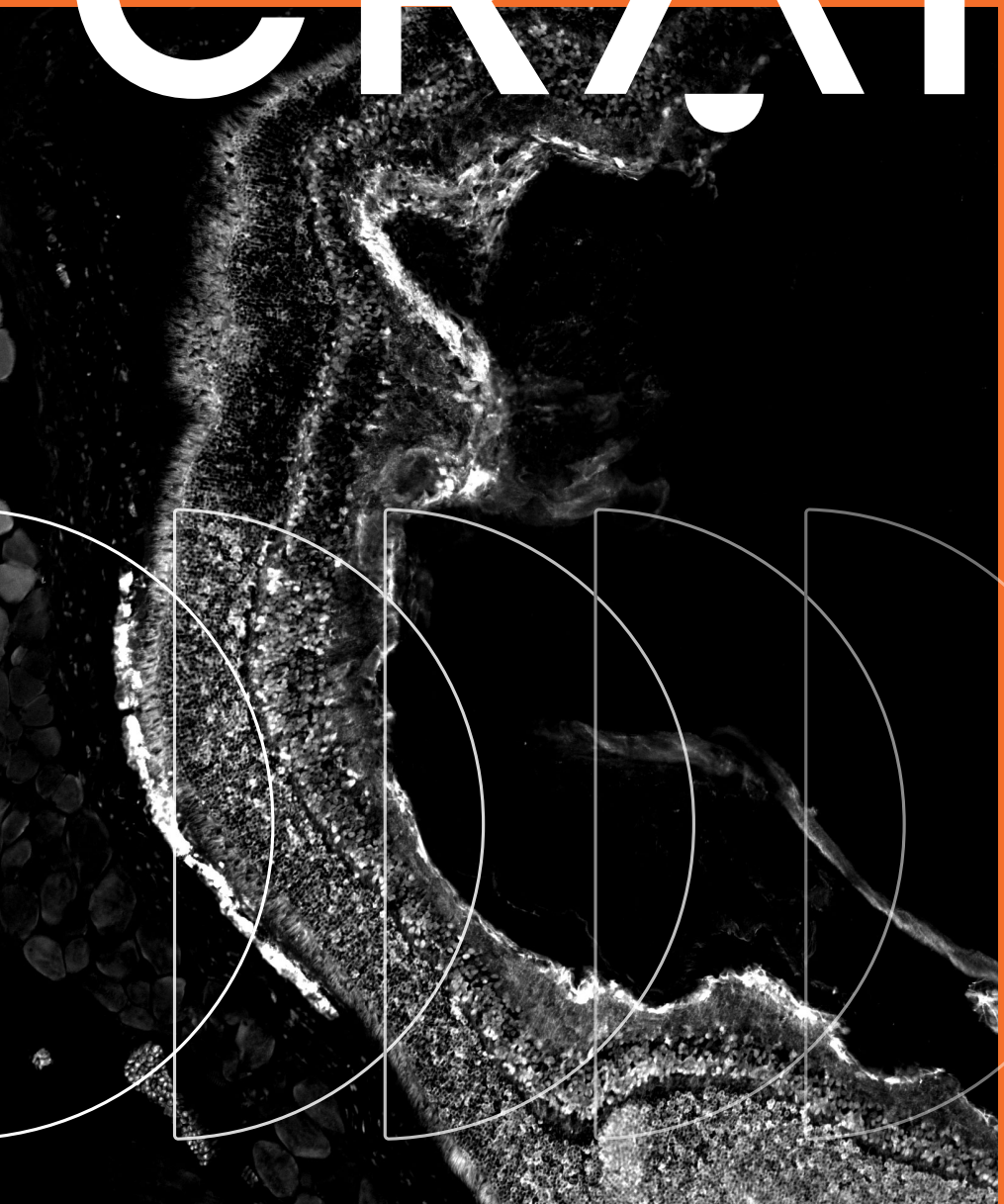
Conference on Recent Advances in Translational Eye Research 2023

September 7–8, 2023

Copernicus Science Center, Warsaw, Poland

CRATER



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ICTER International Centre for Translational Eye Research

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Dear Participants of CRATER'2023,

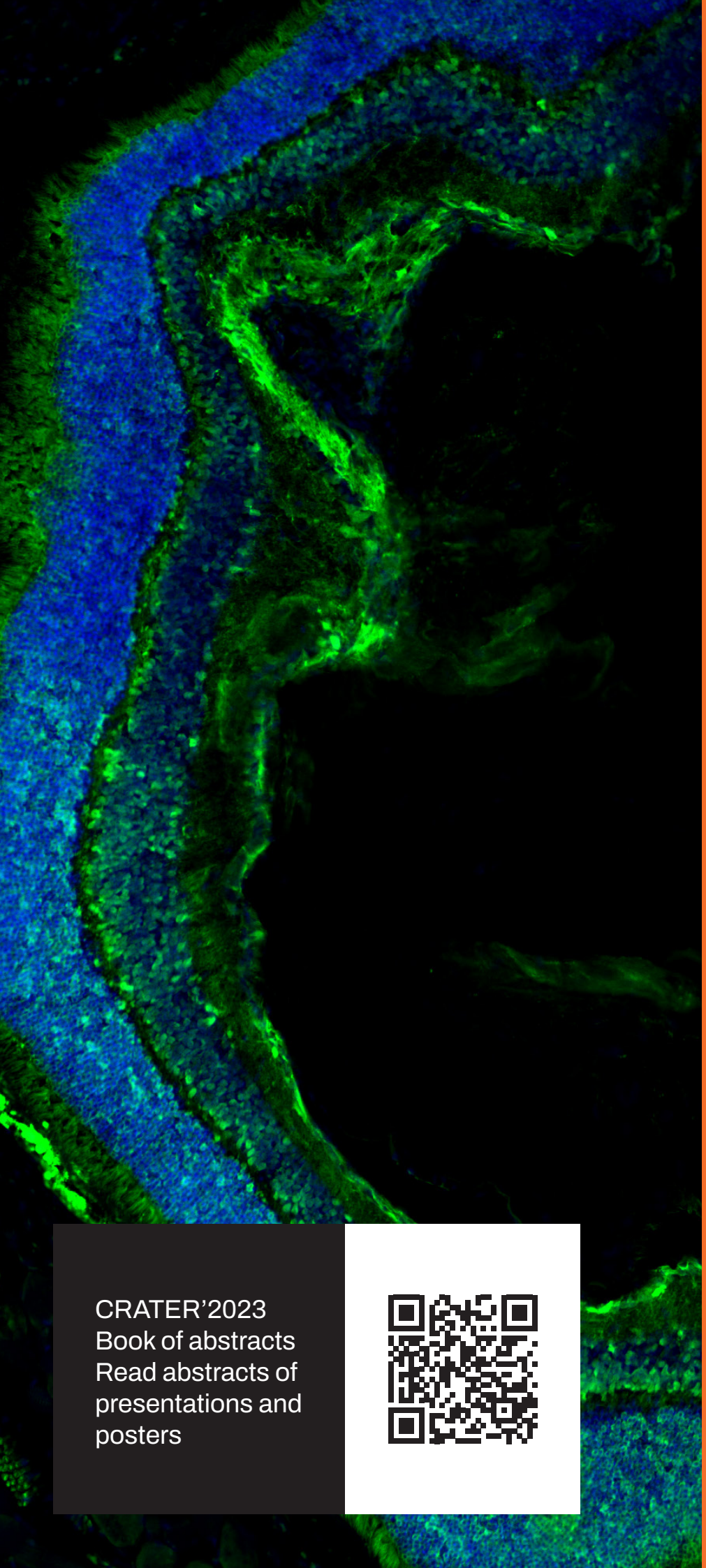
We are very pleased to invite you to the inaugural CRATER - Conference on Recent Advances in Translational Eye Research. This event has been prepared by ICTER as a vibrant platform for the exchange of ideas, dissemination of research results and exploration of cutting-edge advances related to translational eye research.

ICTER - International Centre for Translational Research of the Eye was established in 2019 as a center of excellence. The institution was established thanks to an International Research Agenda grant application, led by Maciej Wojtkowski and Krzysztof Palczewski, awarded by the Foundation for Polish Science (FNP). Researchers at the centre are working on breakthrough technologies for eye imaging and facilitating procedures to save or restore vision. The research is interdisciplinary and involves fields such as biology, chemistry, physics and computer science. The results of these endeavours will pave the way for the creation of innovative technologies that will serve society in times to come.

After five years of ICTER, we meet today at CRATER to discuss progress, ambitions and future plans for ICTER. The Organizing Committee has worked over the past three years to provide a platform to discuss the frontiers of research into new methods and tools to diagnose and treat eye diseases, as well as ideas on how to facilitate the rapid implementation of new eye therapies.

We strongly encourage active participation in the conference and discussions. The two-day program is filled with outstanding presentations, celebratory moments and an insightful poster session. The convergence of the diverse communities represented here offers a unique opportunity to broaden your horizons, forge new collaborations and immerse yourself in the global essence of translational eye research. We hope you enjoy the conference program, experience the captivating atmosphere and have a great time in Warsaw.

Best regards,
ICTER Management Board
& Organising Committee



CRATER'2023
Book of abstracts
Read abstracts of presentations and posters

Conference Chairs

Andrew Dick
Krzysztof Palczewski
Maciej Wojtkowski

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Chris Dainty
Francesca Fanelli
Arie Gruzman
Alison Hardcastle
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Serge Picaud
Olaf Strauss

Organising Committee

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Anna Pawlus
Klaudia Nowacka
Barbara Czerw

Day 1

7 September

8:00	Registration & Coffee & Cookies	
9:00	Opening remarks	
9:20	ICTER - research centre with a mission to save sight Maciej Wojtkowski	
9:40	Service Appreciation Ceremony Chris Dainty	
9:50	Plenary: The special barrier functions of the retinal pigment epithelium, a target for disease monitoring Olaf Strauss	
10:30	Coffee break	
10:50	Plenary: Visual restauration in blind patients: from prosthesis to sonogenetic therapy Serge Picaud	
11:30	Plenary: Cellular Senescence in Retinal Vascular Diseases Przemysław Sapieha	
12:10	Plenary: Documenting the spatial redistribution of hyperpigmented spots during enlargment of geographic atrophy Michel Paques	
12:50	Lunch break	
14:00	PARALLEL SESSION I.1: WAVEFRONT CONTROL AND TWO PHOTONS IN THE EYE Auditorium A	PARALLEL SESSION I.2: FROM GENE TO EYE TREATMENT Auditorium B
	Invited: Developing two-photon excited fluorescence imaging to assess retinal function Christina Schwarz	Invited: Modelling inherited retinal diseases with retinal organoids Alison Hardcastle
	Invited: Clinical Applications of AOSLO Retinal Imaging Joseph Carroll	Visual information processing in retinal degeneration and vision restoration Andrzej Foik
	In vivo imaging of the human eye using a two-photon-excited fluorescence scanning laser ophthalmoscope Jakub Bogusławski	Embryonic knockout of Nr2e3 protects photoreceptors in three different mouse models of retinal degeneration Alexander Kolesnikov
	Invited: Peripheral optics in the eye: from myopia to cataracts Pablo Artal	Invited: Rhodopsin confromational modulators and their potential use in the treatment of retinitis pigmentosa Pere Garriga
	Spectral sensitivity curve for two-photon vision Katarzyna Komar	Multimodal approaches for resolving dynamical biological processes by single-cell sequencing Marcin Tabaka
16:00	POSTER SESSION Copernicus Science Center	
18:30 - 22:00	CONFERENCE RECEPTION Lumen – Elektrownia Powiśle	

Day 2

8 September

8:00	Registration & Coffee & Cookies	
8:30	PARALLEL SESSION II.1 – NEW IMAGING METHODS FOR ANTERIOR EYE	PARALLEL SESSION II.2 – NOVEL METHODS OF EYE IMAGING
	New insights into development of aging of the crystalline lens from high-resolution and high-sensitive in vivo optical imagingr Ireneusz Grulkowski	Invited: Full field optical coherence tomography: in vivo and in vitro ocular imaging Kate Grieve
	Cornea ultra-fast confocal and aberration-free 3D imaging with a multi-spectral matrix microscope Victor Barolle	Diffused-illumination full-field swept-source optical coherence tomography Leo Puyo
	Wavefront shaping and Optical Memory Effect of ex-vivo cataractous crystalline lenses Alba Panigua Diaz	Melanin-specific contrast retinal imaging of small animals with polarization-diversity optical coherence tomography YuJie Hu
	On imaging of structure and function of the human cornea Karol Karnowski	Invited: Spatio-temporal optical coherence tomography (STOC-T) for in vivo retinal and corneal imaging Egidijus Auksorius
	Eye in Focus: Strategies for Extending the Imaging Depth of Vitreous with SS-OCT Vashantha Kathirvelu	In vivo imaging of retina regeneration in adult zebrafish using ultrahigh resolution optical coherence tomography Juliane Hammer
10:20	Coffee break	
10:50	PARALLEL SESSION III.1 – MOLECULAR PROCESSES OF VISION	PARALLEL SESSION III.2 – FUNCTIONAL AND CONTRAST ENHANCEMENT IN RETINAL IMAGING
	Invited: A structure network-based computational model for screening rhodopsin mutants and pharmacological chaperones Francesca Fanelli	Invited: Optoretinography – technology, mechanisms and applications Ramkumar Sabesan
	Invited: Development of fluorinated derivatives of retinal analog: emixustat as drug candidates for the treatment of retinal degenerative diseases Arie-lev Gruzman	Invited: Real-time, high-throughput digital hologram rendering for Doppler imaging and optical coherence tomography in ophthalmology. Estimation of blood volume rate and resistivity changes in retinal arteries. Michael Atlan
	Invited: Recombinant protein delivery for the treatment of inherited retinal diseases Daniele Dell'Orco	Invited: Progress on assessment of retinal physiology with optoretinography (ORG) Robert J Zawadzki
	Invited:Structural mechanisms and drug-receptor interactions leading to biased signaling of G protein coupled receptors Krzysztof Jóźwiak	Invited: Light-evoked retinal pigment epithelium dynamics revealed by optoretinography Bingyao Tan
	From Structure to Diagnosis: Unveiling Protein Conformational Changes to Drive Innovations in Ophthalmic Research Huberto Fernandes	Optoretinography: measuring objective functional responses to light in human and mouse eyes Andrea Curatolo
12:40	Lunch break	

13:40	Planary: The three laws of communication Jean-Iuc Doumont
14:40	INDUSTRIAL HIGHLIGHTS
	Collaborative Progress in Ophthalmology: Heidelberg Engineering's Research and Innovation Roland Rocholz
	Eye as a window to the brain: applications in ophthalmology and beyond Hamed Bahmani
	From Research to Impact: The ZEISS Approach to Open Innovation Tilman Schmoll
15:40	Coffee break
16:10	Plenary: Precise genome editing in the eye: curing blindness is now within sight Krzysztof Palczewski
16:50	CONFERENCE-WRAP-UP
	Awards for the best poster Maciej Wojtkowski
	Closure of the conference Maciej Wojtkowski

Posters

P1	**Magdalena Asejczyk**	A mechanical model of the human eye to investigate the effect of intraocular pressure on lens displacement	S. Zahabia, M. Asejczyk, M. Salimibania
P2	**Bartłomiej Bałamut**	Shedding light on calcium dynamics and membrane potential control with optogenetics	B. Bałamuta, J. Płaczkiewicz, K. Sarana, A. T. Foik
P3	**Amedeo Biasi**	Supramolecular complexes of GCAP1 in inherited retinal dystrophies	A. Biasi, V. Marino, G. Dal Cortivo, D. Dell'Orco
P4	**Patryk Bielski & Justyna Bożek**	From bicelles to a model bilayer containing rhodopsin – a novel method for biomimetic studies	P. Bielski, J. Bożek, I. Brand, K. W. Koch
P5	**Mehdi Borjkhani**	A biophysical computational model of a cortical column in the primary visual cortex	M. Borjkhani, A. T. Foik
P6	**Marina Cunquero**	Maping the structure and function of whole-mount retinal organoids	M. Cunquero, G. Castro-Olvera, M. Marsal, H. Isla-Magrané, M. Zufiaurre, J. García-Arumí, A. Duarri, P. Loza-Alvarez
P7	**Michał Dąbrowski**	Two-photon excited fluorescence scanning laser ophthalmoscope enables robust retina imaging in healthy volunteers	M. Dąbrowski, J. Bogusławski, S. Tomczewski, J. Milikiewicz, M. J. Marzejon, K. Komar, G Palczewska, K. Palczewski, M. Wojtkowski
P8	**Fabian Debowy**	The comparison between software optimized accommodation and formula given accommodation	F. Debowy, B. Pierscionek
P9	**Evangeline Priyadharshini Devaraj**	4-D Imaging of Vitreous Using SS-OCT System	E. Priyadharshini Devaraj, D. Ruminski, B. Kaluzny, J. Sebag, I. Grulkowski
P10	**Zachary Engfer**	Two genetic mouse models of Stargardt disease display differences in targeting of ceramide levels and immune cell crosstalk in response to retinal degeneration	Z. J. Engfer, D. Lewandowski, Z. Dong, G. Palczewska, J. Zhang, K. Kordecka, J. Płaczkiewicz, D. Panas, A. T. Foik, M. Tabaka, K. Palczewski
P11	**Adrian Fernandez Uceda**	Endoscopic en-face optical coherence tomography and fluorescence imaging using correlation-based probe tracking	M. Marques, M. Hughes, A. Fernandez Uceda, G. Gelikonov, A. Bradu, and A. Podoleanu
P12	**Paulina Frycie**	Hyperspectral detection in multiphoton microscopy without a spectrometer	P. Frycie, A. Kwaśny, J. Bogusławski
P13	**Anna Galińska**	Creation of viral plasmids for enhancement of the signal transduction in the retina	A. Galińska, J. Płaczkiewicz, B. Bałamut, A.T. Foik
P14	**Izabela Garaszczuk**	Optical coherence tomography-based tear clearance rate as a marker of dry eye disease	
P15	**Luca Gessa**	Structure and conformational changes of RBP3	L. Gessa, V. Kaushik, N. Kumar, H. Fernandes
P16	**Krzysztof Gromada**	Asynchronous Kalman filtering for real time needle position estimation in OCT-assisted surgery	A. Kurek, T. Piesio, A. Curatolo
P17	**Ireneusz Grulkowski**	Assessment of corneal dynamics in normal, forme fruste and keratoconic eyes using air-puff OCT-based optical biometer	P. Młyniuk, E. Mączyńska-Walkowiak, J. Rzeszewska-Zamiara, A. Jimenez-Villar, BJ. Kałużny, I. Grulkowski
P18	**Oliwia Kaczkoś**	Contrast sensitivity function for two-photon vision based on the method of determining the luminance of the stimuli	O. Kaczkoś, M. Marzejon, J. Pniewski, M. Wojtkowski, K, Komar
P19	**Lynn Kandakji**	Subclinical Keratoconus Detection using Deep Learning on Raw Anterior-Segment Optical Coherence Tomography Imaging	H. Maile, S. Balal, S. Kanda, O. Li, M. Leucci, W. Woof, A. Wilter, I. Moghul, A. Hardcastle, K. Balaskas, S. Tuft, D. Gore, B. Allan, N. Pontikos
P20	**Karol Karnowski**	Robotic arm-based surgical tool tracking for real-time display of intraoperative OCT cross-sections at the surgical tool tip	K. Karnowski, P. Ciąćka, K. Gromada, T. Piesio, A. Kurek, A. Curatolo
P21	**Piotr Kasprzycki**	Optimization-free, phase utilizing alignment method for multiple spectrometer-based OCT	P. Kasprzycki, M. Szkulmowski, M. Wojtkowski, K. Karnowski
P22	**Vineeta Kaushik & Łukasz Olejnik**	A protein structural biology approach to understanding morphological changes in photoreceptor outer segment after light activation: a closer look at PDE6	V. Kaushik, L. Gessa, S. Tomczewski, S. Goswami, Ł. Olejnik, N. Kumar, H. Fernandes
P23	**Mengyuan Ke**	Wide dynamic range digital aberrometry and fast anterior-segment imaging with MHz SS-OCT	M. Ke, A. Kumar, B. O. Meyer, T. E. Ansbæk, R. A. Leitgeb,
P24	**Julia Kochańska**	Multi-range scanning laser ophthalmoscope for imaging the morphology and dynamics of the retinal vessels	J. Kochańska, M. Szkulmowski, P. Stremplewski, E. Dąbrowska, M. Sylwestrzak, K. Dalasiński, J. Wolf, M. Hellmann, K. Narkiewicz, A. Szkulmowska
P25	**Radim Kolar**	Phase analysis of retinal image sequences using Fourier transformation	R Kolář, J. Šíma, T. Vičar, E. Valterová, J. Chmelík, R. Jakubíček, J. Odstrčilík

P26	**Katarzyna Kordecka**	Current impulses induce different activity patterns in the visual system	K. Kordecka, E. Kublik, W. J. Waleszczyk, A. T. Foik
P27	**Maciej Kostałkowski**	Deep Learning models for retinal cell classification	M. Kostałkowski, K.Kordecka, J.Płaczkiewicz, A.Posłuszny, A.T.Foik
P28	**Agata Kotulska**	Heterochromatic flicker photometry for two-photon vision	A. Kotulska, M. Marzejon, D. Stachowiak, G. Soboń, M. Wojtkowski, K. Komar
P29	**Wiktor Kulesza**	Hemodynamics monitoring in mouse retinal vessels via ultrafast volumetric Spatio-Temporal Optical Coherence Tomography (STOC-T) imaging	W.Kulesza, M.Wielgo, P. Węgrzyn, S. Tomczewski, K. Kordecka, A. Galińska, B. Bałamut, E. Auksorius, A. Foik, R. Zawadzki, M. Wojtkowski, D. Borycki, A. Curatoloa,
P30	**Nelam Kumar & Sathi Goswani**	Regulation of Retinal membrane Guanylate Cyclases (RetGC's) by modulator proteins	N. Kumar, S. Goswami, H. Fernandes
P31	**Katarzyna Kunio**	Compact, linearly polarized, high-brightness supercontinuum source for biomedical applications	K. Kunio , J. Bogusławski, D. Tomaszewska-Rolla, G. Soboń
P32	**En Lu**	Developing a digital-twin of human retina enabling simulation of OCT image formation	E. Lu, C. J. Chu, S. Cipiccia, M. V. Sarunic, M. Paques, P. R.T. Munro
P33	**Marcin Marzejon**	Effect of laser pulse train parameters on the brightness of a two-photon stimulus	M. J. Marzejon, Ł. Kornaszewski, M. Wojtkowski, K. Komar
P34	**Ewa Mączyńska-Walkowiak**	Investigation of the relation between eye refractive error and air-puff induced corneal dynamics measured with optical coherence tomography	E. Mączyńska-Walkowiak, P. Młyniuk, J. Rzeszewska-Zamiara, A. Jimenez-Villar, K. Karnowski, B. J. Kałużny, I. Grulkowski
P35	**Carolline Menezes**	Infrared pupillometry: a neurological tool for evaluating therapeutics for inherited retinal disorders	C. Menezes, S. Du, G. Palczewska, Z. Dong, X.Ma, K. Palczewski
P36	**Marta Mikuła-Zdankowska**	Refining the STOC-T system for in vivo cellular-level imaging of the human retina	M. Mikula-Zdankowska, D. Borycki, P. Węgrzyn, M. Wojtkowski
P37	**Jadwiga Milkiewicz**	Opto-mechanical design of multi-spot air-puff OCT clinical prototype	J. Milkiewicz, O. Cetinkaya, R. Pietruch, E. Mączyńska-Walkowiak, P. Młyniuk, A. Eliasy, A. Abass, A. Elsheikh, A. Curatolo, S. Marcos, B. Kałużny, M. Wojtkowski, K. Karnowski
P38	**Monir Modaresinejad**	Lactate Receptor, HCAR1 Deficiency Leads to Cellular Stress Compromising Choroidal Integrity of the Developing Outer Retina	M. Modaresinejad, X. Yang, E. Bajon, Ch. Quiniue, X. Hou, J. C. Rivera, S. Chemtob
P39	**Milena Mućka**	Signal transduction cascade modulation using TRP protein	M. Mućka, J. Płaczkiewicz, A. T. Foik
P40	**Klaudia Nowacka**	Using dynamic light scattering enhances the imaging capabilities of optical coherence tomography	K. Nowacka, K. Karnowski, M. Wojtkowski, D. Borycki
P41	**Katarzyna Paluch**	Working memory items outside the focus of attention: evidence from single-neuron recordings in humans.	M. Magnuski, W. Średniawa , D. Ivanovski, W. Fortuna, K. Smarzewska, M. Służewska-Niedźwiedź, P. Tabakow, H. Babu, J. Kamiński
P42	**Jagoda Płaczkiewicz**	Recombinant Rhodopsin, a novel optogenetic tool	J. Płaczkiewicza, K. Saran, L. Piórkowska, B. Bałamut, A. T. Foik
P43	**José Javier Ruiz**	Non-destructive characterization and classification of choroidal melanoma biopsies with Raman Spectroscopy	J.J. Ruiz, M. Terán, D. Masip, D. Lorenzo, L. Arias, D. Merino, J.M. Caminal, P. Loza-Alvarez
P44	**Karolina Saran**	Stable cell line generation for Rabies VLPs production	K. Saran, J. Płaczkiewicz, A. T. Foik
P45	**Keerthana Soman**	Optical signal discontinuity zones of the crystalline lens at different accommodation demands	K. Soman, A. Gupta, D. Rumiński, B. J. Kaluzny, K. Karnowski, P. Artal, I. Grulkowski
P46	**Dorota Stachowiak**	Widely tunable femtosecond fiber laser (870-1085 nm) with adjustable repetition rate for studying two-photon vision	D. Stachowiak, J. Bogusławski, M. J. Marzejon, Z. Łaszczych, M. Wojtkowski, K. Komar, G. Soboń
P47	**Przemysław Struk**	MOEMS endomicroscopy probe with Mirau micro-interferometer and 2-axis electrothermal micro-scanner for OCT imaging using Lissajous trajectory scanning.	P. Struk, S. Bargiel, M. Józwik, B. Mirecki, M. Wojtkowski, Q. Tanguy, H. Xie, and C. Gorecki
P48	**Maciej Trusiak**	Lensless digital holographic microscopy: numerical and experimental advancements	M. Trusiak, M. Rogalski, P. Arcab, J. Winnik, E. Wdowiak, P. Zdańkowski, M. Józwik, M. Stefaniuk, M. Pawłowska, L. Stanaszek, J. Picazo Bueno, V. Micó
P49	**Maciej Wielgo**	Volumetric Image Registration Algorithm for Phase-Based Functional Optoretinography in Fourier-Domain Full-Field OCT	M. Wielgo, S. Tomczewski, A. Curatolo
P50	**Jakub Zarczuk**	In the world of preservative-free eye drops	P. Łuczyński, T. Pietrzak, J.Zarczuk
P51	**Piotr Zdańkowski**	Common path quantitative phase microscopy and tomography: new solutions and applications	J. Winnik, M. Rogalski, E. Wdowiak, K. Patorski, M. Trusiak

Notes

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