

Kari Vienola | CV

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Education

Vrije Universiteit Amsterdam **Amsterdam, the Netherlands**
PhD, Biomedical Optics 2011–2017

Thesis title: [Imaging the structure and the movement of the retina with scanning light ophthalmoscopy](#)

Supervisor: Prof. Johannes F. de Boer

University of Turku **Turku, Finland**
MSc, Medical Physics 2009–2011

Thesis title: [Combining Near-Field and Far-Field Microscopy: A new method for nanoscale super-resolution imaging](#)

Supervisors: Dr. Tuomas Näreoja and Prof. Jarno Salonen

University of Turku **Turku, Finland**
BSc, Physics 2006–2009

Thesis title: STED-mikroskopia (*STED microscopy in English*)

Supervisors: Dr. Timo Laitinen and Prof. Pekka Hänninen

Research Experience

University of Turku, Institute of Biomedicine, Faculty of Medicine **Turku**
Academy Research Fellow 2023–

- The project funded by the Research Council of Finland is focused on obtaining light-evoked responses from the human retina (healthy and eyes with disease) using a new technology called optoretinography (ORG).
- Other research interests include measuring fixational eye movements and full-field optical coherence tomography (FF-OCT)

UC Davis, Department of Ophthalmology and Vision Science **Sacramento, CA**
Postdoctoral Scholar, Vision Science and Advanced Retinal Imaging Laboratory (VSRI) 2019–2022

- Designed and built a novel OCT system for noninvasive, objective test of neural function in the retina (optoretinography, ORG), patent pending: [US20250143566A1](#)
- Phase-stabilized OCTA imaging using real-time eye tracking

University of Pittsburgh, Department of Ophthalmology **Pittsburgh, PA**
Postdoctoral Associate, Eye and Ear Institute 2017–2019

- Built a multi-channel adaptive optics scanning laser ophthalmoscope (AOSLO) capable of imaging 3 channels simultaneously
- Designed a split detection scheme, where detected light is split into two, confocal and non-confocal signal, and the non-confocal imaging path was capable of performing offset imaging.
- Successfully imaged retinal pigment epithelial (RPE) cells in patients with age-related macular degeneration using 663 nm and 795 nm excitation wavelengths

Vrije Universiteit Amsterdam, Department of Physics and Astronomy **Amsterdam**
PhD researcher, Rotterdam Ophthalmic Institute 2011–2017

- Built and designed a novel ophthalmoscope using a digital micro-mirror device (DMD) technology
- Developed data acquisition software and image processing tools to interpret the data
- Performed proof-of-concept testing to use the DMD-ophthalmoscope for eye tracking
- Research lead to a patent: [US20160157715A1](#)
- Combined scanning laser ophthalmoscope with OCT system to track the eye motion in real-time and minimize the motion artefacts generated by eye motion

University of Turku, Institute of Biomedicine **Turku**
Research assistant 2010–2011

- o Sample preparation (including fluorescent labeling) for STED fluorescence microscopy
- o Fluorescence lifetime imaging testing using the STED microscope
- o Designed and executed experiments using simultaneous data acquisition with atomic force microscope and STED microscope for osteoclast imaging and studying bone resorption

Teaching experience

MDP in Biomedical Imaging

UTU
2022–

Responsible teacher

- o BIMA5108 Biomedical Imaging Project Work (5 ECTS)
- o MEDI3306 Radiation Protection (2 ECTS)
- o DENT0175 Introduction to Radiation Physics (1 ECTS)
- o BIMA2113 Scientific Seminary Diary (2 ECTS)
- o BIMA5105 Fluorescence in bioanalytical research (4 ECTS)
- o BIMA5107 Physical Basis of Medical Imaging (4 ECTS)

Other Skills and Qualifications

Programming and modeling

LabVIEW, MatLAB, ZEMAX, Fusion 360, Python

Productivity tools

Inkscape/Illustrator, Gimp/Photoshop, MS Office, L^AT_EX

Languages

Finnish (native), English, German (Intermediate), Swedish (Conversational), Dutch (Basics)

Obtained funding

2023: Academy of Finland, 678 147 e (OCT-based functional and structural biomarkers for age-related macular degeneration)

2023: Maupertuis program, 6000 e (Perspectives in advanced Light Microscopy and Master's degrees)

Honors and Recognitions

2025: Exceptional Reviewer (Translational Vision Science Technology)

2025 & 2019: Exceptional Reviewer (Investigative Ophthalmology & Vision Science)

2024 & 2020: Outstanding reviewer award (Biomedical Physics & Engineering Express)

2019: Martha Wandrisco Neff Award in Macular Degeneration Research

2019: NVIDIA GPU Grant

2016: Association for Research in Vision & Ophthalmology (ARVO) International Travel Grant

2016 & 2014: Members-in-Training Outstanding Poster Award Finalist (ARVO Annual Meeting)

2013: Biophotonics Graduate Summer School SPIE Poster Award

Academic memberships and positions of trust

Memberships:

- o Association for Research in Vision & Ophthalmology (ARVO): 2013–
- o Society of Photo-Optical Instrumentation Engineers (SPIE): 2012–
- o Optica: 2012–2018, 2025–
- o Finnish Physical Society: 2010–2015
- o Photonics Finland: 2022–
- o International Society for Eye Research: 2024–

Positions of trust:

- o A member of [the Finnish Publication Forum](#)
- o A member of the Steering Board for Biomedical Imaging MSc programme, University of Turku
- o A member of the Scholarship committee for international students, University of Turku
- o A member of the Development of Guidance in International MDPs working group, University of Turku

Publications

- 2025: Denise Valente, **Kari V. Vienola**, Robert J. Zawadzki, Ravi S. Jonnal, "[Insight into human photoreceptor function: modeling optoretinographic responses to diverse stimuli](#)," *Science Advances* 11(24), eadq7332
- 2024: **Kari V. Vienola**, John A. Holmes, Zolten Glasso, and Ethan A. Rossi, "[Head stabilization apparatus for high-resolution ophthalmic imaging](#)," *Applied Optics* 63 (4), 940-944
- 2024: Reddikumar Maddipatla, Christopher S. Langlo, **Kari V. Vienola**, Maciej M. Bartuzel, Ewelina Pijewska, Robert J. Zawadzki, Ravi S. Jonnal, "[Exploring optoretinographic responses of photoreceptor function in disease-affected retinas](#)," *Proc. SPIE* 12824, 1282406, (2024)
- 2022: **Kari V. Vienola**, Denise Valente, Robert J. Zawadzki, and Ravi S. Jonnal, "[Phase-based optoretinography using tissue velocity](#)," *Optica* 9 (10), 1100-1108
- 2022: **Kari V. Vienola**, Raphael Lejoyeux, Elena Gofas-Salas, Valerie C. Snyder, Min Zhang, Kunal K. Dansingani, José-Alain Sahel, Jay Chhablani, and Ethan A. Rossi "[Autofluorescent hyperreflective foci on infrared autofluorescence adaptive optics ophthalmoscopy in central serous chorioretinopathy](#)," *Am. J. Ophthalmol. Case Rep.* 28, 101741
- 2022: Elena Gofas-Salas, Yuhua Rui, Pedro Mecê, Min Zhang, Valerie C. Snyder, **Kari V. Vienola**, Daniel M. W. Lee, José-Alain Sahel, Kate Grieve, and Ethan A. Rossi, "[Design of a radial multi-offset detection pattern for in vivo phase contrast imaging of the inner retina in humans](#)," *Biomed. Opt. Express*, 13(1), 117-132, (2022)
- 2022: **Kari V. Vienola**, Min Zhang, Valerie C. Snyder, Kunal K. Dansingani, José-Alain Sahel and Ethan A. Rossi, "[Near infrared autofluorescence imaging of retinal pigmented epithelial cells using 663 nm excitation](#)," *Eye* 36 (10), 1878-1883.
- 2021: **Kari V. Vienola**, Kunal K. Dansingani, Andrew W. Eller, Joseph N. Martel, Valerie C. Snyder, and Ethan A. Rossi, "[Multimodal Imaging of Torpedo Maculopathy With Fluorescence Adaptive Optics Imaging of Individual Retinal Pigmented Epithelial Cells](#)," *Frontiers in Medicine* 8: 769308 (2021).
- 2021: Denise Valente, **Kari V. Vienola**, Robert J. Zawadzki, Ravi S. Jonnal, "[Simultaneous directional full-field OCT using path-length and carrier multiplexing](#)," *Opt. Express*, 29(20), 32179-32195, (2021)
- 2020: Denise Valente, **Kari V. Vienola**, Robert J. Zawadzki, Ravi S. Jonnal, "[Kilohertz retinal FF-SS-OCT and flood imaging with hardware-based adaptive optics](#)," *Biomed. Opt. Express* 11(10), 5995-6011, (2020)
- 2020: Mehdi Azimipour, Denise Valente, **Kari V. Vienola**, John S. Werner, Robert J. Zawadzki, Ravi S. Jonnal, "[Optoretinogram: optical measurement of human cone and rod photoreceptor responses to light](#)," *Opt. Lett.* 45(17), 4658-4661, (2020)
- 2020: **Kari V. Vienola**, Ming Zhang, Valerie C. Snyder, José-Alain Sahel, Kunal K. Dansingani, Ethan A. Rossi, "[Microstructure of the retinal pigment epithelium near-infrared autofluorescence in healthy young eyes and in patients with AMD](#)," *Sci. Rep.* 10(1), 1-10, (2020)
- 2020: Mehdi Azimipour, Denise Valente, **Kari V. Vienola**, John S. Werner, Robert J. Zawadzki, Ravi S. Jonnal, "[Investigating the functional response of human cones and rods with a combined adaptive optics SLO-OCT system](#)," *Proc. SPIE* 11218, 1121813, (2020)
- 2019: Takahiro Deguchi, Elnaz Fazeli, Sami V. Koho, Paula Pennanen, Maria H. Alanne, Mayank Modi, John E. Eriksson, **Kari V. Vienola**, Pekka E. Hänninen, Juha Peltonen, "[Density and function of actin-microdomains in healthy and NF1 deficient osteoclasts revealed by combined use of AFM and STED-microscopy](#)," *J. Phys. D: Appl. Phys* 53, 014003, (2020)
- 2018: **Kari V. Vienola**, Mathi Damodaran, Boy Braaf, Koenraad A. Vermeer, and Johannes F. de Boer, "[In vivo retinal imaging for fixational eye motion detection using a high-speed digital micromirror device \(DMD\)-based ophthalmoscope](#)," *Biomed. Opt. Express* 9(2), 591-602 (2018)

- 2017: Mathi Damodaran, **Kari V. Vienola**, Boy Braaf, Koenraad A. Vermeer, and Johannes F. de Boer, "[Digital micromirror device based ophthalmoscope with concentric circle scanning](#)," Biomed. Opt. Express 8(5), 2766-2780 (2017)
- 2015: **Kari V. Vienola**, Mathi Damodaran, Boy Braaf, Koenraad A. Vermeer, and Johannes F. de Boer, "[Parallel line scanning ophthalmoscope for retinal imaging](#)," Opt. Lett. 40(22), 5335-5338 (2015)
- 2014: Boy Braaf, Koenraad A. Vermeer, Mattijs de Groot, **Kari V. Vienola**, and Johannes F. de Boer, "[Fiber-based polarization-sensitive OCT of the human retina with correction of system polarization distortions](#)," Biomed. Opt. Express 5, 2736-2758 (2014)
- 2013: Boy Braaf, **Kari V. Vienola**, Christy K. Sheehy, Qiang Yang, Koenraad A. Vermeer, Pavan Tiruveedhula, David W. Arathorn, Austin Roorda, and Johannes F. de Boer, "[Real-time eye motion correction in phase-resolved OCT angiography with tracking SLO](#)," Biomed. Opt. Express 4, 51-65
- 2012: **Kari V. Vienola**, Boy Braaf, Christy K. Sheehy, Qiang Yang, Pavan Tiruveedhula, David W. Arathorn, Johannes F. de Boer, and Austin Roorda, "[Real-time eye motion compensation for OCT imaging with tracking SLO](#)," Biomed. Opt. Express 3, 2950-2963
- 2012: Boy Braaf, Koenraad A. Vermeer, **Kari V. Vienola**, and Johannes F. de Boer, "[Angiography of the retina and the choroid with phase-resolved OCT using interval-optimized backstitched B-scans](#)," Opt. Express 20, 20516-20534