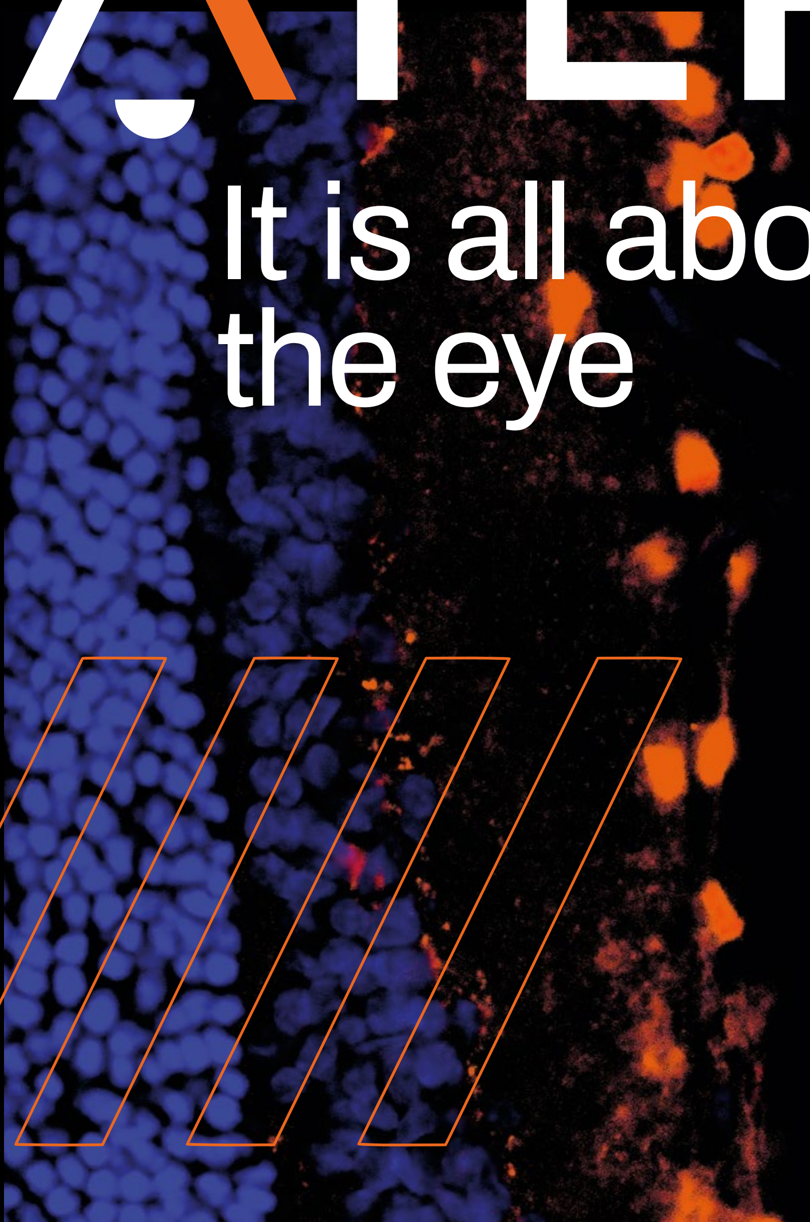
Conference on
Recent Advances
in Translational
Eye Research
2025

Special track dedicated to
25 years of Fourier Domain Optical Coherence Tomography (FD-OCT) imaging in ophthalmology

CRATER



It is all about the eye

October
8–10, 2025
Copernicus
Science Centre,
Warsaw, Poland

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ORGANISERS

ICTER International Centre for Translational Eye Research

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Dear Colleagues and Friends,

It is our great pleasure to welcome you to II Conference on Recent Advances in Translational Eye Research. This conference represents more than a scientific meeting – it is a platform for translational eye research, where fundamental discoveries are shaped to meet clinical application, and where collaboration paves the way toward improving vision health worldwide.

CRATER was conceived as a forum for exchanging ideas, showcasing new technologies, and fostering multidisciplinary dialogue across basic science, clinical research, and industry. CRATER 2.0 continues this mission with renewed energy, bringing together leading experts to address some of the most pressing challenges in translational eye research.

This year, CRATER also marks a very special milestone: the 25th anniversary of Fourier Domain Optical Coherence Tomography (FD-OCT) imaging in ophthalmology. The first retinal imaging systems based on this revolutionary technology were constructed at the Nicolaus Copernicus University in Toruń (Poland), laying the foundations for a diagnostic method that has since transformed clinical practice and vision science around the world. Celebrating this achievement here in Poland highlights the important role of local innovation in shaping global ophthalmology.

Building on decades of pioneering research and expertise in Poland, we are also proud to introduce TRIO-VI CoE – a Teaming for Excellence project that establishes a Centre of Excellence through the partnership of three leading research institutions: the Institute of Physical Chemistry of the Polish Academy of Sciences, the Institute of Ophthalmology at University College London, and the Institut de la Vision at Sorbonne University. TRIO-VI strengthens Europe's hub for cutting-edge eye research and innovation by funding this conference, supporting researcher mobility, and enabling joint projects.

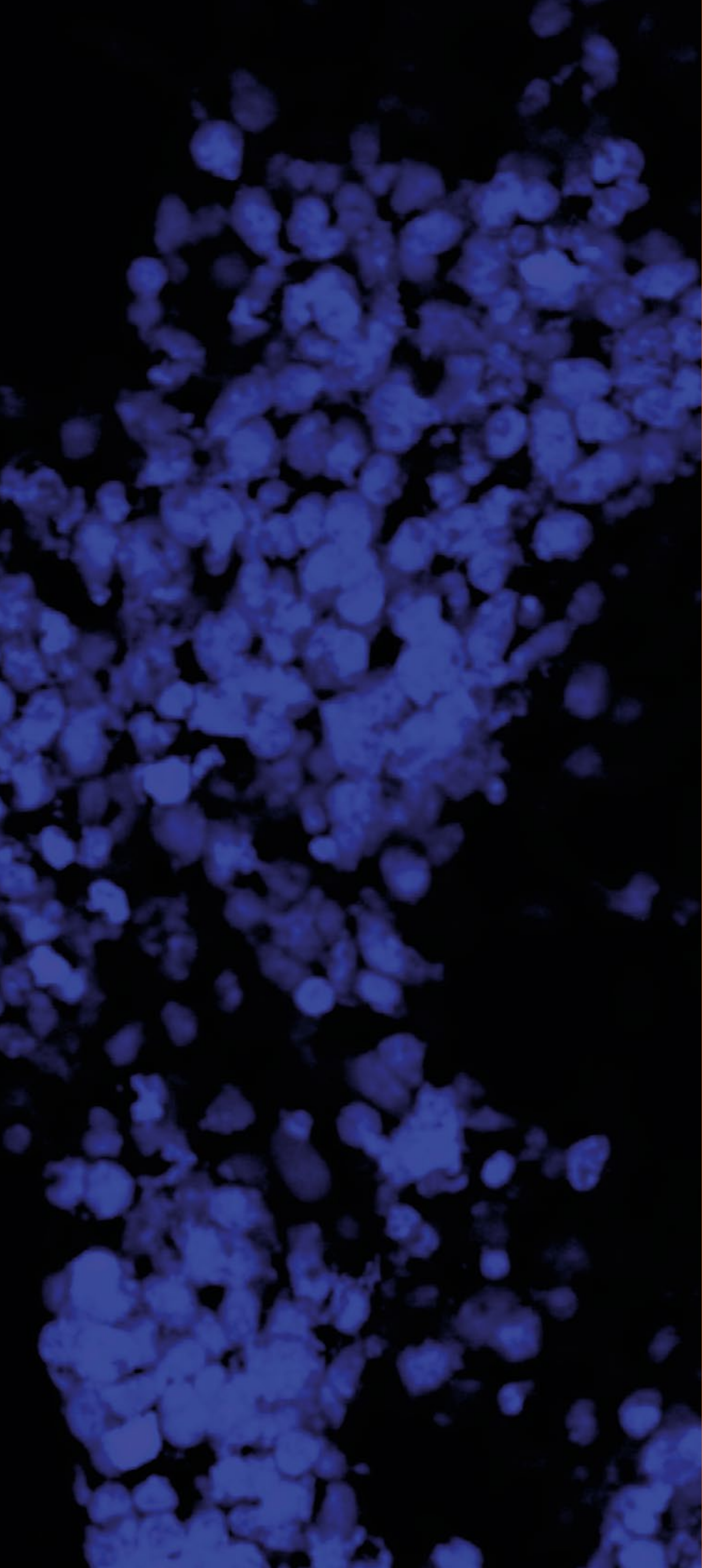
This conference is organized by ICTER – International Centre for Translational Eye Research, a part of the Institute of Physical Chemistry of the Polish Academy of Sciences, in close partnership with the Candela Foundation and supported by the i2Eye community. Combined efforts ensure that CRATER is not only a place for high-level science, but also a nurturing environment for collaboration, mentorship, inspiration, and future breakthroughs.

We warmly thank you for joining us in this endeavor. Your presence and contributions will help shape the future of eye research. May CRATER 2.0 inspire new partnerships, ignite innovative ideas, and strengthen our shared commitment to preserving and restoring vision.

With our best wishes for an inspiring and productive conference,

ICTER Management Board
Maciej Wojtkowski, Anna Pawlus, Christophe Gorecki

Organising Committee
Piotr Węgrzyn, Humberto Fernandes, Joanna Kartasiewicz, Ada Krawiec, Anna Pawlus, Mihai Suster, Mateusz Woliński



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Olaf Strauss
Maciej Wojtkowski

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James Bainbridge
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Organising Committee

Humberto Fernandes
Joanna Kartasiewicz
Ada Krawiec
Anna Pawlus
Mihai Suster
Piotr Węgrzyn
Mateusz Woliński

Day 1

October 8

8:00	Registration & coffee & cookies
9:00	Welcome remarks Maciej Wojtkowski
9:20	Recognition of Maciej Żylicz's contribution to ICTER's mission Maciej Wojtkowski
9:30	Plenary: Translating a stem cell therapy for age-related macular degeneration into the clinic: An update from the London Project to Cure Blindness Amanda Carr
10:00	Plenary: Hidden in Plain Sight - Microscopic Secrets of Clinical OCT Images Revealed Using Multi-Perspective Non-Confocal Adaptive Optics SLO Richard B. Rosen
10:30	Coffee break
11:00	Plenary: Extracellular Vesicles and Complement Activation Drive AMD Pathogenesis in Patient-Derived RPE Cells Majlinda Lako
11:25	Plenary: Optical Tomography of the Cornea: From backscattering to forward scattering Claude Boccara
11:50	Plenary: Retinal gene therapy - opportunities and challenges James Bainbridge
12:15	Plenary: Fluorophores as optical sensors in the living retina Jennifer Hunter
12:40	Lunch break

PARALLEL I.1: MOLECULAR PROCESSES OF VISION Aula A	PARALLEL I.2: CLINICAL TECHNOLOGIES Aula B
Invited: In silico and in vitro screening of rod opsin mutants and development of small chaperones with therapeutic potential Francesca Fanelli 14:00	Invited: TelCaps in macular edema: revisiting the concept of focal vs diffuse rupture of the blood-retinal barrier Michel Paques 14:00
Invited: The role of Retinal Degeneration Protein 3 in visual dysfunction and tumor development Karl-Wilhelm Koch 14:25	Microstructural Changes in Leber Hereditary Optic Neuropathy (LHON) Revealed by Adaptive Optics Ophthalmoscopy Elena Gofas-Salas 14:25
Invited: Beyond cell death: altered mechanisms and therapy insights in a new mouse model of GUCA1A cone-rod dystrophy Daniele Dell'Orco 14:50	The potential of utilizing eye movements as a diagnostics indicator of Parkinson's Disease - retinal eye tracker NeuroFET Marta Skrok 14:45
From Molecular Motion to Clinical Insight: Protein Conformational Dynamics as Biomarkers in Ophthalmic Imaging Humberto Fernandes 15:15	The Immediate Effect of Defocus Incorporated Multiple Segment (DIMS) Spectacle Lenses on the Choroidal Thickness using Swept-Source Optical Coherence Tomography in Children Lou Ann Christensen Andersen 15:05

	Structure and dynamics of human cone phosphodiesterase 6 Nikolai Artemyev — 15:40	Optimizing Imaging Modalities to Monitor Cyst-Photoreceptor Interactions in Retinitis Pigmentosa Ayoub Lassoued — 15:25
		In-vivo Measurement of Pulsatile Motion of Ocular Structures with Long-range Swept-Source OCT Vasantha Kumar Kathirvelu — 15:45
16:00	Poster session	
18:00	Welcome reception Pracownia Przewrotu Kopernikańskiego	
21:00	End of the day 1	

Day 2

October 9

8:30	Registration & coffee & cookies	
9:00	Introducing PICO – announcement of a new research group at ICTER Olaf Strauss, Maciej Wojtkowski	
9:10	Plenary: Autofluorescence imaging of the human retina: metabolic marker for health and disease Thomas Ach	
9:35	Plenary: Adaptive optics autofluorescence imaging of retinal degenerations Ethan Rossi	
10:00	Plenary: IDHea™: Accelerating Oculomics, AI, and Digital Health Innovation Tilman Otto	
10:25	Coffee break	
10:50	Plenary: A bacterial discovery platform for small cyclic peptides that effectively rescue the misfolding and aggregation of proteins associated with human diseases Georgios Skretas	
11:15	Plenary: Experimental human optoretinography: relating functional imaging to visual function Ravi S. Jonnal	
11:40	Plenary: Quantitative functional retinal angiography via real-time Doppler holography. Effects of moderate intraocular pressure elevation Michael Atlan	
12:05	Plenary: Dynamic FFOCT of retinal explants and organoids Kate Grieve	
12:30	Conference photo	
12:35	Lunch break	
	PARALLEL II.1: FUNCTIONAL RETINAL IMAGING Aula A	PARALLEL II.2: GENOMICS AND AI Aula B
	Invited: Full-Field imaging platforms for structural and functional assessment of retina in humans and small animal models Robert J Zawadzki — 13:45	Identifying multimodal molecular programs with topic modeling. Marcin Tabaka — 13:45

	Spectral phasor analysis of two-photon excited human fundus autofluorescence: a promising approach for objective retinal diagnostics Piotr Kasprzycki 14:10	Unlocking FFPE Tumor Archives for Single-Cell ATAC and RNA Sequencing Natalia Ochocka-Lewicka 14:05
	Investigating phase noise in velocity-based optoretinography Kari V. Vienola 14:30	Understanding Factor H Related Protein 1 (FHR1) role in Age-related Macular Degeneration using Next Generation Sequencing Andjela Sekulic 14:25
	Optoretinography at ICTER – fast and non-contact in vivo measurements of photoreceptors' function Sławomir Tomczewski 14:50	OCT retinal layer segmentation using the DeepLabV3 neural network Agnieszka Paściak 14:45
	Optoretinography with Time-Domain Full-Field OCT: Achieving Cellular Resolution and Wide Field-of--View Functional Imaging Maxime Bertrand 15:10	Recurrence Quantification Analysis of Eye Movement for Parkinson's Disease Detection Bogna Bylicka 15:05
15:30	Coffee break	
	PARALLEL II.3: NOVEL OPTICAL METHODS Aula A	PARALLEL II.4: OPHTHALMIC BIOLOGY Aula B
	Invited: Hyperspectral imaging, phasor analysis and deep learning for ocular diagnosis Meritxell Vilaseca 16:00	Invited: Female sex is risk factor for accelerated retinal degeneration via lipid peroxidation in murine RP models Henri Leinonen 16:00
	Invited: A calibration-free eye-tracker for research and clinics Maciej Szkulmowski 16:25	Invited: Using human feedback to optimise visual restoration Matthew Chalk 16:25
	The best fixation target revisited: new insights from retinal eye tracking Diederick C. Niehorster 16:50	What brain see after the eyes open again? Andrzej Foik 16:50
	Two-photon vision for Augmented Reality Katarzyna Komar 17:10	Engineering human retinal organoids to study and treat autosomal dominant cone-rod dystrophies Carmen Longo 17:10
	Anatomical and physical factors that (might) affect the crystalline lens wobbling performance Damian Siedlecki 17:30	Glial Contributions to Diabetic Retinopathy: Insights from the INSC94Y Porcine Model Sweetu Susan Sunny 17:30
	Deep Learning-Based Retinal Blood-Flow Extraction from Spatio-Temporal Optical Coherence Imaging Mehdi Borjkhani 17:50	
18:10	End of the day 2	

Day 3

October 10

Celebrating 25 years of Fourier Domain Optical Coherence Tomography in ophthalmic imaging

8:30	Registration & coffee & cookies

9:00	Plenary: Imaging the cornea with mechanical contrast using phase-decorrelation OCT Andrew M. Rollins
9:25	Plenary: Label-free functional and structural assessment of in vitro tissues by computational optical coherence tomography Yoshiaki Yasuno
9:50	Plenary: Fourier-domain OCT: From Ultrahigh to How Low Is Enough? Rainer A. Leitgeb
10:15	Coffee break
10:45	Plenary: mmuno-OCT: High resolution catheter based Structural and Molecular imaging in vivo Johannes F. de Boer
11:10	Plenary: From Ocular Biometry to High-Speed, High-Resolution, and Multifunctional Optical Coherence Tomography - Interferometric Ranging and Imaging in the Human Eye over 40+ Years Christoph K. Hitzenberger
11:35	Plenary: Translating Optoretinography for Clinical Retinal Imaging Marinko Sarunic
12:00	Plenary: Progress in the speed of en-face optical coherence tomography Adrian Podoleanu
12:25	25 years of Fourier Domain Optical Coherence Tomography in Poland: Recognition of Andrzej Kowalczyk's contribution Maciej Wojtkowski
12:45	Lunch break

PARALLEL III.1: NOVEL OCT TECHNIQUES Aula A	PARALLEL III.2: NOVEL IMAGING AND ROBOTICS METHODS Aula B
Recent progress in high resolution imaging of anterior eye: From Time-domain Full-field OCT to Transmission Interferometric Microscopy Viacheslav Mazlin 14:00	Transforming Eye Care: OCT Innovations, Robotic Guidance, and Low-Cost Tools for the Future Karol Karnowski 14:00
STOC-T: From Early Concept to Prototype of New--Generation Noninvasive Volumetric Retinal and Corneal Imaging Dawid Borycki 14:30	Dynamic High-resolution Full-Field Optical Coherence Microscopy of Living Mouse Oocytes and Early Embryos Seweryn Morawiec 14:30
Invited: OCT Imaging of the Vitreous Body: A New Frontier in Ophthalmic Diagnostics Ireneusz Grulkowski 15:00	Microscopic imaging behind scattering media from speckle pattern Mikołaj Rogalski 15:00
Line-field spectral domain OCT for fast volumetric acquisition towards in vivo dynamic OCT Zofia Bratasz 15:25	WUTScope-FPM – a Fourier ptychographic microscope system for ultra high-resolution, label-free widefield biomedical imaging Piotr Arcab 15:25

15:50	Conference wrap-up Maciej Wojtkowski
16:00	End of the day 3 and end of the CRATER 2.0

Poster Session

P1	**Poster withdrawn**		
P2	**Patricio Espinoza**	Compact Pulse Compressor for Human Two-Photon Excited Fluorescence Scanning Laser Ophthalmoscopy (TPEF-SLO)	P. Espinoza, P. Kasprzycki, M. Wojtkowski
P3	**Anna Galińska**	Targeting Retinal Cells with G-deleted Rabies Virus	A. Galińska, J. Płaczkiewicz, K. Saran, M. Gumkowska, A. Foik
P4	**Tomasz Gawroński**	YOLO AI for a real time surgical tool classification and pose estimation	T. Gawroński, K. Gromada, A. Kurek, K. Karnowski
P5	**Luca Gessa**	Structural and Functional Insights into Retinol-Binding Protein 3: CryoEM and SAXS Reveal Ligand-Induced Conformational Dynamics Relevant to Retinal Disease	L. Gessa, V. Kaushik, N. Kumar, H. Fernandes
P6	**Mateusz Grochalski**	Color matching of two-photon stimuli projected by scanning laser	M. Grochalski, O. Kaczkoś, D. Rumiński, K. Komar
P7	**Krzysztof Gromada**	Application of force feedback in robotic assisted ophthalmic procedures	K. Gromada, T. Gawroński, A. Kurek, K. Karnowski
P8	**Milena Gumkowska**	Beyond the Limits of Optogenetics: Is Signal Amplification Possible?	M. Gumkowska, J. Płaczkiewicz, A. Foik
P9	**Agata Gut**	Application of higher-order statistics to the identification of retinal layers in OCT scans	A. Gut, D. R. Iskander
P10	**Oliwia Kaczkoś**	Accommodation in two-photon vision – application in Augmented Reality technology	O. Kaczkoś, M. Vinas Pena, J. Pniewski, M. Wojtkowski, K. Komar
P11	**Vineeta Kaushik**	PDE6 Conformational Dynamics as a Molecular Driver of Light-Induced Photoreceptor Length Modulation	V. Kaushik, L. Gessa, S. Tomczewski, N. Kumar, S. Karmakar, A. Grabowska, J. Czarnecka, H. Fernandes
P12	**Julia Kochańska**	Quantifying Retinal Vascular Dynamics with Scanning Laser Ophthalmoscope	J. Kochańska, M. Nowakowski, P. Stremplewski, E. Dąbrowska, C. López-Mariscal, M. Sylwestrzak, K. Dalasiński, J. Wolf, M. Hellmann, K. Narkiewicz, A. Szkulmowska, M. Szkulmowski
P13	**Wiktor Kulesza**	Functional mouse retinal imaging using the recently advancing translational eye research STOC-T method	W. Kulesza, M. Wielgo, P. Węgrzyn, S. Tomczewski, K. Kordecka, A. Galińska, B. Bałamut, E. Auksorius, A. Foik, M. Wojtkowski, D. Borycki, A. Curatolo
P14	**Adam Kurek**	Manual and remote robot control for ophthalmic applications	A. Kurek, K. Gromada, K. Karnowski, T. Gawroński
P15	**Marcin Marzejon**	A hybrid time-of-flight-resolved parallel interferometric near-infra-red spectroscopy (parallel iNIRS) with a fast two-dimensional and a single-channel iNIRS	M. Marzejon, K. Nowacka-Pieszak, M. Dąbrowski, D. Borycki
P16	**Marta Mikuła-Zdańkowska**	Recent advances in the Spatio-Temporal Optical Coherence Tomography (STOC-T) for in vivo cellular-level imaging of the human retina	M. Mikuła-Zdańkowska, D. Borycki, P. Węgrzyn, M. Wojtkowski
P17	**Jadwiga Milkiewicz**	Impact of diurnal IOP variations on the multi-spot air-puff OCT measurements	J. Milkiewicz
P18	**Klaudia Nowacka-Pieszak**	Speckle contrast analysis in parallel interferometric near-infrared spectroscopy for cerebral blood flow monitoring	K. Nowacka-Pieszak, S. Samaei, D. Borycki
P19	**Anna Avesani**	Synergistic Effects of Chronic Lead Exposure and Genetic Predisposition on Retinal Degeneration	A. Avesani, G. Targa, M. Di Peco, S. Peluso, M. Cambiaghi, D. Dell'Orco
P20	**Jagoda Płaczkiewicz**	A Viral Vector Approach for Restoring Light Sensitivity with Modified Opsins	J. Płaczkiewicz, K. Saran, B. Bałamut, A. Galińska, A. T. Foik
P21	**Poster withdrawn**		
P22	**Piotr Rutkowski**	Inferring multimodal single-cell feature signatures with topic modeling	P. Rutkowski, N. Ochocka-Lewicka, D. Panas, M. Ficek, M. Tabaka
P23	**Karolina Saran**	Characterization of Visual Information Processing Alterations in the RHOP23H/WT Rat Model of Retinitis Pigmentosa	K. Saran, A. Galińska, H. Leinonen, A. T. Foik
P24	**Przemysław Struk**	Swept source optical coherence tomography imaging by an MOEMS endomicroscopy probe with Mirau micro-interferometer and two-axis electrothermal micro-scanner using Lissajous curves scanning.	P. Struk, S. Bargiel, M. Józwik, B. Mirecki, M. Wojtkowski, H. Xie, C. Gorecki
P25	**Bartłomiej Bałamut**	Visually evoked retinal responses in a pharmacological model of an early stage of photoreceptor degeneration	B. Bałamut, P. Węgrzyn, A. Posłuszny, A. T. Foik
P26	**Valerio Marino**	Interaction between RD3 and GCAP1 in photoreceptors: implica-tions for retinal dystrophies and therapy	V. Marino, A. Biasi, E. O. Ahoulou, J. B. Ames, D. Dell'Orco
P27	**Jibran Riaz**	Swept-Source vs Spectral-Domain OCT in Anterior Segment Imaging	J. Riaz

P28	**Maryam Dinpajhouh**	Expanding the Dynamic Range of Glaucoma Assessment with Peripapillary Optical Coherence Tomography towards End-Stage Disease using a Deep Learning-Based Framework	M. Dinpajhouh, P. van Ooijen, N. Janson
P29	**Austėja Trečiokaitė**	High-throughput spatio-temporal optical coherence tomography (HT-STOC-T)	K. Adomavičius, A. Trečiokaitė, E. Tarvydas, E. Auksorius
P30	**Rosa Vila-Andrés**	Lensless Digital In-line Holography: Application to the characterization of ophthalmic solutions for refractive error compensation	R. Vila-Andrés, S. Ferrer-Altabás, A. Martínez-Espert, J.J. Esteve-Taboada, V. Micó
P31	**Armin Eskandarinasab**	Region-Based Phasor Analysis of Multispectral Retinal Images for Disease Identification	A. Eskandarinasab, L. Rey-Barroso, F.J. Burgos-Fernández, M. Vilaseca
P32	**Katarzyna Kunio**	Enabling Safe, High-Resolution Two- and Three-Photon Imaging at Microwatt Powers	K. Kunio, G. Soboń, J. Bogusławski
P33	**Lars-oliver Peters**	A rare mutation in GCAP1 disrupts the function of the cGMP-signaling protein complex and causes Retinitis Pigmentosa	L. Peters, T. Ben-Yosef, K.Koch
P34	**Lorenzo Fratini**	Validating Saccade Amplitude Measurement with a Webcam-based Eye Tracker	L. Fratini, J. Pujol, J.L. Güell, C. Mestre
P35	**Nataliya Galagan**	Cas9-based method to deplete abundant sequences in sequencing libraries, shown in cell lines with potential for FFPE applications	N. Galagan
P36	**Patryk Bielski**	Bicelles as versatile platforms for rhodopsin in biophysical applications	P. Bielski, J. Bożek, V. Marino, D. Dell'Orco, C. Dosche, I. Brand, K.W. Koch
P37	**Julia Dudek**	Calibration method for lensless holographic tomography	J. Dudek, M. Rogalski, E. Wdowiak, P. Arcab, J. Winnik, P. Zdańkowski, M. Trusiak
P38	**Krzysztof Tołpa**	Retinal Based Eye-Tracking for Non-Invasive Detection of Early-Stage Parkinson's Disease	K. Tołpa, M. Skrok, B. Bylicka, R. Konklewski-Pilewicz, V. Pryhodiuk, M. Nowakowski, A. Szkulmowska, M. Szkulmowski
P39	**Simon Winter**	Retinal peripheral image quality in Chinese children's eyes	S. Winter, C. Liu, Z. Lin, P. Artal, W. Lan, L. Zheleznyak
P40	**Saurav Karmakar**	Structural, Biophysical and Bioinformatics Insights into PDE6 as a Pillar protein in the Phototransduction Cascade	S. Karmakar
P41	**Nelam Kumar**	Retinal Guanylyl Cyclase: domains, ligands, and diseases	N. Kumar, H. Fernandes
P42	**Paulina Ibek**	Advancing Precision Diagnostics for Delineation of Basal Cell Carcinoma in Hyperspectral Images	P. Ibek, A. Degener, M. Stridh, P. Edén, V. Olariu, M. Malmsjö, A. Merdasa
P43	**Anna Izabela Grabowska**	Quantification of Retinol-Binding Protein 3 via labelled antibodies followed by Two-Photon Excitation Fluorescence Imaging as an early Biomarker for Diabetic Retinopathy	A. I. Grabowska, V. Kaushik, L. Gessa, K. Saran, M. Gumkowska, A. Galińska, H. Doleżyczek, A. Foik, H. Fernandes
P44	**Damian Panas**	Interactive exploration of single-cell trajectories with Cell Journey	D. Panas, M. Tabaka
P45	**Raúl Urriza Arpal**	Visualization and quantification of mechanical wave propagation in soft media using phase-sensitive OCT and focused-ultrasound stimulation	R. Urriza Arpal, P. Pyzik, Ł. Ambroziński, I. Grulkowski
P46	**Anna Maria Błońska**	Residual visual dysfunction in Purtscher-like retinopathy despite full visual acuity recovery: a case highlight	A. M. Błońska
P47	**Stefania Robakiewicz**	CUT&Tag for Profiling Histone Modifications and Transcription Factors in Human Cells and Tissues	S. Robakiewicz, M. Tabaka
P48	**Piotr Nalewajko**	Blueprint for Low-Cost, Flexible OCT (Work-in-Progress)	P. Nalewajko, K. Gromada, K. Karnowski
P49	**Łukasz Jarzęcki**	Cascaded Enhancement of angiography – split spectrum algorithm on polarization sensitive OCT data	Ł. Jarzęcki, K. Karnowski
P50	**Mateusz Nowak**	Architecture and Initial Tests of a simultaneous, Two-Meridian OCT for Corneal Air-Puff Studies	M. Nowak, K. Karnowski
P51	**Joanna Bem**	Unraveling Gene Regulation: Combined RNA and Chromatin Profiling at Single-Cell Resolution	A. Zawada, J. Bem, N. Ochocka, S. Robakiewicz, K. Krawczyński, N. Galagan, D. Panas, A. Kornacka, M. Tabaka, L. Wolińska-Nizioł
P52	**Agata Labedz**	Development of new rabies virus vectors with modified tropism toward retinal cells	A. Labedz, J. Płaczkiewicz, L. Piórkowska, A. Foik
P53	**Barbara Kominek**	X-linked hereditary nephropathy in Canis lupus familiaris as a translational model for Alport syndrome in humans	B. Kominek, J. Gruszczyńska, B. Grzegrzółka
P54	**Maciej Barna**	Real-time hyperspectral clusterization for two-photon ophthalmic imaging of the mouse retina	M. Barna, G. Palczewska, K. Kunio, G. Soboń, K. Palczewski, J. Bogusławski

Notes