34th Newsletter of the ITN:

"NExt Generation of Tuneable LASers for optical coherence tomography"

(NETLAS)

led by University of Kent

APRIL 2023

Congratulations to NETLAS ESR

Philipp Tatar-Mathes for his great achievement!

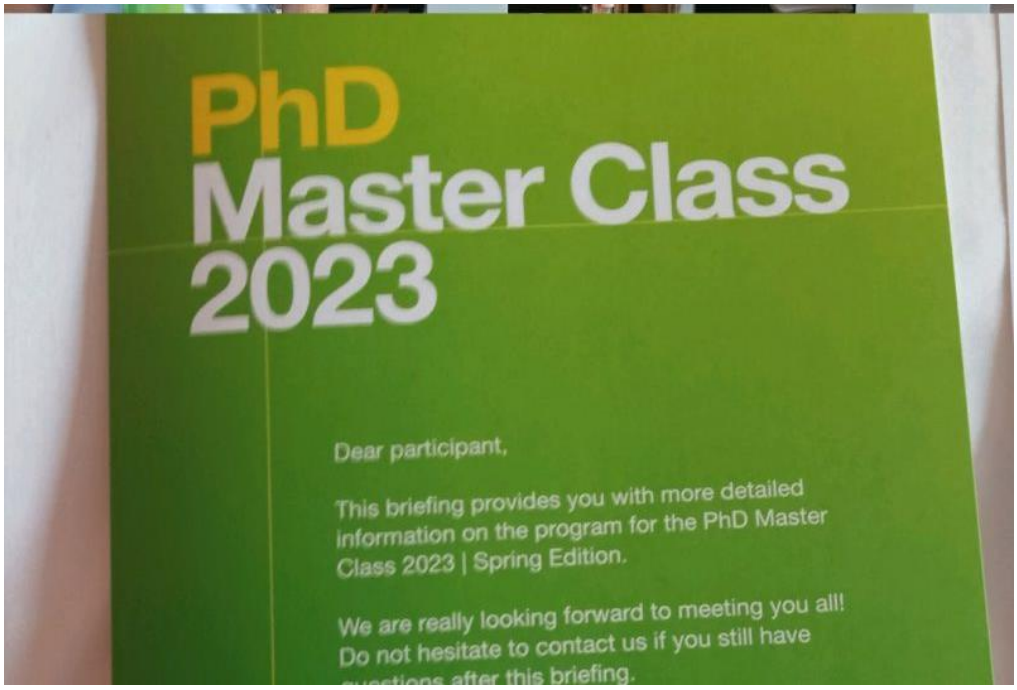
"I am excited to have been considered for **a fantastic PhD Masterclass** at ASML in Eindhoven. Here, I recently had the opportunity to participate in a career event that left me feeling incredibly positive about my professional future. **This is thanks to NETLAS for funding me over the last three years and ORC in Tampere to provide me with a skillset that is otherwise hard to find.** The event provided a platform for me to connect with like-minded individuals and gain valuable insights from industry experts.

Throughout the event, **I was impressed by the level of engagement and the thought-provoking discussions that took place.** It was clear that the organizers had put in a lot of effort to ensure that attendees were able to get the most out of their experience.

As someone who is constantly striving to learn and grow in my career, I found the event to be both informative and inspiring**. I was able to gain new perspectives on industry trends and the challenges they come along with. We were also encouraged to explore new ideas and approaches.**

Overall, **I left the event feeling energized and excited about the opportunities that lie ahead.** I would highly recommend this event to anyone looking to connect with industry professionals and gain valuable insights into their chosen field.

Many thanks to Marjan Flohr and the rest of the organizing team for putting on such a great event!"



@ by Philipp Tatar-Mathes recruited by Tampere University

Congratulations to our NETLAS Associated Partners David (Ted) Garway-Heath and Pearse Keane for being nominated in the Ophthalmologist Power List 2023

Twelve Moorfields Eye Hospital and UCL Institute of Ophthalmology (IoO) staff were named on The Ophthalmologist Power List 2023, a list of the top 100 most influential people in the world of ophthalmology. This **year's theme was ten years of excellence and impact on ophthalmology**, with each nomination highlighting the most influential and inspirational people in the field across the past decade. Judging was against the impact each individual has made across five separate themes. Two Moorfields staff were named in the Power List's top ten, with a total of four in the top 20, recognising them for truly world-leading impact. With twelve names**, the Moorfields and UCL IoO partnership are the most represented institution in the world across the whole list.**

Congratulations to all the staff who feature on the Power List 2023, and to their teams at Moorfields and UCL IoO who have supported their achievements.

[Twelve Moorfields staff honoured in the Ophthalmologist Power List 2023 | Moorfields Eye Hospital NHS Foundation Trust]

AOG Journal Club

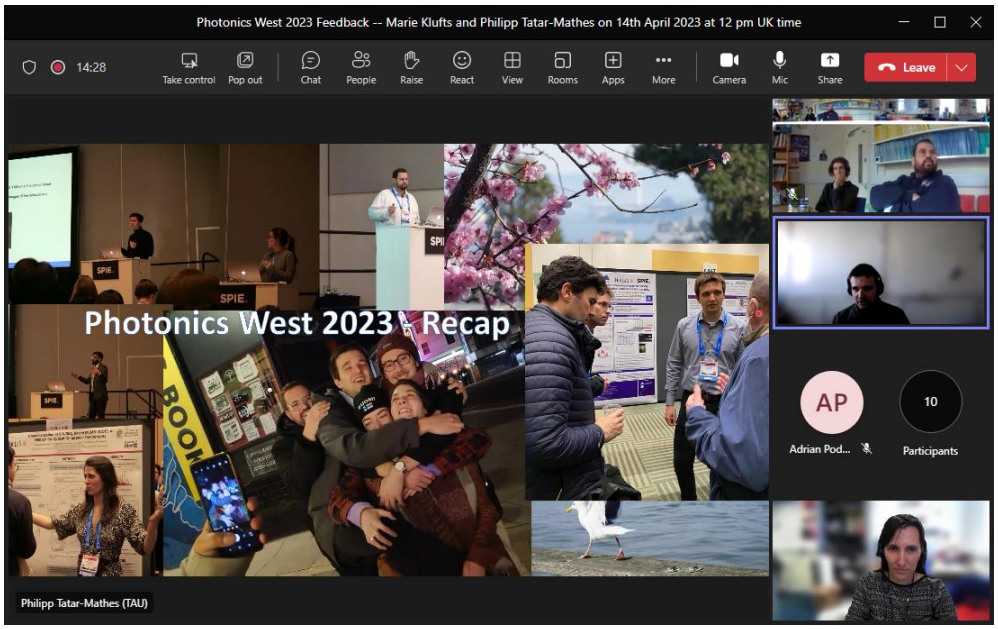
Feedback from the Photonics West 2023 conference in San Francisco
(28 January - 2 February 2023)

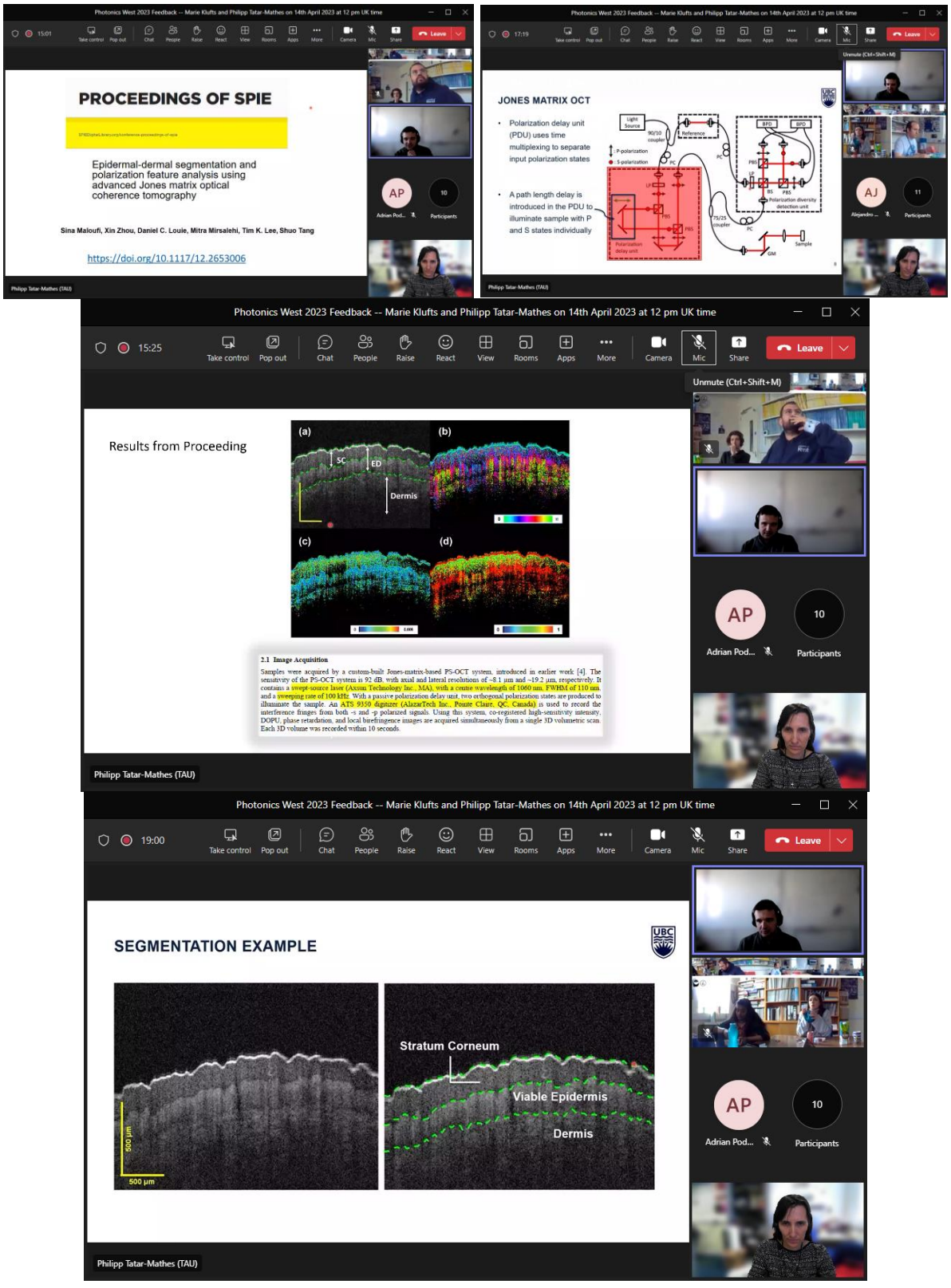
Presentation by NETLAS PhD Student Philipp Mates-Tatar

Friday 14/04/2023 at 12 pm

Philipp presented in a hybrid event a paper from Photonics West 2023 he found very interesting to share with the AOG members entitled "***Epidermal-dermal segmentation and polarization feature analysis using advanced Jones matrix optical coherence tomography***". A few slides from Philipp's presentation are presented below.

Epidermal-dermal segmentation and polarization feature analysis using advanced Jones matrix optical coherence tomography (spiedigitallibrary.org)





Slides from Philipp's presentation

AOG Journal Club

Feedback from the Photonics West 2023 conference in San Francisco
(28 January - 2 February 2023)

Presentation by NETLAS PhD Student Marie Klufts

Friday 14/04/2023 at 12 pm

Marie presented highlights from Photonics West 2023 from **five presentations** (links below) in an hybrid event. The event was very well received by the AOG members and other NETLAS PhD Students. Slides from Marie's presentation are presented below.

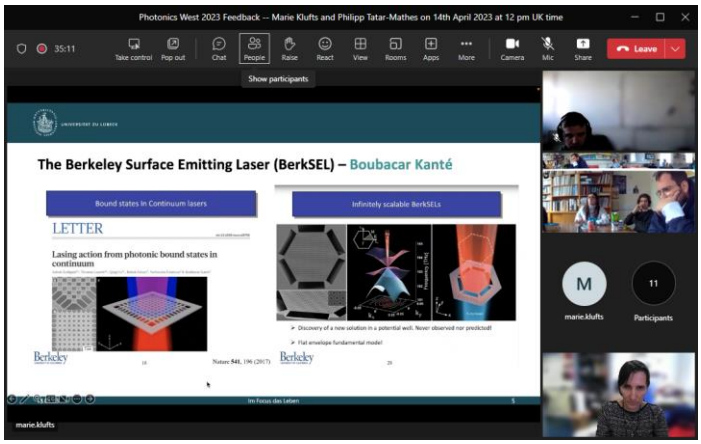
The Berkeley Surface Emitting Laser (BerkSEL) (spiedigitallibrary.org)

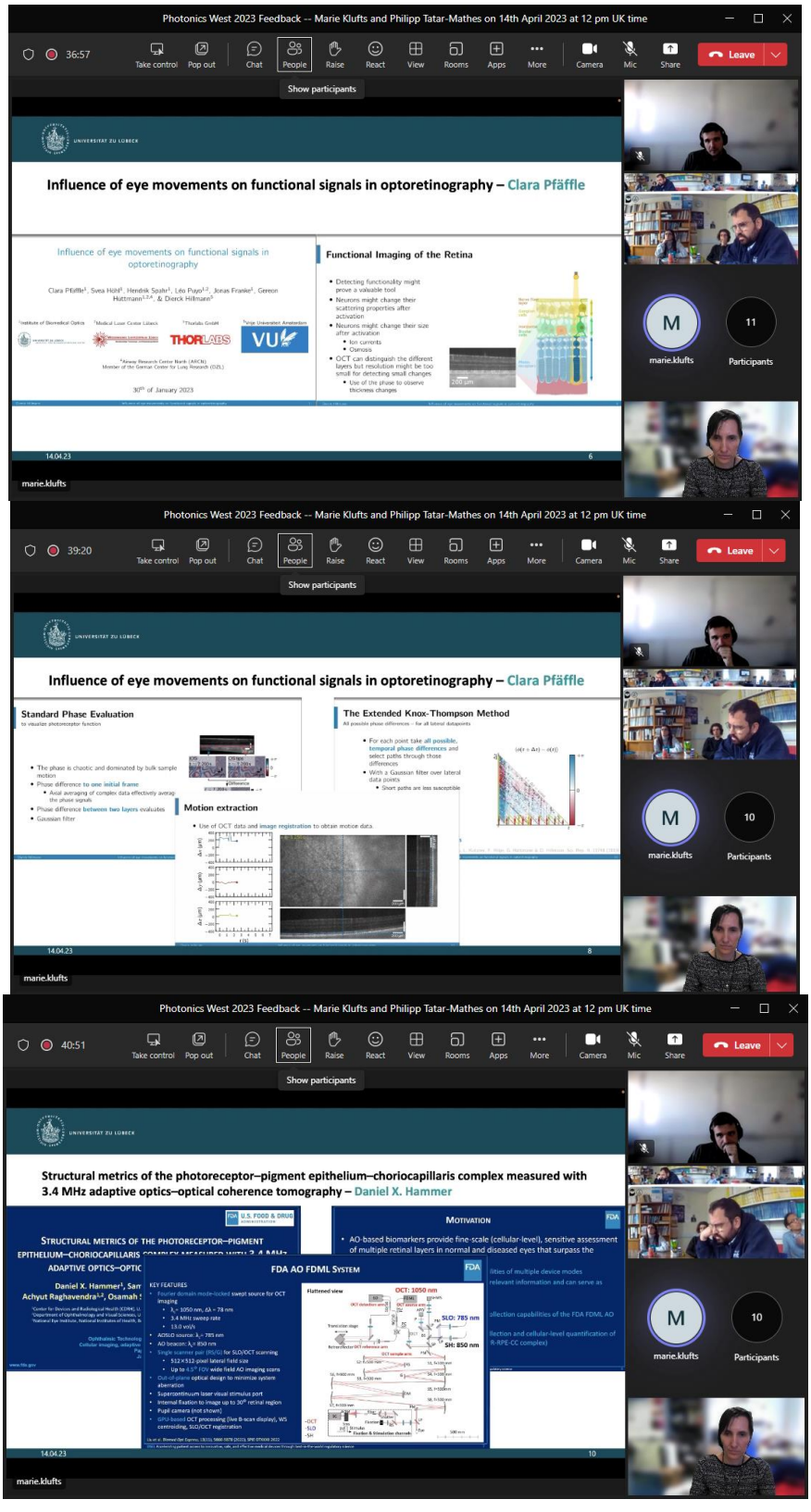
Influence of eye movements on functional signals in optoretinography (spiedigitallibrary.org)

Structural metrics of the photoreceptor–pigment epithelium–choriocapillaris complex measured with 3.4 MHz adaptive optics–optical coherence tomography (spiedigitallibrary.org)

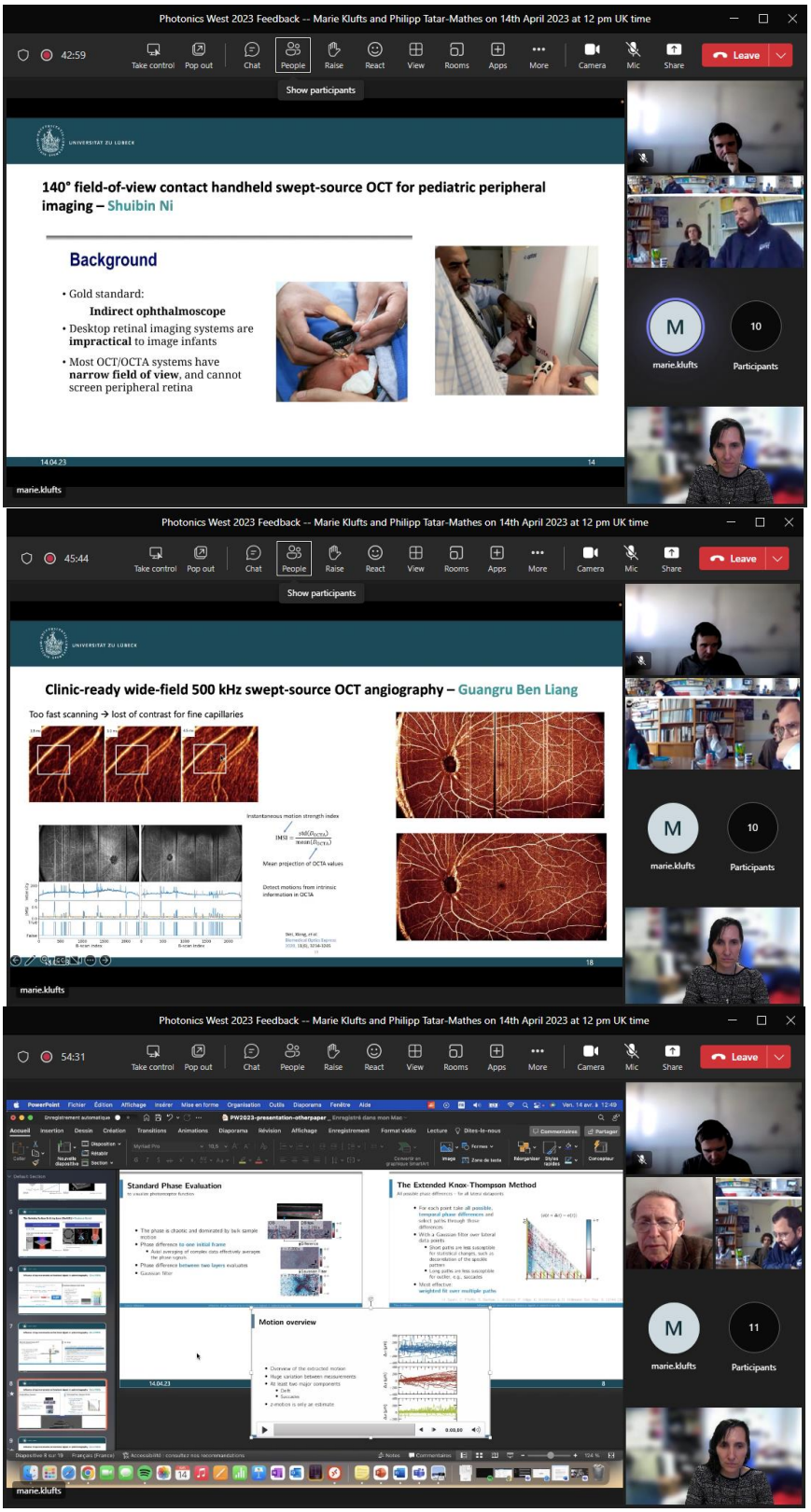
140° field-of-view contact handheld swept-source OCT for pediatric peripheral imaging (spiedigitallibrary.org)

Clinic-ready wide-field 500 kHz swept-source OCT angiography (spiedigitallibrary.org)





Slides from Marie's presentation



Slides from Marie's presentation

AOG Journal Club

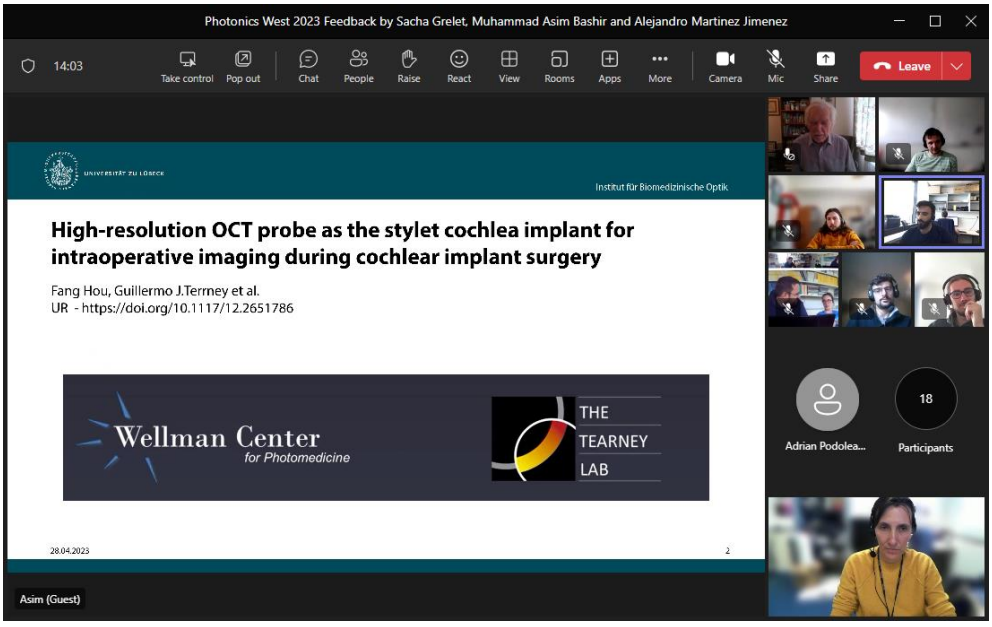
Feedback from the Photonics West 2023 conference in San Francisco
(28 January - 2 February 2023)

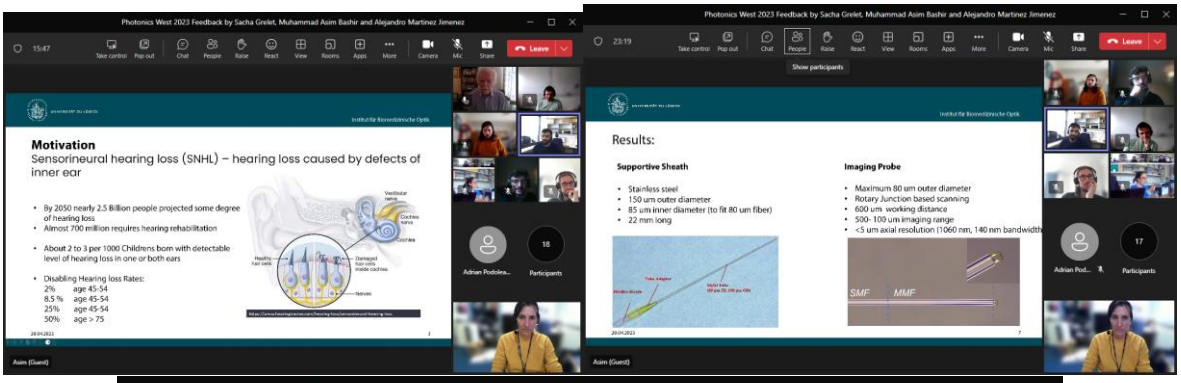
Presentation by Muhammad Asim Bashir

Friday 28/04/2023 at 12 pm

Asim presented in a hybrid event a paper from Photonics West 2023 he found very interesting to share with the AOG members entitled "***High-resolution OCT probe as the stylet cohlea implant for intraoperative imaging during cochlear implant surgery***" (link below). A few slides from Asim's presentation are presented below.

High-resolution OCT probe as the stylet of cochlea implant for intraoperative imaging during the cochlear implant surgery| Hou | Publications | Spie





Slides from Asim's presentation

AOG Journal Club

Feedback from the Photonics West 2023 conference in San Francisco
(28 January - 2 February 2023)

Presentation by Sacha Grelet

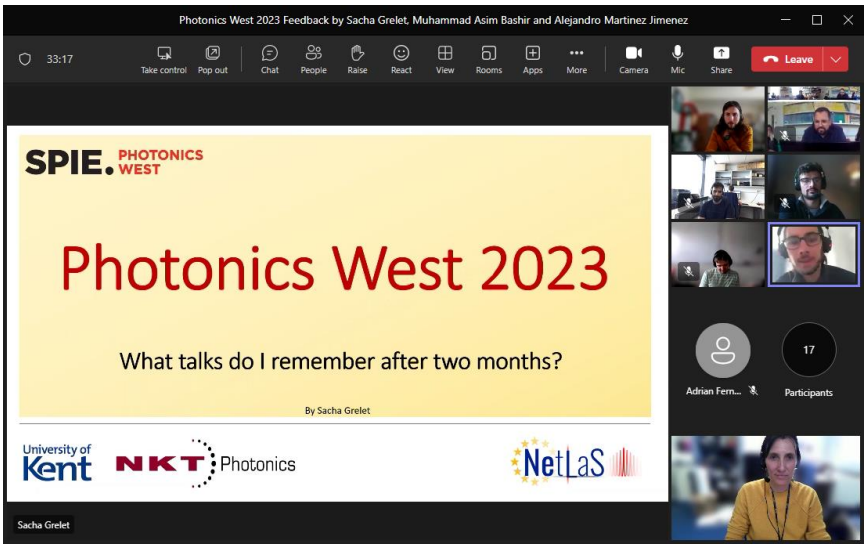
Friday 28/04/2023 at 12 pm

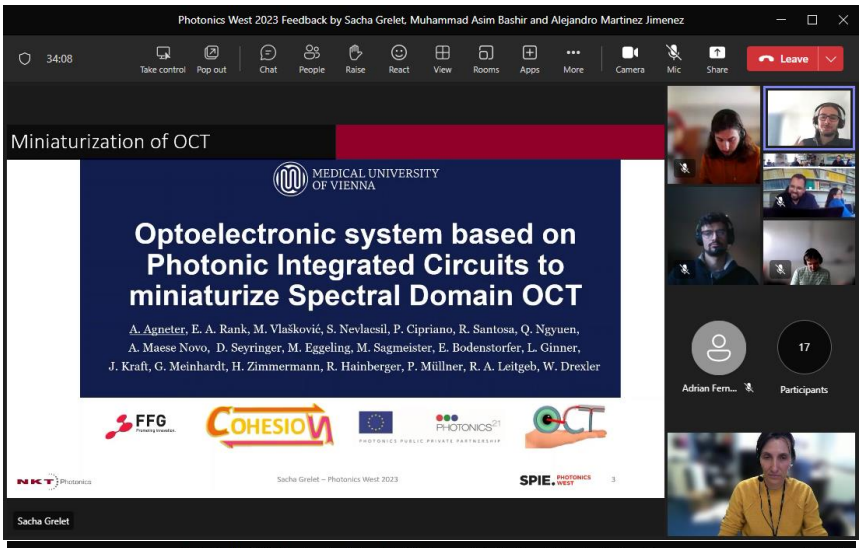
Sacha presented highlights from Photonics West 2023 from **three presentations** (links below) in an hybrid event. The event was very well received by the AOG members and other NETLAS PhD Students. Slides from Sacha's presentation are presented below.

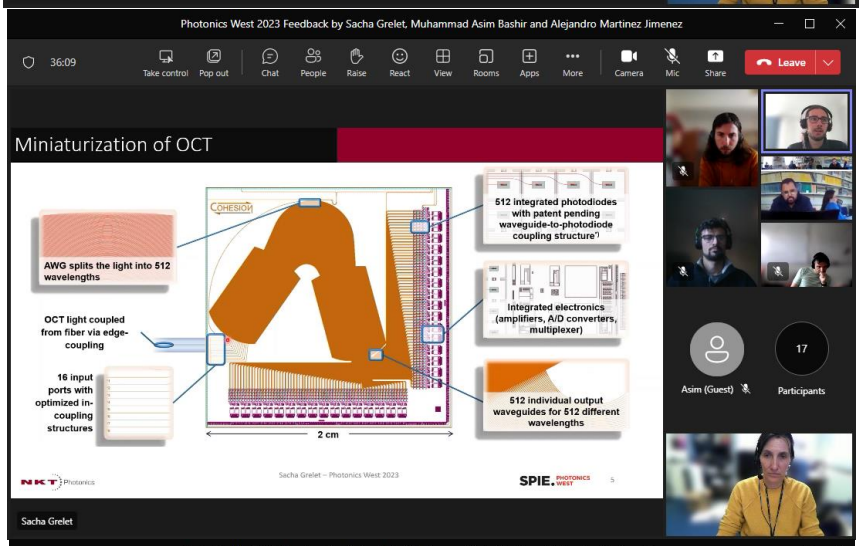
Optoelectronic system based on photonic integrated circuits to miniaturize spectral domain OCT| Agneter | Publications | Spie

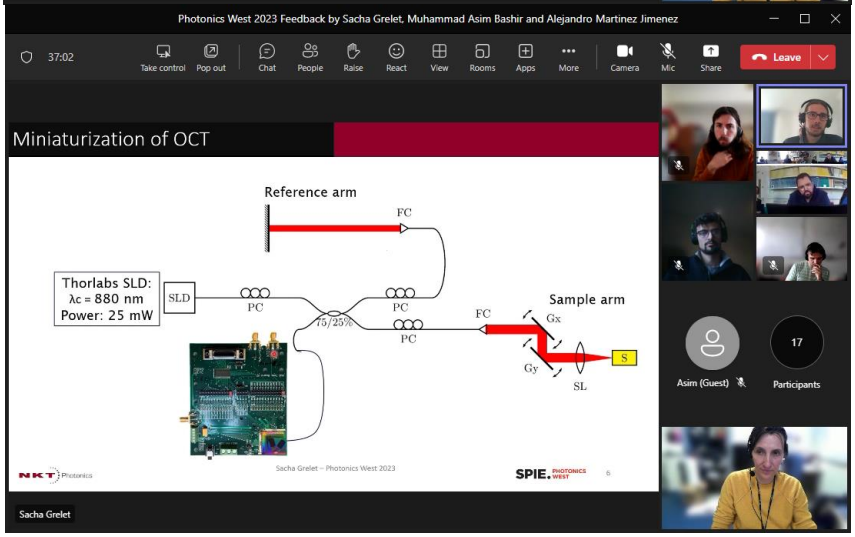
Multi-molecular super resolution metabolic imaging in aging and diseases (Conference Presentation) (spiedigitallibrary.org)

Compact ultra-fast pulse modulation device based on rotated chirped volume Bragg gratings (spiedigitallibrary.org)

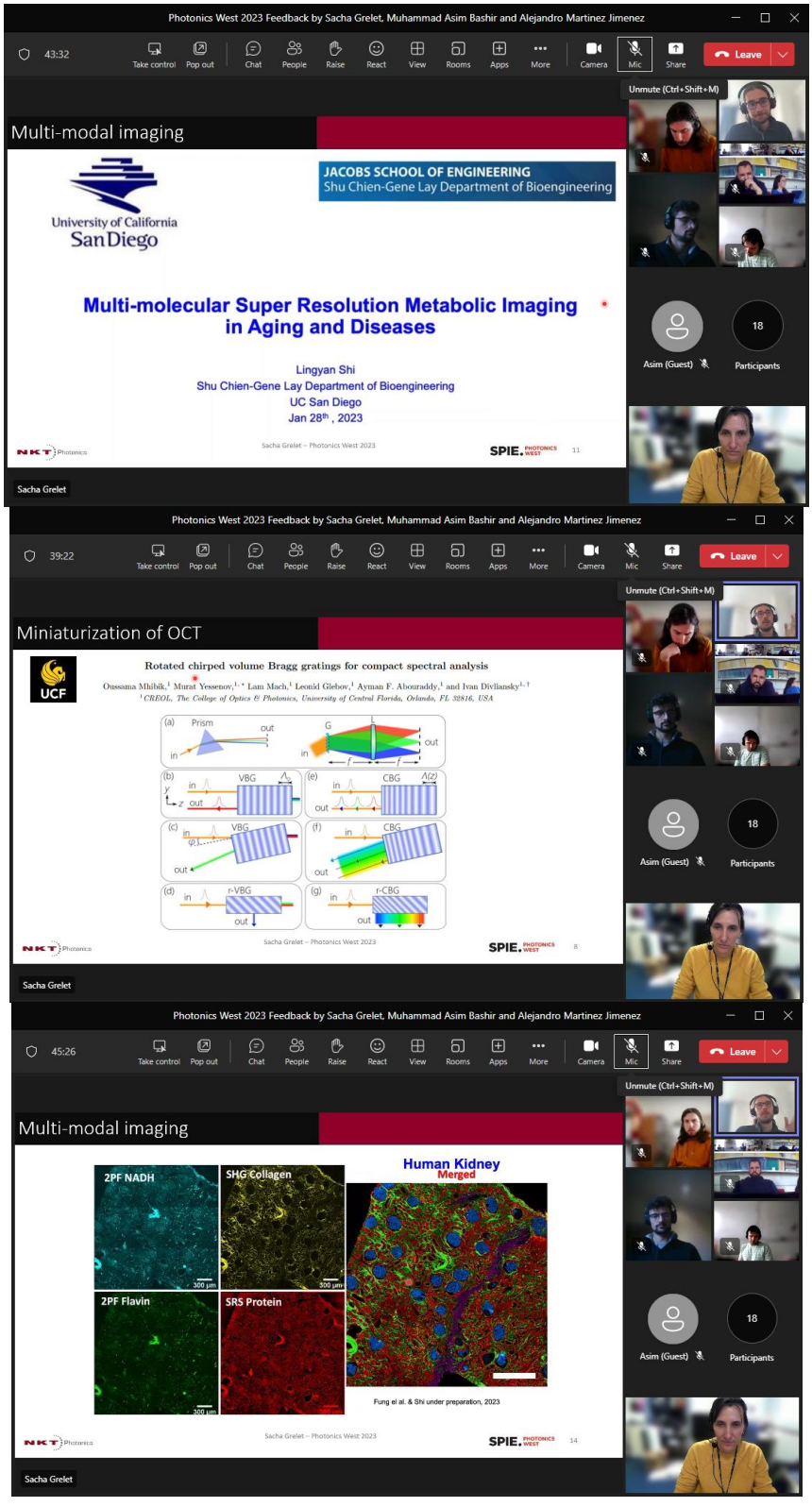








Slides from Sacha's presentation



Slides from Sacha's presentation

AOG Journal Club

Feedback from the Photonics West 2023 conference in San Francisco
(28 January - 2 February 2023)

Presentation by Alejandro Martinez Jimenez

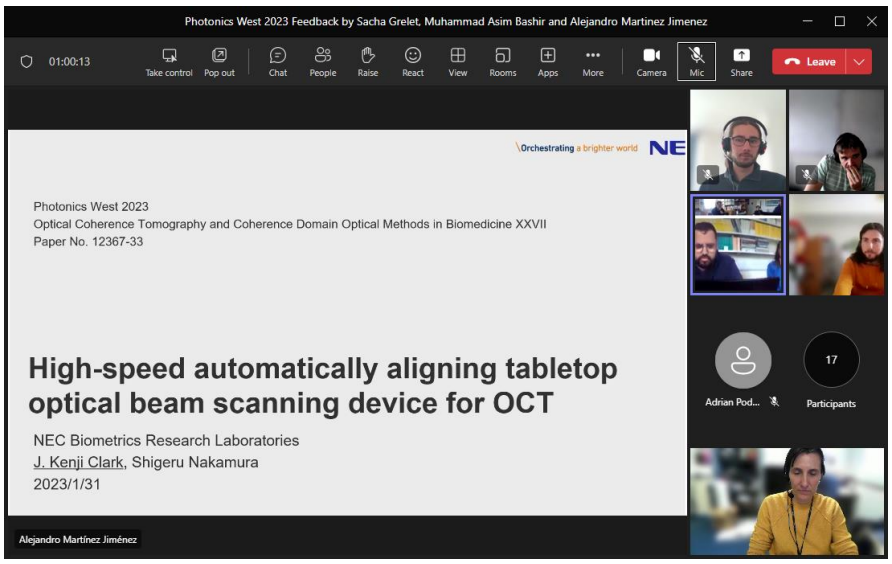
Friday 28/04/2023 at 12 pm

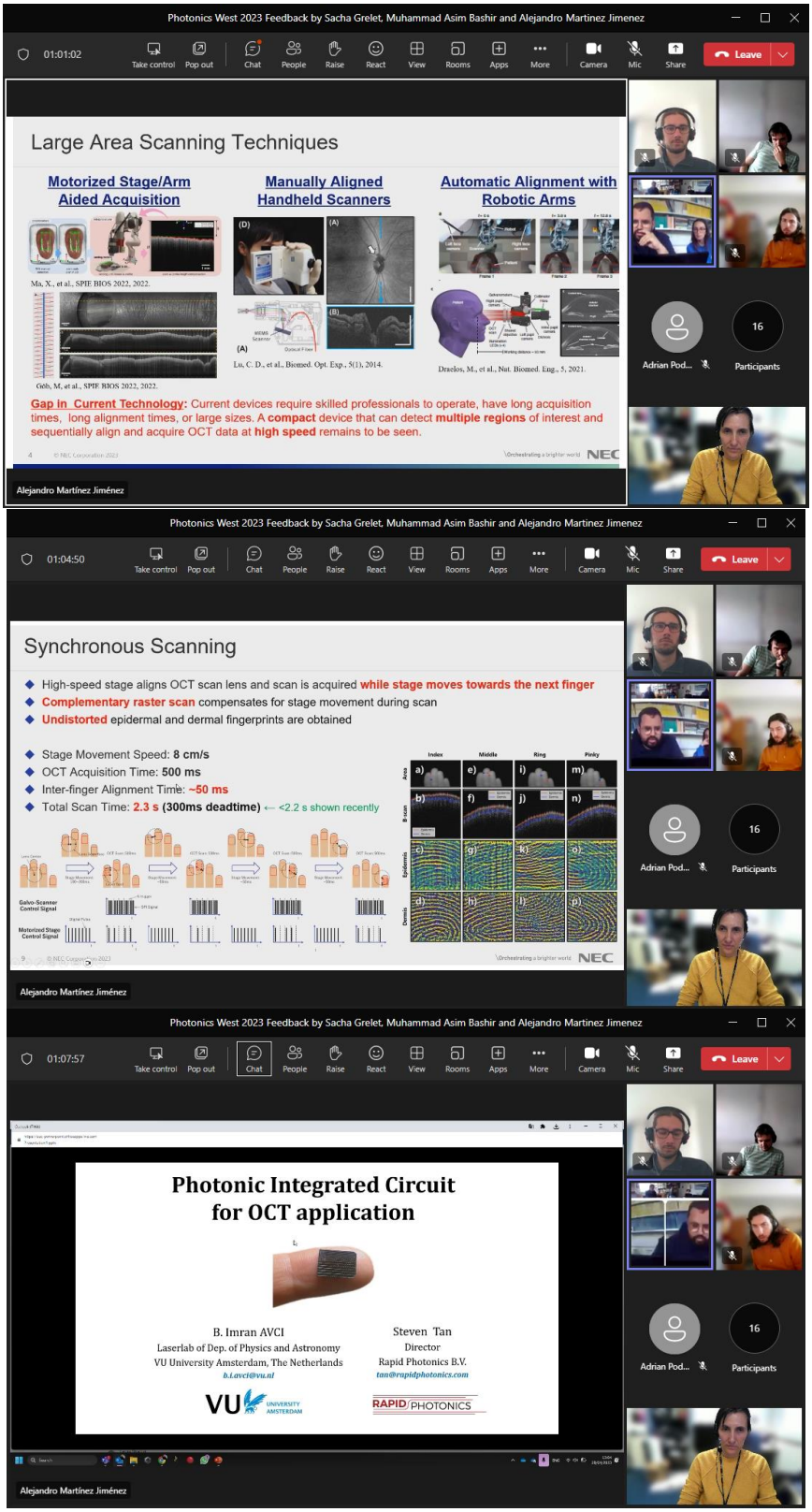
Alejandro presented highlights from Photonics West 2023 from **three presentations** (links below) in an hybrid event. The event was very well received by the AOG members and other NETLAS PhD Students. Slides from Alejandro's presentation are presented below.

High-speed automatically aligning tabletop optical beam scanning device for OCT | (2023) | Clark | Publications | Spie

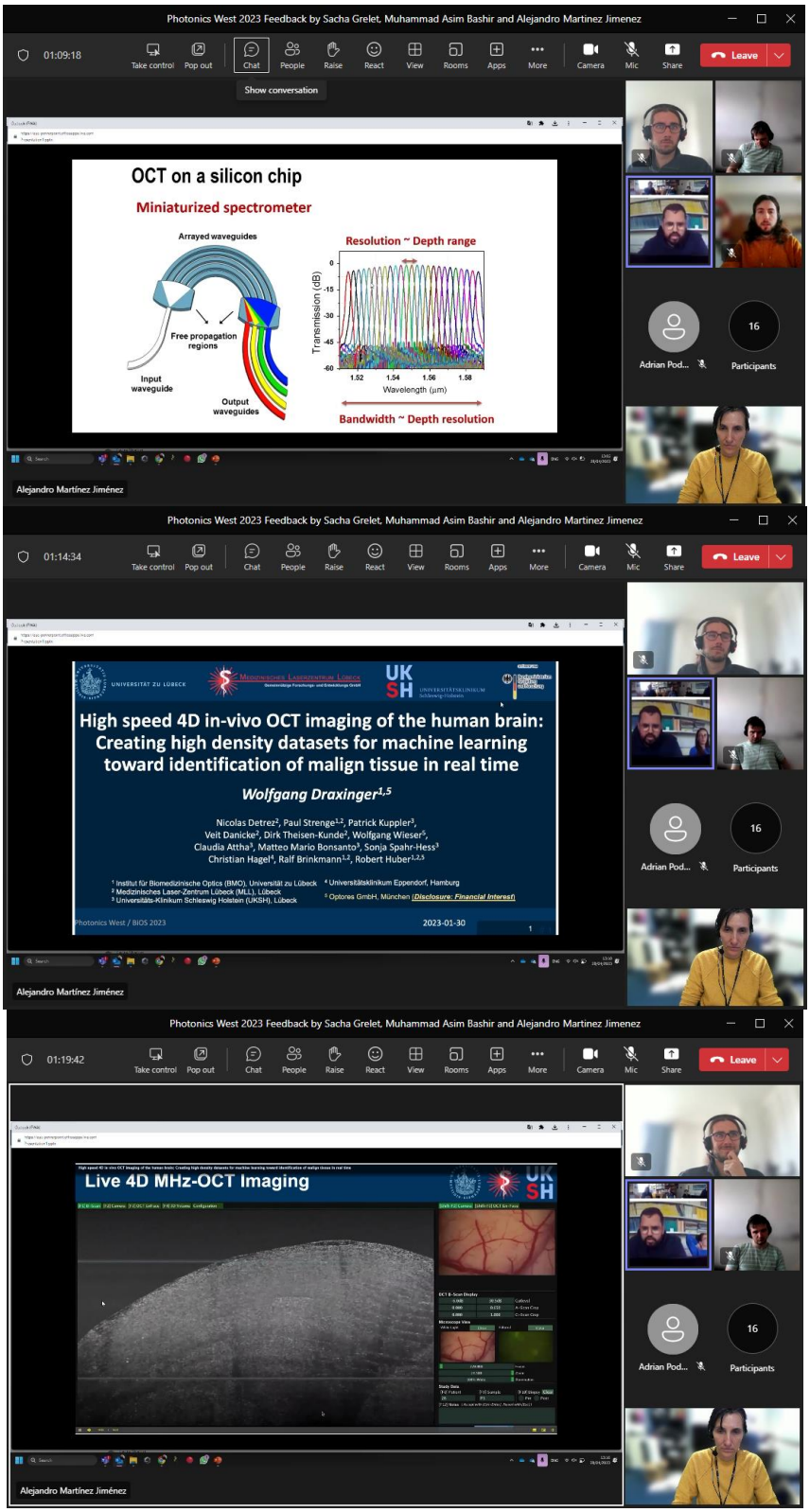
Photonic integrated circuit for OCT applications (spiedigitallibrary.org)

High speed 4D in-vivo OCT imaging of the human brain: creating high density datasets for machine learning toward identification of malign tissue in real time | (2023) | Draxinger | Publications | Spie





Slides from Alejandro's presentation



Slides from Alejandro's presentation

Many thanks to all NETLAS ESRs Marie Klufts, Alejandro Martínez Jiménez, Rene Riha, Irene Lamoso, Asim Bashir, Esteban Proano, Sacha Grelet and Philipp Tatar-Mathes for sharing with their colleagues and AOG members interesting presentations they witnessed at the Photonics West Conference, San Francisco, 28 January - 2 February 2023!

AOG Seminar

12th April 2023, 2 pm Ingram Building, LT

By Assistant Prof. Sam Van der Jeught

Sam Van der Jeught was born in Antwerp, Belgium, in 1987. He graduated as master in Physics in 2010 from the University of Antwerp, where he researched new ways of accelerating the digital signal processing algorithms **involved in optical coherence tomography in a joint collaboration between the Laboratory of Biomedical Physics (BIMEF) and the University of Kent, UK**. As a Marie Curie fellow, **he was able to work at the Applied Optics Group (AOG) at the University of Kent for a period of ten months.** He received his degree of PhD in Science: Physics in 2015 at the University of Antwerp for the dissertation entitled ***"Optical techniques for real-time morphology measurement of the tympanic membrane***". He is currently researching new optical methods for measuring human eardrum shape in real-time and in-vivo as a tenure-track assistant professor at the University of Antwerp within the Faculty of Applied Sciences (InViLab).

Title of Sam's presentation: *Optical techniques for real-time morphology measurement of the human eardrum*

Abstract: The eardrum is the first component in the complicated mechanical system of the middle ear. To fully understand the functioning of the human hearing organ, and to optimize ossicular prostheses and middle ear implants, highly realistic computer models of the middle ear system are being developed. As input for such models, accurate geometric data of the eardrum are needed. In addition, the ear transports sound energy whilst dealing with large quasi-static pressure variations. Therefore, models need to be validated in this low-frequency high-pressure regime, especially since these large displacements form a particular problem in middle ear prosthesis design. Much research on in-vitro samples has already been performed in this area, but a technique to measure full-field deformation of the human eardrum has been missing. In this talk, we present several non-contact optical measurement techniques to measure real-time three-dimensional eardrum deformation.

Photos from Sam's presentation will follow below.

Photos from Sam's presentation @by Dr Ramona Cernat (top photos) & Prof. Adrian Podoleanu (last photo)

[Visit (and talk) by Dr Sam Van der Jeught - Applied Optics Group - Research at Kent]

PUBLICATIONS

Surgical polarimetric endoscopy for the detection of laryngeal cancer

Ji Qi, **Taranjit Tatla**, Eranga Nissanka-Jayasuriya, Alan Yilun Yuan, Danail Stoyanov & Daniel S. Elson

Nat. Biomed. Eng (2023).
https://doi.org/10.1038/s41551-023-01018-0

The standard-of-care for the detection of laryngeal pathologies involves distinguishing suspicious lesions from surrounding healthy tissue via contrasts in colour and texture captured by white-light endoscopy. However, the technique is insufficiently sensitive and thus leads to unsatisfactory rates of false negatives. **Here we show that laryngeal lesions can be better detected in real time by taking advantage of differences in the light-polarization properties of cancer and healthy tissues. By measuring differences in polarized-light retardance and depolarization,** the technique, which we named '**surgical polarimetric endoscopy'** (SPE), **generates about one-order-of-magnitude greater contrast than white-light endoscopy**, and hence allows for the better discrimination of cancerous lesions, as we show with patients diagnosed with squamous cell carcinoma. **Polarimetric imaging of excised and stained slices of laryngeal tissue indicated that changes in the retardance of polarized light can be largely attributed to architectural features of the tissue**. We also assessed SPE to aid routine transoral laser surgery for the removal of a cancerous lesion, indicating that SPE can complement white-light endoscopy for the detection of laryngeal cancer. Read More

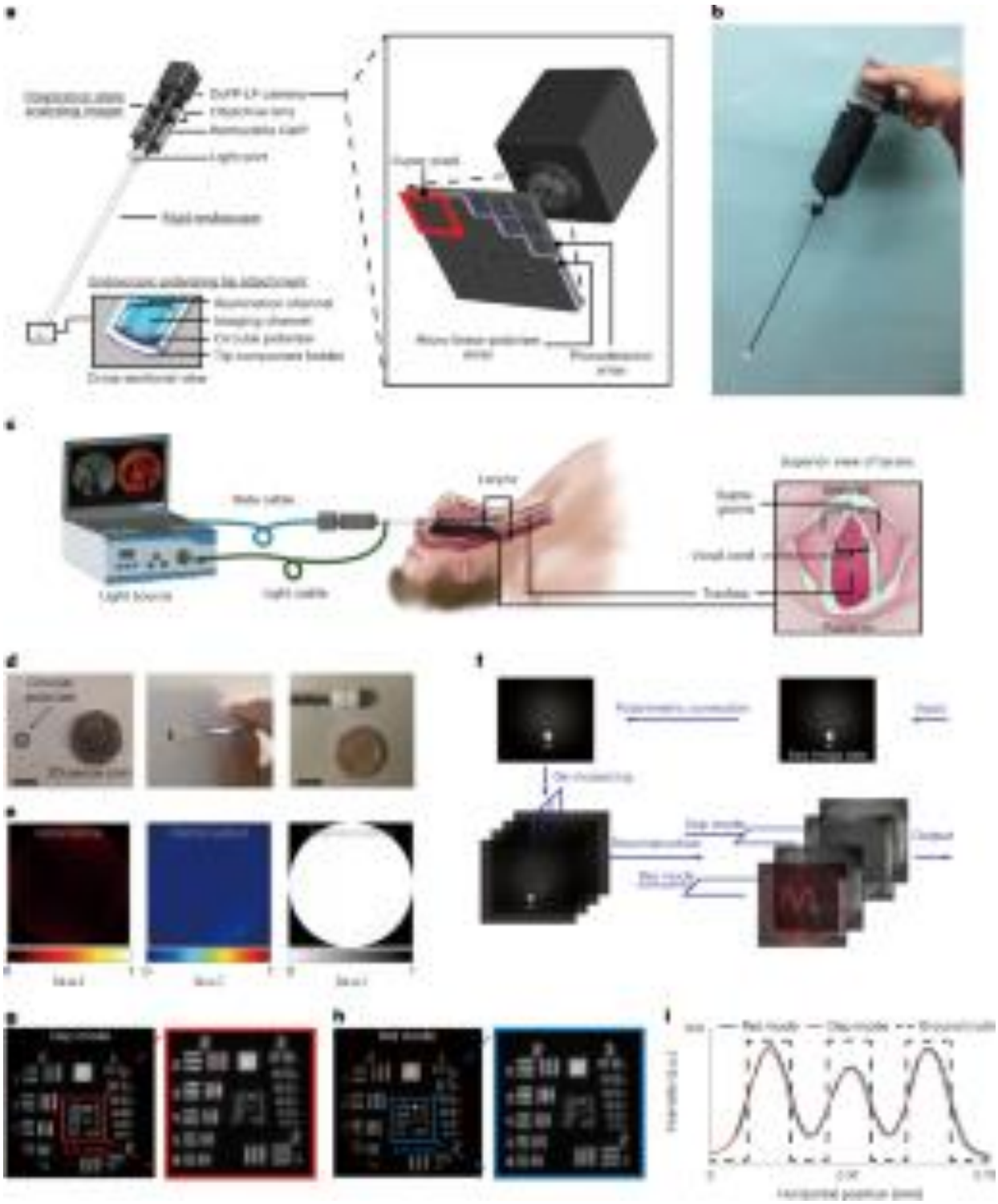


Fig1 The SPE system

Bragg Gratings in ZEONEX Microstructured Polymer Optical Fiber With 266 nm Nd:YAG Laser

L. Pereira *et al*. Ole Bang *et al*.

IEEE Sensors Journal PP(99), March 2023

DOI:10.1109/JSEN.2023.3259546

We present the first fiber Bragg gratings inscription in ZEONEX-480R microstructured polymer optical fiber by employing the fourth harmonic (266 nm) of a Nd:YAG laser system. The gratings were produced in the L-band region by the phase mask method, in 270 μm diameter polymer optical fiber samples connectorized with ferrule connectors. The results of 3 produced gratings are reported, showing good stability over 99 days. The sensing response to strain, temperature and humidity was analyzed and confirmed the good stability and performance of the inscribed gratings in this polymer fiber. These results are promising from the point of view that gratings can be produced in ZEONEX-480R microstructured polymer optical fiber with the 266 nm wavelength, which is an alternative and viable cost-effective solution. Read More

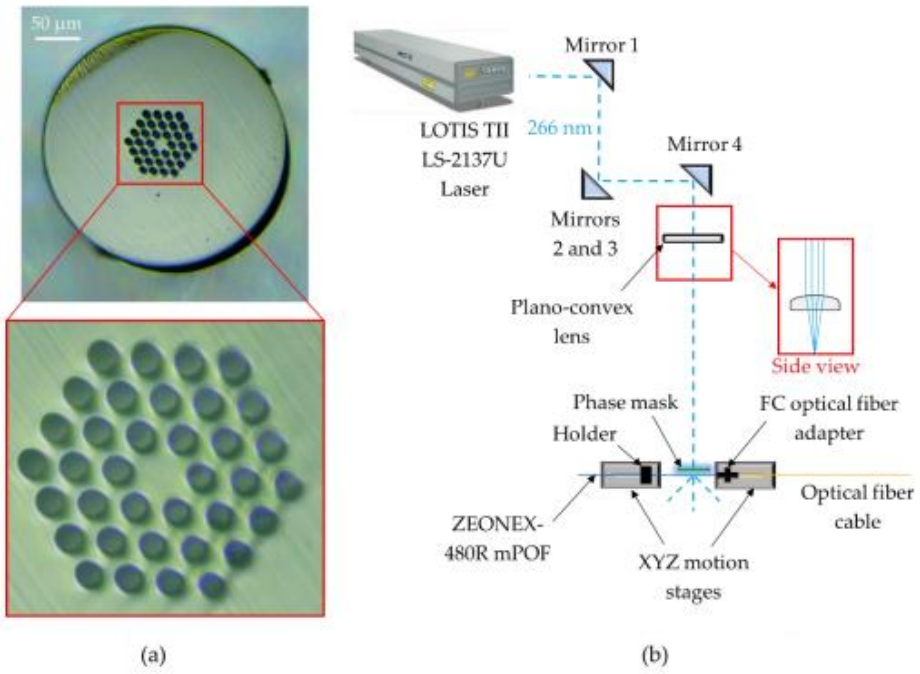


Fig. 1. (a) Cross-section of the ZEONEX-480R mPOF, detailing the 3-rings hexagonal hole structure, (b) POFBG inscription setup (view from above)

Mid-IR Supercontinuum Noise Reduction Using a Short Piece of Normal Dispersion Fiber - A General Mechanism

Hansen, Rasmus & Smith, Callum & Moltke, Asbjørn & Petersen, Christian & Raghuraman, Sidharthan & Yoo, Seongwoo & Bang, Ole

Laser & Photonics Review, April 2023

DOI:10.1002/lpor.202200776,

Mid-infrared (IR) supercontinuum (SC) lasers are important in applications such as pollution detection, stand-off detection, and non-destructive testing. The performance in many applications is limited by the noise level of the supercontinuum laser. High noise typically results in low sensitivities or a need for long integration times. In this paper, a simple technique to reduce the noise of high noise soliton-based SC sources is introduced by adding a short piece of normal dispersion fiber to force the spectrally distributed solitons to spectrally broaden through self-phase modulation and thereby overlap to average out the noise. Read More

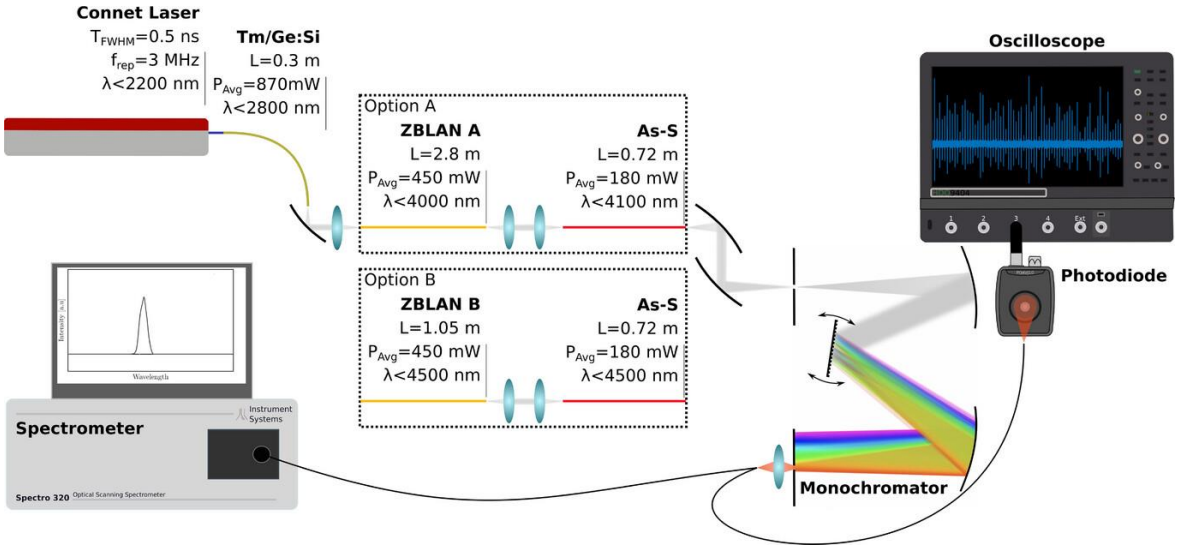


Figure 2: The experimental setup. The supercontinuum cascade is initiated by a pulsed Connet Laser module, and a Tm/Ge doped silica fiber. The remaining cascade either consists of ZBLAN fiber A or ZBLAN fiber B, followed by the As-S fiber. A Czerny–Turner type monochromator spectrally filters the light, that is subsequently measured by a photodiode, to measure the noise or a spectrometer to measure the center wavelength and spectral width at each setting on the monochromator.

An Overview of Anterior Segment OCT

By Sharon Keh, OD, Irene Frantzis, OD and Yana Seviaryn, OD

A recent article by Keh et al., published in Review of Optometry, gives a device-independent overview of anterior segment OCT and how it can serve as a valuable, adjunctive tool in the diagnosis and monitoring anterior segment abnormalities. It discusses the virtues and shortcomings of its clinical applications in angle assessment, corneal disease, and contact lens fitting, in addition to highlighting why this technology has earned its rightful place in the optometric practice. Read More

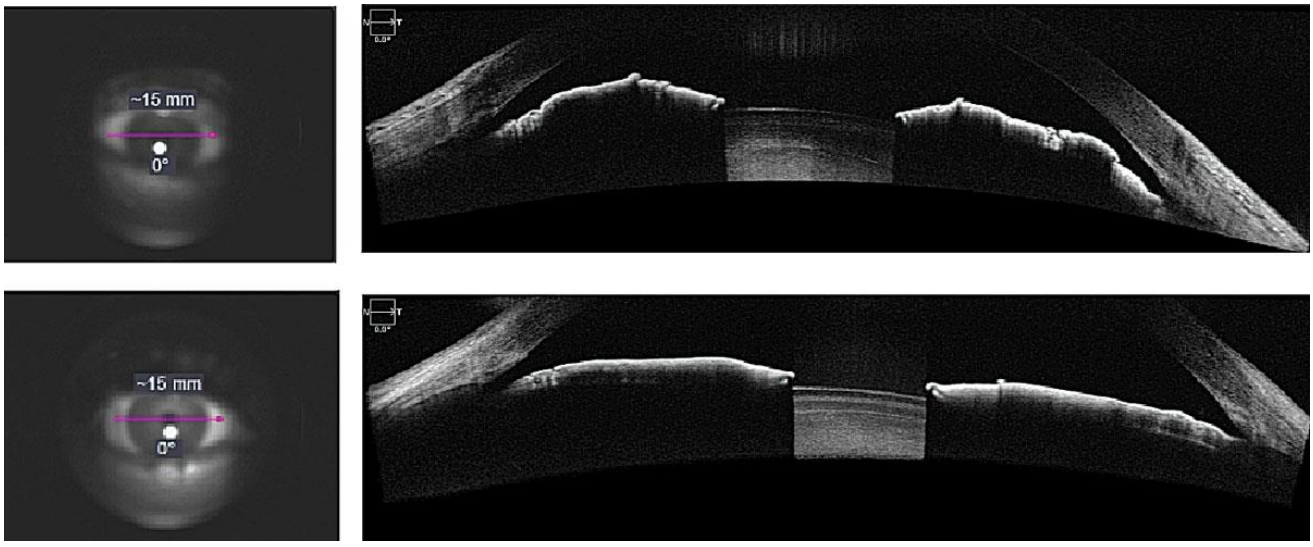


Fig. 1. AS-OCT evaluation of narrow angle (top) and open angle (bottom) using anterior segment angle-to-angle scans.

An Overview of Anterior Segment OCT (reviewofoptometry.com)

Fluid compartments influence elastography of the aging mouse brain

Gary R Ge, J**annick P Rolland** Wei Song, Maiken Nedergaard, Kevin J Parker

Phys Med Biol, 2023

doi: 10.1088/1361-6560/acc922

Elastography of the brain has the potential to reveal subtle but clinically important changes in the structure and composition as a function of age, disease, and injury.

Approach: In order to quantify the specific effects of aging on mouse brain elastography, and to determine the key factors influencing observed changes, we applied optical coherence tomography reverberant shear wave elastography at 2000 Hz to a group of wild-type healthy mice ranging from young to old age.

Main Results: We found a strong trend towards increasing stiffness with age, with an approximately 30% increase in shear wave speed from 2 months to 30 months within this sampled group. Furthermore, this appears to be strongly correlated with decreasing measures of whole brain fluid content, so older brains have less water and are stiffer. Rheological models are applied, and the strong effect is captured by specific assignment of changes to the glymphatic compartment of the brain fluid structures along with a correlated change in the parenchymal stiffness.

Significance: Short-term and longer-term changes in elastography measures may provide a sensitive biomarker of progressive and fine-scale changes in the glymphatic fluid channels and parenchymal components of the brain.

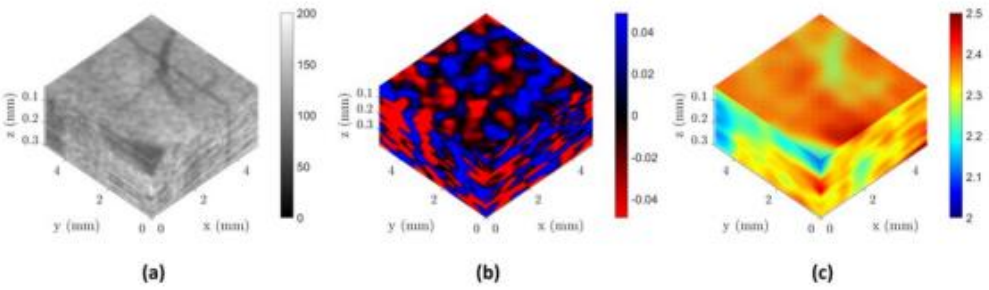


Figure 1. An example of elastography in the mouse brain using 2000 Hz reverberant shear waves. (a) 3D data set from the OCT scan of the anterior cortical brain (top)with a resolved blood vessel under the intact dura mater.(b)Instantaneous displacement patterns within the reverberant shear wave field, with red and blue colors indicating the direction positive or negative of the displacements. (c) Estimated SWSs within the 3D volume with some spatial variation corresponding to proximity to the blood vessel. Colorbar units are arbitrary grayscale in (a), arbitrary phase displacement in (b), and in m s−1 in (c).

Reliability of Retinal Layer Annotation with a Novel, High-Resolution Optical Coherence Tomography Device: A Comparative Study

Leon von der Emde, Marlene Saßmannshausen, Olivier Morelle, Geena Rennen, Frank G. Holz, Maximilian W. M. Wintergerst, and Thomas Ach

Optical coherence tomography (OCT) enables in vivo diagnostics of individual retinal layers in the living human eye. However, **improved imaging resolution could aid diagnosis and monitoring of retinal diseases and identify potential new imaging biomarkers.** The investigational high-resolution OCT platform (High-Res OCT; 853 nm central wavelength, 3 µm axial-resolution) has an improved axial resolution by shifting the central wavelength and increasing the light source bandwidth compared to a conventional OCT device (880 nm central wavelength, 7 µm axial-resolution**). To assess the possible benefit of a higher resolution**, **we compared the retest reliability of retinal layer annotation from conventional and High-Res OCT, evaluated the use of High-Res OCT in patients with age-related macular degeneration (AMD), and assessed differences of both devices on subjective image quality.**

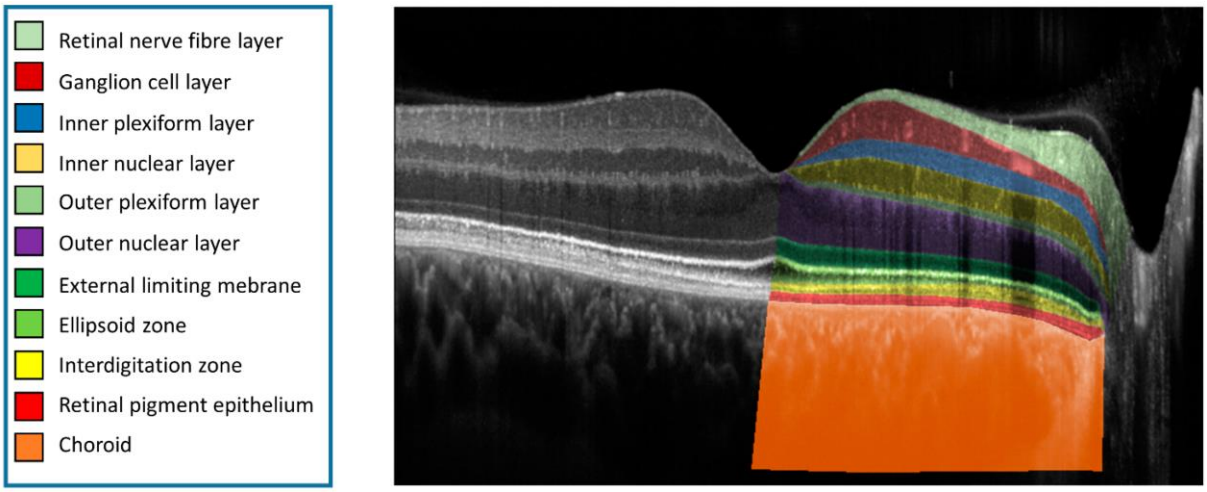


Figure 1: OCT Layer Annotation. Eleven different layers (from retina and choroid), annotated and color-coded on a central B-scan from a High-Res OCT image. The right eye of a 28-year-old male control participant (best corrected visual acuity of 1.0)

Read More on Bioengineering | Free Full-Text | Reliability of Retinal Layer Annotation with a Novel, High-Resolution Optical Coherence Tomography Device: A Comparative Study (mdpi.com)

Development of polarization-sensitive optical coherence tomography imaging platform and metrics to quantify electrostimulation-induced peripheral nerve injury *in vivo* in a small animal model

Guillermo L. Monroy, at all.

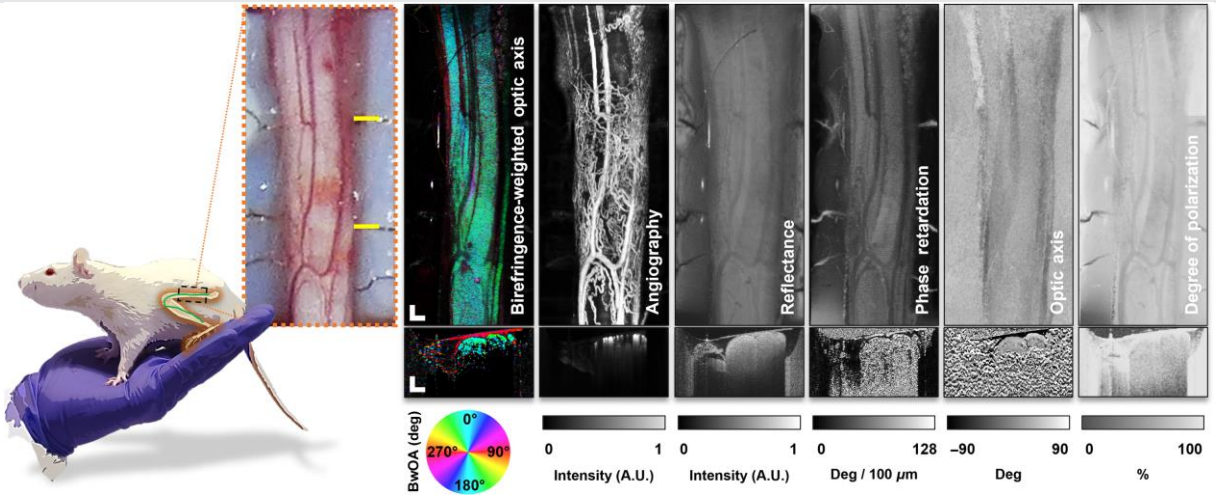
Neurophotonics, Vol. 10, Issue 2, 025004 (April 2023).

https://doi.org/10.1117/1.NPh.10.2.025004

AIM: We aim to demonstrate an imaging and stimulation platform that can elucidate the biological mechanisms and impacts of neurostimulation in the PNS and apply it to the sciatic nerve to extract imaging metrics indicating electrical overstimulation.

Conclusions

The poststimulation changes observed in our study are manifestations of nerve injury and repair, specifically degeneration and angiogenesis. Optical imaging metrics quantify these processes and may help evaluate the safety and efficacy of neuromodulation devices.



Platform output: processed PSOCT data, animal #2: SC, D7. Representative data from a rat sciatic nerve as observed in this study of the six data channels captured. *En face* representations and cross-sectional scans for each channel are shown. BwOA, birefringence-weighted optic axis. Scale bar: 500μm

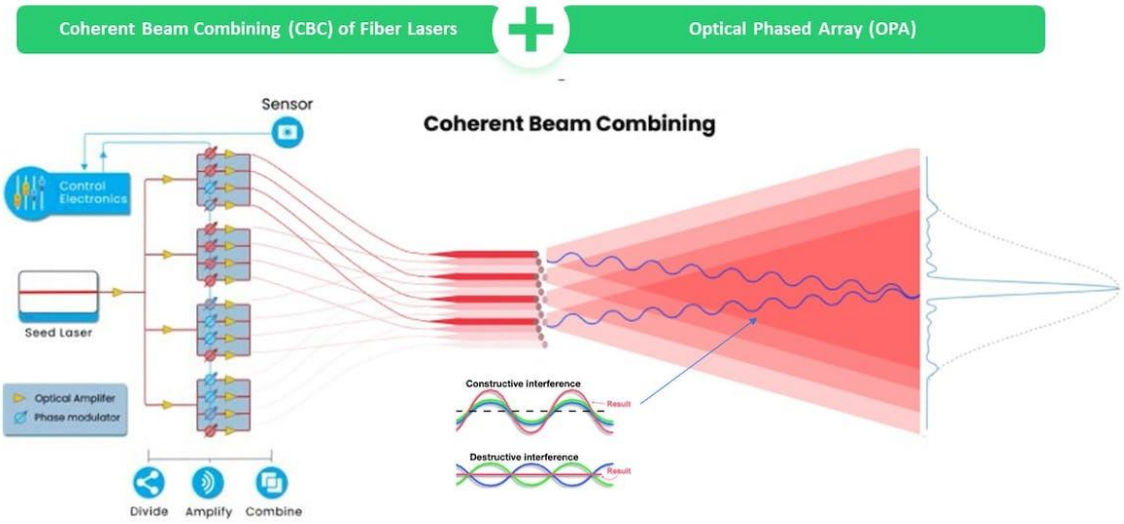
Galvo scanners and dynamic beam lasers

Combining galvo scanners and dynamic beam lasers provides advancements in laser welding needed to increase feed rates for e-mobility welding applications.

In today's world of manufacturing, speed is a key factor in producing new products. This is where galvo scanners come into play, providing a common method for laser welding and metal additive manufacturing. These scanners allow the laser beam to move in high feed rates and complex geometries, providing manufacturers with greater flexibility and control over their manufacturing processes. **Galvo scanners are widely used in various areas of manufacturing, including the automotive industry.**

To ensure high-quality output, **galvo scanners are often combined with sensors to monitor weld quality.** This provides manufacturers with the ability to quickly identify and correct any issues in the manufacturing process, reduce waste, and increase productivity.

However, **galvo scanners require the mechanical movement of lenses to maintain the correct focus position and complex optics to maintain the inclination angle.** This complexity can make it difficult for manufacturers to use the technology to its full potential.



Read More on [Galvo scanners and dynamic beam lasers | Laser Focus World]

Directional Connectivity-based Segmentation of Medical Images

Z. Yang and S. Farsiu,

Computer Vision and Pattern Recognition Conference, *CVPR, 2023*.

Anatomical consistency in biomarker segmentation is crucial for many medical image analysis tasks. A promising paradigm for achieving anatomically consistent segmentation via deep networks is incorporating pixel connectivity, a basic concept in digital topology, to model inter-pixel relationships. However, previous works on connectivity modeling have ignored the rich channel-wise directional information in the latent space. In this work, we demonstrate that effective disentanglement of directional sub-space from the shared latent space can significantly enhance the feature representation in the connectivitybased network. To this end, **we propose a directional connectivity modeling scheme for segmentation that decouples, tracks, and utilizes the directional information across the network. Experiments on various public medical image segmentation benchmarks show the effectiveness of our model** as compared to the state-of-the-art methods.

Code is available at https://github.com/Zyun-Y/DconnNet

Read More

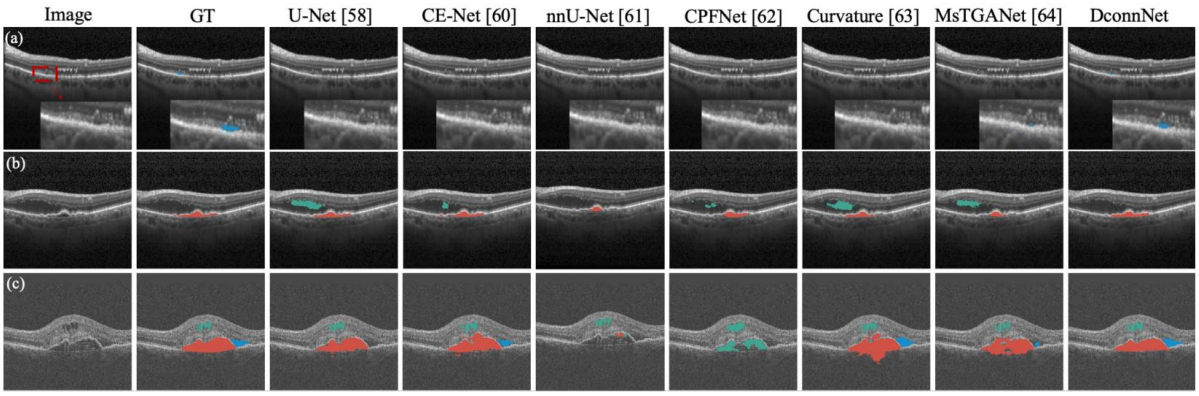


Figure 7. Visual comparison between the proposed DconnNet and other state-of-the-art methods on Retouch dataset. Different colors of masks represent different biomarker classes. Green: IRF; blue: SRF; red: PED.

Blind deconvolution of second harmonic microscopy images of the living human eye

Rosa M. Martínez-Ojeda, Laurent M. Mugnier, Pablo Artal, and Juan M. Bueno

Biomedical Optics Express, Vol. 14, Issue 5,, pp. 2117-2128, (2023)

•https://doi.org/10.1364/BOE.486989

Second harmonic generation (SHG) imaging microscopy of thick biological tissues is affected by the presence of aberrations and scattering within the sample. Moreover, additional problems, such as uncontrolled movements, appear when imaging *in-vivo*. Deconvolution methods can be used to overcome these limitations under some conditions. In particular, we present here a technique based on a marginal blind deconvolution approach for improving SHG images obtained *in vivo* in the human eye (cornea and sclera). Different image quality metrics are used to quantify the attained improvement. Collagen fibers in both cornea and sclera are better visualized and their spatial distributions accurately assessed. This might be a useful tool to better discriminate between healthy and pathological tissues, especially those where changes in collagen distribution occur.

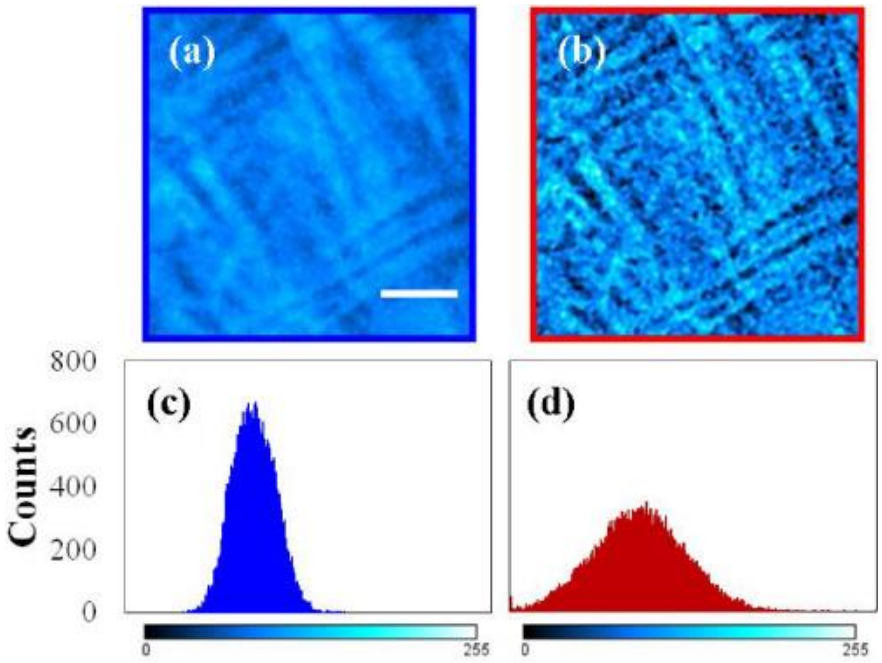


Fig. 4. Original (a) and deconvolved (b) SHG images of an ex vivo human cornea. The corresponding intensity histograms (c, d) are also shown. Scale bar: 50 μm.

Overview of the best photonics books: 2023 update

If you are looking for information about photonics, you have many resources at your disposal. You have tweets, articles, blog posts , brochures, flyers, whitepapers, videos, and of course books.

From among the resources listed above books remain the primary source as “first principles” knowledge of photonics. Photonics is a progressive discipline that is evolving fast. This evolution rests on a solid bedrock of knowledge contained in books.

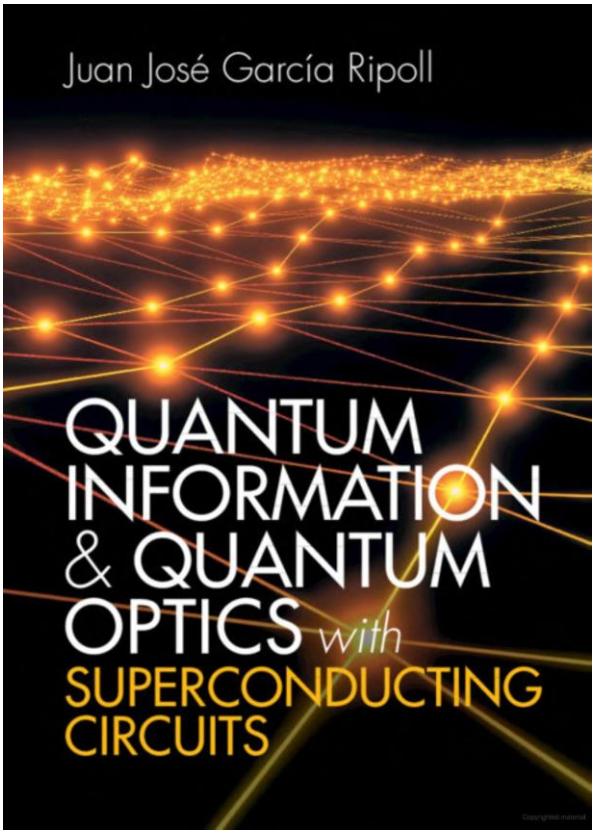
Keep reading the following article to find out the best books to read:

- Books on lasers: Principles of lasers, Ultrafast lasers
- Optics books: Principles of optics, Imaging optics
- Silicon photonics books, Silicon photonics design, Handbook of silicon photonics
- Biophotonics books: Handbook of biophotonics
- Fiber optic communication books: Nonlinear fiber optics
- Nanophotonics books: Introduction to nanophotonics
- Computational Photonics: Computational photonics: an introduction with Matlab

Overview of the best photonics books: 2023 update - Photonics report

Quantum Information and Quantum Optics with Superconducting Circuits New Edition

by Juan José García Ripoll



This book provides a comprehensive and self-contained introduction to the world of superconducting quantum circuits, and how they are used in current quantum technology. Beginning with a description of their basic superconducting properties, the author then explores their use in quantum systems, showing how they can emulate individual photons and atoms, and ultimately behave as qubits within highly connected quantum systems. Particular attention is paid to **cutting-edge applications of these superconducting circuits in quantum computing and quantum simulation. Written for graduate students and junior researchers, this accessible text includes numerous homework problems and worked examples**.

Quantum information and quantum optics superconducting circuits | Quantum physics, quantum information and quantum computation | Cambridge University Press

Order from Amazon

Student Theses -Optical Coherence Tomography News

Machine Learning Approaches for Automated Glaucoma Detection using Clinical Data and Optical Coherence Tomography Images

By **Nahida Akter**

University of New South Wales

Aims of this thesis: The research first focuses on optimising glaucoma diagnostic features by combining structural, functional, demographic, risk factor, and optical coherence tomography (OCT) features. The significant features were evaluated using statistical analysis and trained in ML algorithms to observe the detection performance. Three crucial structural ONH OCT features: cross-sectional 2D radial B-scan, 3D vascular angiography and temporal-superior-nasal-inferior-temporal (TSNIT) B-scan, were analysed and trained in explainable deep learning (DL) models for automated glaucoma prediction. The explanation behind the decision making of DL models were successfully demonstrated using the feature visualisation. The structural features or distinguished affected regions of TSNIT OCT scans were precisely localised for glaucoma patients. This is consistent with the concept of explainable DL, which refers to the idea of making the decision-making processes of DL models transparent and interpretable to humans. However, artifacts and speckle noise often result in misinterpretation of the TSNIT OCT scans. This research also developed an automated DL model to remove the artifacts and noise from the OCT scans, facilitating error-free retinal layers segmentation, accurate tissue thickness estimation and image interpretation.

Persistent link to this record
http://hdl.handle.net/1959.4/101104

OPTICS & PHOTONICS NEWS

Optics & Photonics News Magazine
April 2023 Issue

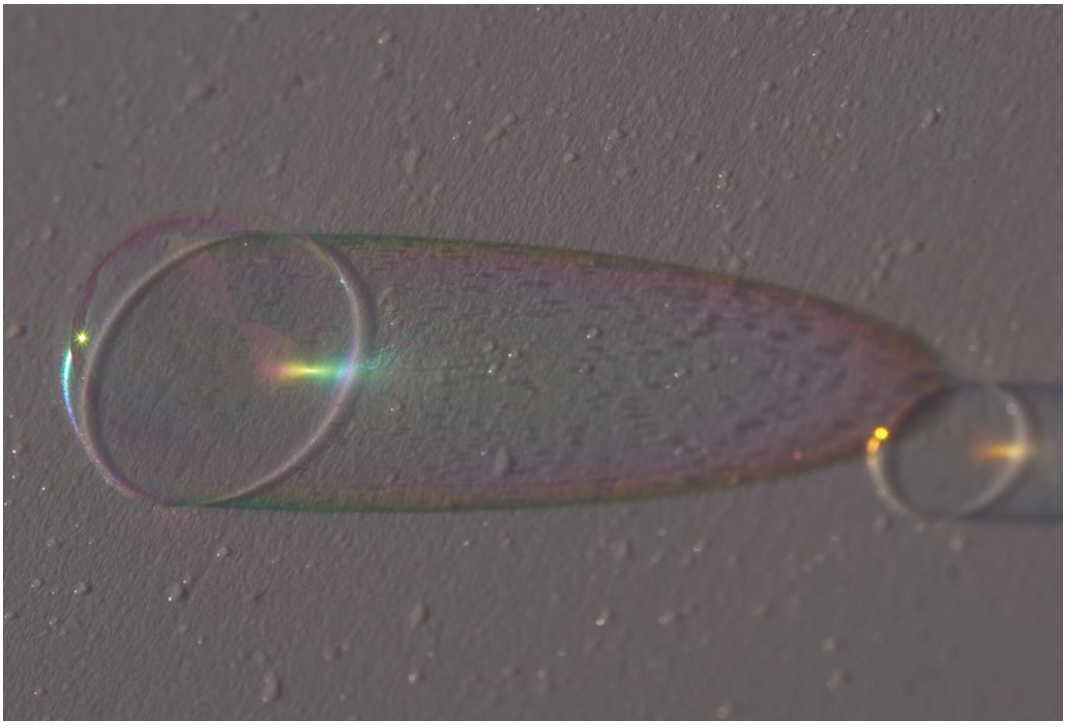
- Microscopy's Cutting Edge
- Use Photonics. Find a Solution. Change the World.
- Light as Medicine: Niels Finsen's Phototherapy

Browse all Issues

OPTICS & PHOTONICS NEWS

Image of the Week

Striking images of optics and photonics, contributed by OPN readers



Soap Bubble Spectrum

A soap bubble resting on a flat white surface, illuminated by sunlight (elevation about 14 degrees). A teacup cusp caustic is caused, with light contributions from differently inclined parts of the bubble, resulting in different colors along the caustic.

—Markus Selmke, Deutsches Patent- und Markenamt, Jena, Germany

Webinars

We recommend our NETLAS PhD students to attend these upcoming webinars (part of the free Thorlabs webinar series). Thorlabs' Digital Webinars are covering a variety of topics, each with a dedicated live Q&A session, and have a common goal of providing educational, engaging, and valuable content.

Thorlabs Previously Recorded Webinars

Thorlabs' Digital Webinar series began in mid-2020. Each webinar and Q&A session is recorded and added to the archive on Thorlab's web page.

April
26
2023

Thorlabs' Strategy for Sustainable Work Force Development

The photonics manufacturing industry requires a highly skilled workforce to design, manufacture, and assemble the precise instruments and equipment necessary for advanced research and development in the medical, telecommunications, and defense industries. Join Thorlabs' Business Development Manager, Navid Entezarian, as he outlines the approach Thorlabs is taking to solve the trained workforce shortage.

Presented by Navid Entezarian,

Business Development Manager, Thorlabs

Navid Entezarian began his career at Thorlabs in 2013 as a production engineer, and has worked his way through the optics department to his current role as Business Development Manger. In this role, he focuses on growing the optics and mechanics unit here at Thorlabs. Navid graduated from New Jersey Institute of Technology with a degree in Physics and has since then been involved in the photonics industry to become a seasoned specialist in the optics field.

Click to Register!

Browse All Job Openings
on Our Careers Page

Fiber laser technology for commercial quantum applications

NKT Photonics has for many years been the leading provider of narrow linewidth fiber lasers and also the sole commercial producer of photonic crystal amplification fiber. These are the key ingredients that allow NKT Photonics to match the ambitious development roadmaps of the world's foremost quantum computing efforts.

They are motivated by making a difference in the world through fiber and laser technology, and we have been active in the quantum optics community for many years. In recent years, we have developed high-power frequency conversion for the emerging cold atom quantum sensing community which didn't have any commercial options at these levels.

Watch the following video to learn more about fiber lasers for commercial quantum applications

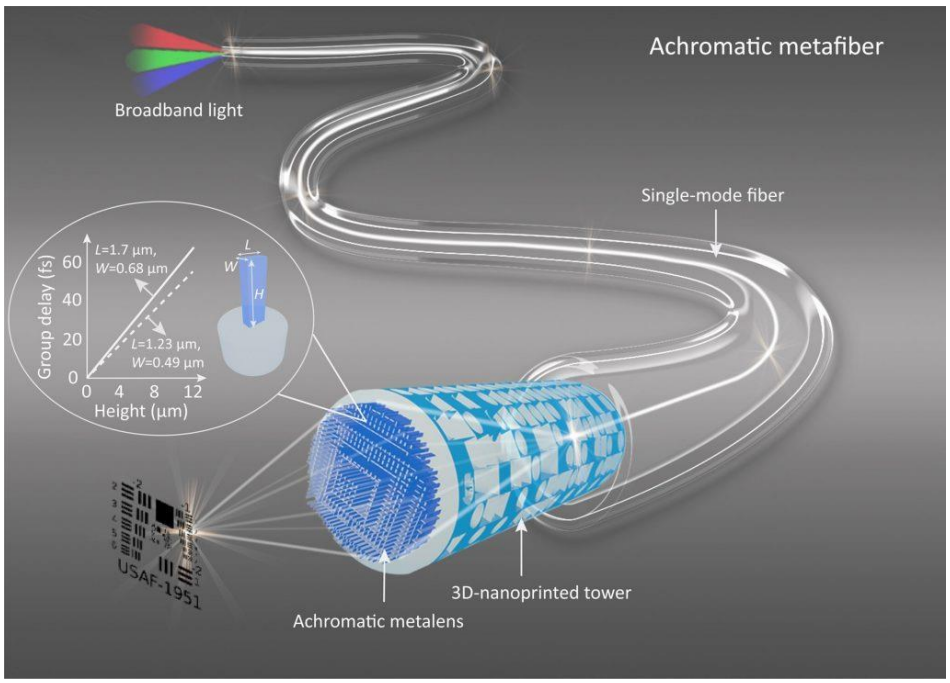
(video was shot at Photonics West 2023)

https://vimeo.com/809667470

Dispersion engineering with meta-optics

Meta-optics is an emerging technology that provides for dispersion-free optical engineering

The Ren Group - a research team at the School of Physics and Astronomy, Monash University - has developed a broadband achromatic metafiber and used a SuperK FIANIUM supercontinuum white light laser to characterize it. NKT Photonics SuperK lasers are ideal for the characterization of advanced optical components, metamaterials, plasmonics, etc., due to their high brightness, high spatial resolution, and flat and broad spectrum.
Get the summary in their case story or the full story in the article in Nature Communications.



Principle of an achromatic metafiber used for achromatic focusing and imaging

CONFERENCES

Markus Pessa Summer School "New Frontiers in Optical Technologies", August 7-11, Tampere, Finland, in conjunction with the NETLAS International Conference

The International Summer School New Frontiers in Optical Technologies was established in 2001. The 11th edition organized this year marks a name change to "**Markus Pessa International Summer School New Frontiers in Optical Technologie**s" – a tribute to the memory of the late Prof. Markus Pessa, the founder of the Optoelectronics Reserch Centre in Tampere and the pioneer of optoelectronics and semiconductor laser technology in Finland.

Tutorial type of lectures covering laser technologies, imaging (including bio-imaging technology), quantum technology, photonic integration, transferable skills and Student Mentoring Activities.

All NETLAS ESRs are expected to present orally.

Registration is now open, more information can be found at:

Markus Pessa Summer School | Tampere Universities (tuni.fi)

SEMINAR Careers after the MSCA fellowship

Alternative careers beyond academia & industry

Apr 28, 2023 12:00 PM in UK

Speakers:

Dr Anouk Lafortune, Policy Officer at MSCA Unit, European Commission

Dr Joana Moscoso, Social business innovator/Entrepreneur at Native Scientists and Chaperone -

Dr Ruben Riosa, Associate Medical Communications Manager at Excerpta Medica and Chair of the MCAA Communications working group

Dr Kyriakos Tzafestas, Director at PharmaVentures

MCAA Webinar: Careers after the MSCA fellowship - alternative careers beyond academia & industry | Marie Skłodowska-Curie Actions (europa.eu)

VCSEL Day 2023, Politecnico di Torino,

September 22, 2023: SAVE the DATE

Dear VCSELers,

after a two-year break, the VCSEL Day is back. **It will be a one-day informal session**, to be held in the Maxwell room of the Department of Electronics and Telecommunications (DET), at the Politecnico campus, Corso Duca degli Abruzzi 24, Torino, Italy. The event will take place on the **last day of the International Conference on Numerical Simulation of Optoelectronic Devices** NUSOD (Torino, Lingotto Campus, September 18—22).

Deadline for registration: June 30. An application link will be provided via email.
Deadline for submitting contributions: August 31. A template will be provided via email to the registered participants.

Please use this email address vcselday2023@polito.it for all correspondence

Questions to ask at interviews part 1: Ask yourself first

Many students and young professionals hesitate to ask questions at their interviews as they believe interviews are one-way. However, **asking your own questions is a powerful tool.** It's just as important for you to understand and feel comfortable with the position and work environment you are applying to work in as it is for the supervisor to get to know you as a candidate.

As you consider whether a job is right for you, first identify the aspects that are most important to you based on professional advancement, long-term goals, community, location and more. **Make a list with your very specific values categorized and ranked by your priorities**. This will help you prioritize your needs and select which questions to ask in an interview. Please consider that different cultures and institutions will have different standards.

Below, we have put together a list of questions to ask yourself before your interview to determine if a job is right for *you.*

Questions to ask yourself before accepting a PhD or Postdoc position:

1. ***What do I want to achieve by taking this position?***
2. ***Do I know what the project is about, and do I understand what is expected from me to be successful?***
3. ***Would I enjoy working in this environment, and do I share similar ethics and goals as the rest of the group?***
4. ***Do I understand the funding situation for my position in terms of salary, purchase of equipment and travel opportunities?***
5. ***Am I aware of the challenges I may encounter to successfully write and defend a Ph.D. thesis?***
6. ***What type of support and guidance will my advisors be able to give, both in technical areas and for career advancement?***
7. ***What should I look for to successfully become an independent researcher/secure a tenure track position?***

Read More at Questions to ask at interviews part 1: Ask yourself first | Blog | Optica

Posted by **Optica Ambassadors** Alessandra Carmichael-Martins **(Class of 2022),** Linhui (Lynn) Yu **(Class of 2021) and** Richard Zeltner **(Class of 2022) |**

Job by University of Antwerp

Biomedical Imaging Researcher

A PhD researcher with an interest in optical measurement techniques (laser and imaging based) is required in the framework of an interdisciplinary research project on Plasma Oncology with research groups UAntwerpen - CORE, Plasmant, BIMEF and InViLab.UAntwerp.

You will work actively on the preparation and defense of a PhD thesis in the field of in-situ characterization of the mechanical properties of skin tissue. You will use camera-based measurement techniques (e.g. hyperspectral imaging) and laser-based methods (e.g. laser Doppler vibrometry) to identify the material properties of healthy and cancerous skin tissue during plasma treatment. The research will be performed at the Industrial Vision Lab (InViLab) and Biomedical Physics (BIMEF) research groups in collaboration with researchers of the Plasma Lab for Applications in Sustainability and Medicine (PLASMANT) and Center for Oncological Research (CORE). A short description of the project on which you will work, can be found here.

You will publish scientific articles related to the research project and you will present your work at conferences as well as to a broader audience (through social media).

You will carry out a limited number of teaching and research support tasks for the InViLab and BIMEF research groups.

For more information or to apply, please go to the UAntwerp vancancy website

Parkinson's Centre, Canterbury, UK

Parkinson's Centre is a community-based treatment and research centre located in Canterbury - a global ambition with a family feel. They offer a range of non-drug therapies for Parkinson's disease, all under one roof and host educational courses and placement schemes to train the next generation of clinicians and researchers in this integrated care model.

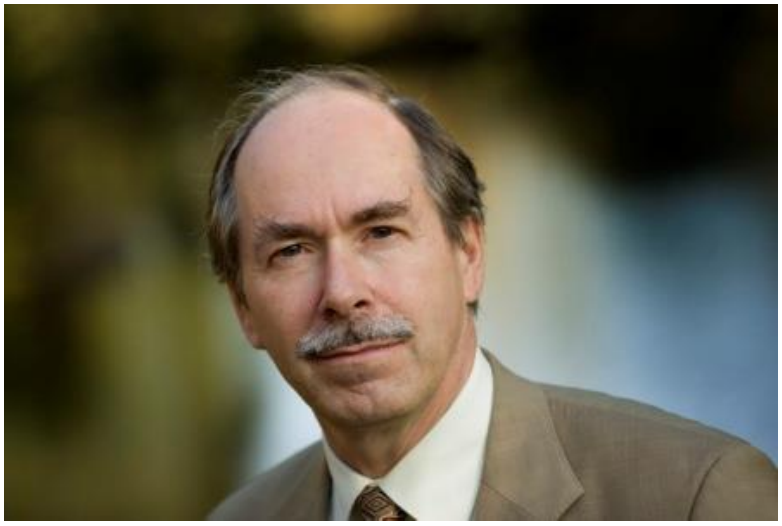
Parkinson's Centre - University of Kent

Find out more about the Centre

Did you know?

Nobel laureate Gerardus 't Hooft built a marvellous webpage called

"How to become a GOOD Theoretical Physicist" (goodtheorist.science)



If you follow his advice, you may achieve great things in physics!

Good luck!

Professor Gerardus 't Hooft, University of Utrecht, Utrecht, the Netherlands, and **Professor Emeritus Martinus J. G. Veltman,** University of Michigan, USA, resident in Bilthoven, the Netherlands, were awarded in 1999 the Nobel Prize for having placed particle physics theory on a firmer mathematical foundation. **They have in particular shown how the theory may be used for precise calculations of physical quantities.** Experiments at accelerator laboratories in Europe and the USA have confirmed many of the calculated results.

New project to tackle farming food-waste launches

The University and Produced in Kent are together launching a gleaning project that will see students work with farms to tackle food waste and reduce the environmental impact of surplus food, which currently accounts for 6-7% of greenhouse gas emissions every year in the UK.

The project will support farms in the Kent Downs Area of Outstanding Natural Beauty (AONB) redistributing produce to businesses, charities and community groups in the Canterbury area, using the FoodLoop app – an app developed by Produced in Kent, which connects those who have surplus food with those who need it. Statistics on volumes of surplus gleaned from Kent fields and redistributed to those who need it, will be collected through FoodLoop and shared publicly.

The project will be supported by established local gleaning groups *Deal with It* and *Hythe Environmental Community Group*, who will train the students in the art of gleaning. The food redistribution infrastructure developed through the project can be replicated in other areas of the county.

Dr Philip Pothen, Director of Engagement at Kent, said: 'The University's Right to Food initiative brings all areas of the University's work to bear on tackling the challenges of securing fair and sustainable access to food. This project demonstrates that volunteering has an important role to play in bringing communities together, building links with farms and food suppliers and redistributing food to where it is needed and wanted most. We're delighted to be working with Produced in Kent and other partners on this important initiative.'

Read More at New project to tackle farming food-waste launches - News Centre - University of Kent

Did you know?

April is recognized as National Stress Awareness Month to bring attention to the negative impact of stress. **Managing stress is an essential component of a healthy lifestyle**. Knowing how to manage stress can improve mental and physical well-being as well as minimize exacerbation of health-related issues.

As we head towards the end of Stress Awareness Month, **University of Kent mental health Support wanted to highlight how to have conversations at work around the subject of mental health.** If you are experiencing a mental health problem, it can sometimes be difficult to initiate a conversation about mental health needs with your manager, and vice versa if you're a manager concerned about a colleague. At Kent University, you should have at least one appraisal discussion yearly and this is also a good opportunity to talk about wellbeing and mental health needs.

If you're looking for some advice, Nuffield Health have some great tips on how to talk with a team member that you have concerns for as a manager. The basic advice is to set the right tone, keep it simple, listen and show interest. They also have advice on how to raise the subject of support for your mental health with your manager. They have also created a useful video that encapsulates the advice for both parties.

If you contact the Employee Assistance Programme, you can talk to a member of their team about how to start that initial conversation with someone, or, if you are a manager, you can speak to someone about how you feel about supporting someone with mental health needs. We also have a network of Mental Health Allies who are trained to have discussions about mental health. There's also an easily accessible development courses that can help in this area. For example, 'How to hold a Wellbeing Conversation' and 'Emotional Intelligence'.

Let's Talk About Mental Health at Work (sharepoint.com)

Did you know?

Monastic brewer makes instant beer powder | GlobalSpec

By Marie Donlon

An instant beer powder has reportedly been developed by a German monastic brewery in what is being called a world's first.

The German monastery based-brewery Klosterbrauerei Neuzelle has developed a zero-alcohol, high dextrin beer that is initially brewed like traditional beers but then further processed and transformed into a powder that will dissolve when added to water.

Source: Klosterbrauerei Neuzelle

According to its developers, the process for creating this beer is shorter than traditional beer-making processes and uses less energy and fewer natural resources.

Further, the beer is lighter to transport in powder form, shipping at just 10% the weight of liquid beer.

The powdered beer is currently being trialed in smaller markets through mid-2023 and the brewers are now attempting to develop an alcohol-based version of the powdered beer.

To contact the author of this article, email mdonlon@globalspec.com

Happy Birthday to
Johann Carl Friedrich Gauss

German mathematician, astronomer, and physicist

Born on 30 April 1777 – Died on 23 February 1855

Gauss wrote pivotal works in diverse scientific fields such as differential geometry, algebra, analysis, modular arithmetic, statistics, geophysics, geodesy, optics, planetary astronomy, electromagnetism and number theory, to which he remained devoted until his death.

He published over 150 works and made such important contributions as the fundamental theorem of algebra (in his doctoral dissertation), the least squares method, Gauss-Jordan elimination (for solving matrix equations), and the bell curve, or Gaussian error curve (*see* normal distribution). Gauss made important contributions to physics and astronomy and pioneered the application of mathematics to gravitation, electricity, and magnetism. He also developed the fields of potential theory and real analysis.
With Archimedes and Newton, **he is one of the greatest mathematicians of all time.**

Carl Friedrich Gauss | Biography, Discoveries, & Facts | Britannica

NETWORK EVENTS

We invite all partners to communicate events and ideas to place in our newsletter

Please send any piece of news, on NETLAS activities or anything else happening that may be of interest to the NETLAS community, to Ramona Cernat: R.Cernat@kent.ac.uk and to Adrian Podoleanu: ap11@kent.ac.uk