started up a European conference on plasma etching (PESM). From 2011 till 2013 he worked at Global Foundries Fab1 in Germany as Member of Technical Staff. Since 2013 he worked for Mapper llc, a subsidiary of a Dutch company Mapper Lithography first as a Manufacturing Director then as CEO.

Application of Lasers and Optics in Climate Tech

Jonathan Naoukin[1]
1. Type 1 Compute, Washington, DC, USA

ABSTRACT

Lasers, Optics, and Photonics have emerged as a promising approach for developing clean energy systems. Each component has a multitude of factors that can be offered to provide better guidance in computation and engineering. But what are the benefits of utilizing these systems compared to traditional methods (i.e. traditional HPC). This paper comprehensively surveys the integration of Photonics, Optics, and Lasers, and discuss future directions, and discuss the potential benefits of these technologies.

Keywords: Lasers; Optics; Photonics; Climate.

BIOGRAPHY:

Jonathan Naoukin is a Mathematics/Entrepreneurship at UT Austin, one of the founding fellows at the Texas Entrepreneurship Exchange for Energy Fellowship (a Cleantech Fellowship led byMIT in collaboration with Greentown Labs and 5 Texas Universities). His main research interests are in energy-efficient and next-gen computing (Quantum Computing, Neuromorphic Computing, etc.), Cleantech (Nuclear Fission, Nuclear Fusion, Geothermal, Decarbonization, etc.), and concepts/initiatives that would benefit humanity. He has had the pleasure of speaking at several conferences (Quantum Innovation Summit 2024, IGSC 2024, andCERAWeek2025). Jonathan is the Co-founder and CTO of Type 1 Compute, a pre-seed startup where we are building and optimizing Modular Data Centers to scale AI Infrastructure and Energy through the use of next-gen computing.

Dynamic Memristor Quenching for Enhancing Geiger-mode Avalanche Photodiode Performance: A Technical Overview

Jiyuan Zheng [1]

[1] Beijing National Research Center for Information Science and Technology, Tsinghua University, Beijing 100084, China

ABSTRACT

Geiger-mode Avalanche Photodiodes (GmAPDs) are crucial for low-light detection applications, including bio-imaging, quantum communication, and astronomical observations. However, their practicality is hindered by long recovery times, high afterpulsing probability, and excessive jitter, especially in large-area devices. This study introduces a Dynamic Memristor (DM) as a quenching resistor to significantly enhance the performance of large-area GmAPDs.

Two comparative experiments were conducted. The first compared small-area (200 µm) and large-area (3 mm) GmAPDs using a Fixed Resistor (FR) quenching method, highlighting the limitations of large-area devices in terms of count rate, jitter, and afterpulsing. The second experiment evaluated the performance of a 3-mm-diameter GmAPD using DM quenching against FR quenching. The DM, fabricated with a crossbar structure, demonstrated a high off-state resistance (>100 MΩ) and low on-state resistance (<10 kΩ), enabling rapid quenching and recharging.

Key improvements were observed: a 100× increase in count rate at an overvoltage of 2.5 V, jitter reduction from 3.60 ns to 0.48 ns, and afterpulsing probability mitigation from 30.88% to 8.58%. These advancements address the critical challenges in large-area GmAPD performance, offering significant potential for enhanced applications in bio-imaging, quantum communication, and other low-light detection fields.

In addition, this report will introduce the integration work of DM with GmAPD. Compared to GmAPD, DM has a very small size, similar to an electrode. However, its active metal electrodes may penetrate into the silicon material, causing material contamination. This report will explain how to reduce the process impact through the design of an ion-blocking layer, achieving an integrated DM-GM-APD that can operate continuously.

Keywords: Geiger-mode avalanche photodiode; Dynamic memristor; Photon counting.

BIOGRAPHY:

Jiyuan Zheng, Associate Research Professor, Tsinghua University. He received his Ph.D. in the Department of Electrical Engineering at Tsinghua University in 2017. From 2017 to 2019, he conducted his first postdoctoral research at the University of Virginia, followed by his second postdoctoral research at the University of Chicago from 2019 to 2020. Focused on the application needs of high-performance intelligent photonic integrated circuits, he adopts an interdisciplinary research approach, systematically investigating the physical mechanisms of photonic devices, features of artificial intelligence algorithms, chip operating principles, fabrication processes, and application validations. He developed a high-speed Geiger-mode avalanche photodetector using the dynamic memristor quenching principle, significantly enhancing the performance of intelligent sensing sensors in terms of speed, efficiency, timing jitter, and integration density. Additionally, he introduced the Minigap theory through first-principles calculations, which predicted and validated key properties of AlInAsSb digital alloy materials, enabling flexible wavelength adjustment and reducing noise in intelligent sensing sensors.

Overcoming Bandwidth Bottlenecks in Silicon Photonics: Hybrid Silicon-Organic Solutions for the Future of High-Speed Data

Siraj Nour El Ahmadi
Member of the Board-Lightwave Logic, USA

ABSTRACT

As the demand for ultra-high-speed data transmission continues to escalate, silicon photonics as the ideal platform for scalable optical interconnects is now facing performance limits that may not allow it to accommodate the more stringent bandwidth and power constraints demanded by the emerging AI and machine-to-machine applications. This presentation explores the various technology and material alternatives for high speed interconnects with an emphasis on a novel hybrid silicon-organic integration approach that combines the scalability of silicon with the superior electro-optic performance of organic materials. We demonstrate how these hybrid devices can significantly surpass the bandwidth ceilings of conventional silicon photonics, enabling data rates exceeding 200 Gb/s per channel with reduced drive voltages and compact footprints. Key design strategies, fabrication techniques, and experimental results will be presented, along with a discussion of the challenges and opportunities ahead for widespread adoption. This work highlights a critical step toward meeting the performance and efficiency demands of next-generation optical communication systems.

BIOGRAPHY:

Mr. Siraj Nour El-Ahmadi joined the Lightwave Logic Board in October 2013 and currently serves as Chairperson of the Compensation Committee, a Member of the Operations Committee and a Member of the Nominating and Governance Committee. Since 2004, Mr. El-Ahmadi has served as Founder, President and Chief Executive Officer of Menara Networks, a developer of innovative products and solutions that simplify layered optical transport networks. Mr. El-Ahmadi has over 17 years of experience in optical transmission in particular and the telecom industry in general.

On the Efficiency of High-order Harmonic Generation in Attosecond Physics

Ang-YangYu[1]

1. Heilongjiang Agricultural Engineering Vocational College; Harbin, China, 150025

ABSTRACT

For the first time, the interaction between Hydrogen atom and Free-electron lasers (FEL) is simulated. The conversion efficiency of high-order harmonic generation (HHG) can beenhanced by means of two-color free electron laser with frequency multiplication. It is found that the conversion efficiency of HHG is improved to the largest extent when fourth-fold frequency multiplication is introduced into two-color FEL. The microscopic mechanism of improving the efficiency of HHG is analyzed and discussed.

Keywords: Free-electron lasers; High-order harmonic generation; Ionization probability; Wave packet; Attosecond.

Light Trace Photonics

Dr. Dominic A

Sulway CTO and Co-Founder of Light Trace Photonics, UK

ABSTRACT

'Light Trace Photonics is a Bristol-based start-up focused on advancing rapid, low-risk photonic integrated circuit (PIC) development. We have created a cutting-edge pipeline designed to accelerate the development of PIC products, offering comprehensive support through technical feasibility studies, proven component IP, and circuit-on-a-chip evaluation modules. In this talk, I will introduce Light Trace Photonics, share our mission, and highlight the progress we've made so far.'

BIOGRAPHY:

Dr. Dominic A. Sulway is the CTO and Co-Founder of Light Trace Photonics, a Bristol-based start-up developing a range of products and services to facilitate rapid, low-risk photonic integrated circuit (PIC) product development. Dominic is an expert in photonic integrated circuit PIC design, simulation and characterisation, with a wealth of experience in PIC post-processing and packaging, nonlinear optics, quantum optics, and thermo/electro-optics. He received his PhD from the University of Bristol, where he was part of the Quantum Engineering Centre for Doctoral Training. During his PhD, Dominic specialised in the design of integrated photonic components for quantum photonic resource generation in silicon waveguides at an operational wavelength of 2 µm. Post-PhD, he held a Research Associate position at the University of Bristol exploring how to integrate these chip-based quantum photonic systems into cryogenic environments.

UPCOMING EVENT

ISLOP2026

4th International Summit on Lasers, Optics and Photonics

May 25-27, 2026 | Madrid, Spain