Stanford

Alfredo Dubra, PhD

Professor of Ophthalmology

Bio

BIO

My interest in ophthalmology started at a very early age, motivated by my own amblyopia and hyperopia. These led me to study physics and optics, first at the Universidad de la República (Uruguay), and later at Imperial College London (UK) and the University or Rochester (USA). Since then, my research has focused on the advancement of optical technologies for improving the understanding, diagnosing and monitoring of conditions that result in vision loss.

The premise that motivates all the work in my lab, is that after the first few days of life most retinal cells are post-mitotic, and thus early detection and treatment of disease are paramount for preventing vision loss. Therefore, my work is centered on optical technologies that can reveal and monitor pathology with ever increasing sensitivity and detail, even revealing cellular and sub-cellular structural and functional changes. I also believe that people affected by vision loss are better served by the scientific community if we work synergistically, and for that reason, everyone in my lab is committed to the dissemination of our technical advances across the vision research community.

ACADEMIC APPOINTMENTS

- Professor, Ophthalmology
- Member, Bio-X
- Member, Wu Tsai Human Performance Alliance
- Member, Wu Tsai Neurosciences Institute

ADMINISTRATIVE APPOINTMENTS

- Chair, Laser Safety Committee, Stanford University and SLAC, (2018- present)

HONORS AND AWARDS

- Overseas Research Student Award, Universities UK (Ex. Committee of Vice-Chancellors and Principals) (2000)
- Career Award at the Scientific Interface, Burroughs Wellcome Fund (2008)
- Career Development Award, Research to Prevent Blindness (2012)

BOARDS, ADVISORY COMMITTEES, PROFESSIONAL ORGANIZATIONS

- Member, The International Society for Optics and Photonics (2011 - present)
- Member, Association for Research in Vision and Ophthalmology (2001 - present)
- Member, Optical Society of America (2008 - present)

PROFESSIONAL EDUCATION

- PhD, Imperial College London, UK , Physics (2004)
- MSc, Universidad de la República, Uruguay , Physics (2000)
- BSc, Universidad de la República, Uruguay , Physics (1998)

PATENTS

- Alfredo Dubra. "United States Patent 8,226,236 Method and apparatus for imaging in an eye", University Of Rochester, May 18, 2006

LINKS

- Dubra Lab: https://dubralab.stanford.edu/

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

The optics of the eye can be thought of as an imperfect microscope objective through which the retina can be observed. Our lab develops and uses adaptive optics, eye movement correction and optical microscopy technologies to improve the non-invasive visualization of the retina to the point that individual retinal structure and function and can be visualized at the cellular and even sub-cellular scale.

Teaching

STANFORD ADVISEES

Postdoctoral Faculty Sponsor

Gaston Ali Ayubi Zavalla

Publications

PUBLICATIONS

- **Two-lens telecentric model eyes for image distortion measurement in adaptive optics ophthalmoscopes.** *Biomedical optics express*
  Xia, Y., Ayubi, G. A., Bentley, J., Dubra, A.
  2026; 17 (2): 1029-1048
- **Refractive adaptive optics scanning light ophthalmoscope with fast 2D MEMS scanner.** *Biomedical optics express*
  Kunala, K., Xia, Y., Ayubi, G. A., Kowalski, B., Desai, A. X., Lippman, D., Bentley, J., Dubra, A.
  2026; 17 (2): 635-655
- **Automated animal gimbal steering for retinal imaging and stimulation.** *Biomedical optics express*
  Kunala, K., Ayubi, G. A., Franco, J. A., Mahajan, V. B., Dubra, A.
  2026; 17 (1): 502-510
- **Surpassing the diffraction limit for improved lateral resolution in adaptive optics optical coherence tomography of the living human eye.** *Communications engineering*
  Bower, A. J., Zhang, F., Liu, T., Li, J., Aguilera, N., Abouassali, S., Krynitsky, J., Pursley, R., Pohida, T., Kowalski, B., Lu, R., Dubra, A., Tam, et al
  2025
- **Telecentric model eye for correction of image distortion in adaptive optics ophthalmoscopes.** *Biomedical optics express*
  Akondi, V., Ayubi, G. A., Huang, X., Kunala, K., Dubra, A.
  2025; 16 (7): 2767-2791
- **Telecentric model eye for correction of image distortion in adaptive optics ophthalmoscopes** *BIOMEDICAL OPTICS EXPRESS*
  Akondi, V., Ayubi, G. A., Huang, X., Kunala, K., Dubra, A.
  2025; 16 (7): 2767-2791

- **In-vivo Retinal Imaging of Blood Cell Adhesion to Vascular Wall in Sickle Cell Disease**
  Chui, T., Duran, L., Haq, A., Najac, M. J., Bellis, J., Dubra, A., Glassberg, J., Toco, R.
  ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2025
- **Quantifying Retinal Microaneurysm Morphology and Flow in Diabetes using AOSLO Merged Quad-Detection Images**
  Duran, L., Haq, A., Najac, M., Dubra, A., Rosen, R. B., Chui, T.
  ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2025
- **Longitudinal study of foveal scattering features in multiple sclerosis using adaptive optics scanning light ophthalmoscopy**
  Hargrave, A., Buickians, D., Ayubi, G., Parthasarathi, P., Navarro, S., Kowalski, B., Kipp, L., Han, M. H., Dubra, A., Moss, H.
  ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2025
- **Mechanisms of CapillaryVaso-Occlusion in Sickle Cell Disease Revealed using Dynamic OCTA-Guided AOSLO Imaging**
  Rosen, R. B., Haq, A., Duran, L., Najac, M. J., Bellis, J., Weitz, R., Harris, A., Dubra, A., Glassberg, J., Chui, T.
  ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2025
- **Closed loop optical eye tracking and real time data streaming for 3 MHz adaptive optics swept source optical coherence tomography**
  Yang, Q., Bower, A. J., Das, V., Li, J., Krynitsky, J., Pursley, R., Dubra, A., Tam, J.
  ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2025
- **Retinal imaging in mice and primates using the same compact AOSLO with scalable pupil**
  Rogers, J., Khoussine, J., Masumnia-Bisheh, K., Dubra, A.
  ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2025
- **Enhanced genotype-phenotype analysis using multimodal adaptive optics and 3D protein structure in Bietti Crystalline Dystrophy.** *American journal of ophthalmology case reports*
  Kumar, A., Sun, Y. J., Rasmussen, D. K., Hargrave, A., Phillips, C., Vu, J. T., Costa, M. G., Leung, L. B., Yu, C., Dubra, A., Mahajan, V. B.
  2025; 38: 102312
- **Deep compressed multichannel adaptive optics scanning light ophthalmoscope.** *Science advances*
  Park, J., Hagan, K., DuBose, T. B., Maldonado, R. S., McNabb, R. P., Dubra, A., Izatt, J. A., Farsiu, S.
  2025; 11 (19): eadr5912
- **Quantification of optical lensing by cellular structures in the living human eye.** *Biomedical optics express*
  Bedggood, P., Ding, Y., Dierickx, D., Dubra, A., Metha, A.
  2025; 16 (2): 473-498
- **Quantification of optical lensing by cellular structures in the living human eye** *BIOMEDICAL OPTICS EXPRESS*
  Bedggood, P., Ding, Y., Dierickx, D., Dubra, A., Metha, A.
  2025; 16 (2): 473-498
- **Low-cost non-contact axial placement and active focusing of optical components** *APPLIED OPTICS*
  Kunala, K., Dubra, A.
  2025; 64 (21): 6150-6156
- **Embedded CPU-GPU pupil tracking.** *Biomedical optics express*
  Kowalski, B., Huang, X., Dubra, A.
  2024; 15 (12): 6799-6815
- **Improving cone identification using merged non-confocal quadrant-detection adaptive optics scanning light ophthalmoscope images.** *Biomedical optics express*
  Chui, T. Y., Migacz, J. V., Muncharaz Duran, L., Haq, A., Otero-Marquez, O., Dubra, A., Rosen, R. B.
  2024; 15 (11): 6117-6135
- **Improving cone identification using merged non-confocal quadrant-detection adaptive optics scanning light ophthalmoscope images** *BIOMEDICAL OPTICS EXPRESS*
  Chui, T., Migacz, J., Duran, L., Haq, A., Otero-marquez, O., Dubra, A., Rosen, R.
  2024; 15 (11): 6117-6135
- **Biometry study of foveal isoplanatic patch variation for adaptive optics retinal imaging** *BIOMEDICAL OPTICS EXPRESS*

Huang, X., Hargrave, A., Bentley, J., Dubra, A.
2024; 15 (10): 5674-5690

- **Longitudinal Imaging of the Foveal Cone Mosaic in CNGA3-Associated Achromatopsia.** *Investigative ophthalmology & visual science*
  Katta, M., Georgiou, M., Singh, N., Kalitzeos, A., Dubra, A., Carroll, J., Michaelides, M.
  2024; 65 (12): 6
- **Biometry study of foveal isoplanatic patch variation for adaptive optics retinal imaging.** *Biomedical optics express*
  Huang, X., Hargrave, A., Bentley, J., Dubra, A.
  2024; 15 (10): 5674-5690
- **Longitudinal foveal adaptive optics scanning laser ophthalmoscopy in multiple sclerosis**
  Hargrave, A., Buickians, D., Navarro, S., Parthasarathi, P., Kipp, L., Han, M., Zavalla, G., Kowalski, B., Dubra, A., Moss, H. E.
  ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2024
- **Refractive adaptive optics scanning ophthalmoscope for small animal imaging**
  Kunala, K., Lippman, D., Desai, A., Kowalski, B., Bentley, J., Dubra, A.
  ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2024
- **Cone Identification on Merged Non-Confocal Quadrant-Detection Adaptive Optics Scanning Light Ophthalmoscopy (AOSLO) Images**
  Chui, T., Duran, L., Haq, A., Migacz, J. V., Otero, O., Dubra, A., Rosen, R. B.
  ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2024
- **Adaptive optics imaging of cone photoreceptors and RPE cells based on detection of multiply scattered light from a wavelength-swept 3 MHz OCT light source**
  Bower, A. J., Yang, Q., Kowalski, B., Aguilera, N., Das, V., Li, J., Liu, T., Dubra, A., Tam, J.
  ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2024
- **Optical biometry study of the human foveal isoplanatic patch**
  Huang, X., Hargrave, A., Bentley, J., Dubra, A.
  ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2024
- **Embedded CPU-GPU pupil tracking for eye motion stabilization**
  Kowalski, B., Martz, E. P., Dubra, A.
  ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2024
- **In Vivo OCT Imaging of Muller and Macrophage-Like Cells in the Retinas of Patients with and without MS and related diseases**
  Elizabeth, S., Navarro, V., Han, M., Kipp, L., Hargrave, A., Parthasarathi, P., Sylvestre-Bouchard, A., Dubra, A., Moss, H. E.
  ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2024
- **Dual-wavelength AOSLO imaging in the 13-lined ground squirrel**
  Follett, H., Higgins, B. P., Rogers, J., Grieshop, J., Yu, C., Kowalski, B., Cooper, R. F., Merriman, D. K., Dubra, A., Carroll, J.
  ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2024
- **Normalized weighted cross correlation for multi-channel image registration** *OPTICS CONTINUUM*
  Ayubi, G. A., Kowalski, B., Dubra, A.
  2024; 3 (5): 649-665
- **Normalized weighted cross correlation for multi-channel image registration.** *Optics continuum*
  Ayubi, G. A., Kowalski, B., Dubra, A.
  2024; 3 (5): 649-665
- **Minimum intensity projection of embossed quadrant-detection images for improved photoreceptor mosaic visualisation.** *Frontiers in ophthalmology*
  Kalitzeos, A., Michaelides, M., Dubra, A.
  2024; 4: 1349297
- **Application of novel non-invasive ophthalmic imaging to visualize peripapillary wrinkles, retinal folds and peripapillary hyperreflective ovoid mass-like structures associated with elevated intracranial pressure.** *Frontiers in neurology*
  Graven-Nielsen, M., Dubra, A., Dodd, R. L., Hamann, S., Moss, H. E.
  2024; 15: 1383210

- **Robust real-time estimation of non-uniform angular velocity and sub-pixel jitter in images captured with resonant scanners** *OPTICS EXPRESS*
  Ayubi, G. A., Dubra, A.
  2023; 31 (26): 44199-44211

- **Structural and Functional Changes in Non-Paraneoplastic Autoimmune Retinopathy.** *Diagnostics (Basel, Switzerland)*
  Akhavanrezayat, A., Khatri, A., Onghanseng, N. G., Halim, M. S., Or, C., Sredar, N., Razeen, M., Hasanreisoglu, M., Regenold, J., Thng, Z. X., Mohammadi, S. S., Jain, T., Yavari, et al
  2023; 13 (21)

- **Invited Session V: The eye as a window to systemic and neurodegenerative health: Seeking Answers through a keyhole: Harnessing the Synergy of Dynamic OCT/OCT Angiography and Adaptive Optics SLO for Retinal Assessment of Systemic Disease.** *Journal of vision*
  Rosen, R., Otero-Marquez, O., Migacz, J., Zhou, D., Pinhas, A., Castanos, M., Ahsanuddin, S., Rickford, K., Murillo, B., Zhou, R., Spellman, L., Sredar, N., Gillette, et al
  2023; 23 (11): 30

- **Comparison of macular Macrophage Like Cell and Muller Cell Density in Patients with Multiple Sclerosis using OCT**
  Navarro, S., Soetikno, B., Hargrave, A., Buickians, D., Dubra, A., Moss, H.
  ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2023

- **Quad-Fusion Adaptive Optics Scanning Light Ophthalmoscopy: A Novel Multi-Directional Non-Confocal Imaging Technique for Enhancement of Microvascular and Cellular Structures**
  Rosen, R. B., Dubra, A., MuncharazDuran, L., Rios, H., Migacz, J., Ahsanuddin, S., Weitz, R., Glassberg, J. A., Chui, T. Y. P.
  ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2023

- **Longitudinal imaging of microscopic scattering features in the foveal avascular zone of multiple sclerosis using adaptive optics ophthalmoscopy**
  Hargrave, A., Navarro, S., Buickians, D., Kipp, L., Han, M., Kowalski, B., Dubra, A., Moss, H.
  ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2023

- **Surpassing the diffraction limit for improved resolution in adaptive optics optical coherence tomography in the living human eye**
  Bower, A. J., Zhang, F., Liu, T., Kowalski, B., Lu, R., Liu, Z., Hammer, D. X., Dubra, A., Tam, J.
  ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2023

- **Sub-diffraction adaptive optics fluorescence imaging of the living human eye using pixel reassignment**
  Zhang, F., Giannini, J., Lu, R., Kowalski, B., Bower, A. J., Aguilera, N., Li, J., Abouassali, S., Das, V., Liu, T., Dubra, A., Tam, J.
  ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2023

- **Warp speed multi-aperture adaptive optics scanning laser ophthalmoscopy using machine learning**
  Park, J., Hagan, K., DuBose, T., McNabb, R., Dubra, A., Izatt, J., Farsiu, S.
  ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2023

- **Special Section Guest Editorial: Advances in Optical Measurements and Instrumentation for Ophthalmology and Optometry** *OPTICAL ENGINEERING*
  Malacara-Hernandez, D., Dubra, A., Schwiegerling, J., Artal, P., Mejia, Y., Plaza, E.
  2022; 61 (12)

- **Insights into Sickle Cell Disease through the Retinal Microvasculature: Adaptive Optics Scanning Light Ophthalmoscopy Correlates of Clinical OCT Angiography.** *Ophthalmology science*
  Pinhas, A., Migacz, J. V., Zhou, D. B., Castanos Toral, M. V., Otero-Marquez, O., Israel, S., Sun, V., Gillette, P. N., Sredar, N., Dubra, A., Glassberg, J., Rosen, R. B., Chui, et al
  2022; 2 (4): 100196

- **Widespread subclinical cellular changes revealed across a neural-epithelial-vascular complex in choroideremia using adaptive optics.** *Communications biology*
  Aguilera, N., Liu, T., Bower, A. J., Li, J., Abouassali, S., Lu, R., Giannini, J., Pfau, M., Bender, C., Smelkinson, M. G., Naik, A., Guan, B., Schwartz, et al
  2022; 5 (1): 893

- **Reflectance adaptive optics findings in a patient with Vogt-Koyanagi-Harada disease.** *American journal of ophthalmology case reports*

Pham, A. T., Onghanseng, N., Halim, M. S., Ormaechea, M. S., Hassan, M., Akhavanrezayat, A., Uludag, G., Tran, A. N., Razeen, M. M., Sredar, N., Dubra, A., Nguyen, Q. D.
2022; 27: 101660

- **Photoreceptor and Retinal Pigment Epithelium Relationships in Eyes With Vitelliform Macular Dystrophy Revealed by Multimodal Adaptive Optics Imaging.** *Investigative ophthalmology & visual science*
  Liu, T., Aguilera, N., Bower, A. J., Li, J., Ullah, E., Dubra, A., Cukras, C., Brooks, B. P., Jeffrey, B. G., Hufnagel, R. B., Huryn, L. A., Zein, W. M., Tam, et al
  2022; 63 (8): 27
- **Retinal magnification factors at the fixation locus derived from schematic eyes with four individualized surfaces** *BIOMEDICAL OPTICS EXPRESS*
  Huang, X., Anderson, T., Dubra, A.
  2022; 13 (7): 3786-3808
- **Retinal magnification factors at the fixation locus derived from schematic eyes with four individualized surfaces.** *Biomedical optics express*
  Huang, X., Anderson, T., Dubra, A.
  2022; 13 (7): 3786-3808
- **Investigating hyalocyte-like cells in epiretinal membranes using serially acquired optical coherence tomography**
  Soetikno, B., Miller, D., Zhang, H., Goldberg, J. L., Leng, T., Dubra, A.
  ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2022
- **Assessing vitreous cortex hyalocyte morphology and dynamics in the living human eye**
  Rosen, R. B., Otero-Marquez, O., Migacz, J. V., Ahsanuddin, S., Rickford, K., Murillo, B., Zhou, R., Spellman, L., Weitz, R., Dubra, A., Chui, T.
  ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2022
- **Characterization of fluorescently labeled photoreceptors observed in carriers of choroideremia using multimodal adaptive optics imaging**
  Bower, A. J., Aguilera, N., Abouassali, S., Liu, T., Li, J., Lu, R., Giannini, J., Smelkinson, M., Fariss, R. N., Dubra, A., Liu, Z., Hammer, D., Brooks, et al
  ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2022
- **Retinal Magnification Factor Derived from Individualized Four-Surface Schematic Eye using Real Ray Tracing**
  Huang, X., Dubra, A.
  ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2022
- **Evaluation of the double-pass wavefront in model and human eyes**
  Akondi, V., Huang, X., Dubra, A.
  ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2022
- **Automated correction of jitter, interleaving and non-uniform image sampling in scanning ophthalmoscopes**
  Dubra, A., Akondi, V., Hargrave, A., Kowalski, B.
  ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2022
- **In vivo measurement of the light distribution in the focal plane of an AOSLO focused at inner and outer retina**
  Rogers, J., Stangel, N., Dubra, A.
  ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2022
- **Automatic retinal layer segmentation of visible-light optical coherence tomography images using deep learning**
  Gopal, B., Zhang, T., Norcia, A., Goldberg, J. L., Dubra, A., Zhang, H., Soetikno, B.
  ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2022
- **Imaging of vitreous cortex hyalocyte dynamics using non-confocal quadrant-detection adaptive optics scanning light ophthalmoscopy in human subjects** *BIOMEDICAL OPTICS EXPRESS*
  Migacz, J., Otero-Marquez, O., Zhou, R., Rickford, K., Murillo, B., Zhou, D. B., Castanos, M., Sredar, N., Dubra, A., Rosen, R. B., Chui, T. Y. P.
  2022; 13 (3): 1755-1773
- **Imaging of vitreous cortex hyalocyte dynamics using non-confocal quadrant-detection adaptive optics scanning light ophthalmoscopy in human subjects.** *Biomedical optics express*
  Migacz, J. V., Otero-Marquez, O., Zhou, R., Rickford, K., Murillo, B., Zhou, D. B., Castanos, M. V., Sredar, N., Dubra, A., Rosen, R. B., Chui, T. Y.
  2022; 13 (3): 1755-1773

- **Correction of non-uniform angular velocity and sub-pixel jitter in optical scanning** *Optics Express*
  Kowalski, B., Akondi, V., Dubra, A.
  2022; 30 (1): 112-124

- **Hybrid FPGA-CPU pupil tracker** *BIOMEDICAL OPTICS EXPRESS*
  Kowalski, B., Huang, X., Steven, S., Dubra, A.
  2021; 12 (10): 6496-6513

- **Hybrid FPGA-CPU pupil tracker.** *Biomedical optics express*
  Kowalski, B., Huang, X., Steven, S., Dubra, A.
  2021; 12 (10): 6496-6513

- **Clinical Imaging of Macular Surface Macrophages in Retinal Vasculopathies - Automated OCT Cell Density Mapping and Adaptive Optics Microscopy**
  Rosen, R., Otero-Marquez, O., Toral, M., Zhou, D., Weitz, R., Migacz, J., Dubra, A., Chui, T.
  ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2021

- **Millisecond-latency FPGA-based pupil tracker for eye motion stabilization**
  Kowalski, B., Dubra, A., Huang, X.
  ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2021

- **Fundus albipunctatus photoreceptor microstructure revealed using adaptive optics scanning light ophthalmoscopy.** *American journal of ophthalmology case reports*
  Sobol, E. K., Deobhakta, A., Wilkins, C. S., Francis, J. H., Chui, T. Y., Dubra, A., Zhou, D. B., Castanos, M. V., Lema, G. M., Rosen, R. B., Migacz, J. V.
  2021; 22: 101090

- **Direct comparison of photoreceptor reflectivity measurements using simultaneous adaptive optics SLO and OCT**
  Bower, A., Liu, T., Liu, Z., Aguilera, N., Li, J., Lu, R., Giannini, J., Cornelissen, S., Dubra, A., Hammer, D., Tam, J.
  ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2021

- **Adaptive optics fluorescence lifetime ophthalmoscopy of iGlucoSnFR-TS suggests increased glucose in RPE of rho(-/-) compared to healthy mice**
  Kunala, K., Xue, Y., Huynh, K., Yang, Q., Parkins, K., Steven, S., Dubra, A., Cepko, C., Hunter, J.
  ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2021

- **Correction of resonant optical scanner dynamic aberrations using nodal aberration theory** *OPTICS EXPRESS*
  Huang, X., Dubra, A.
  2021; 29 (7): 10346–63

- **In-vivo sub-diffraction adaptive optics imaging of photoreceptors in the human eye with annular pupil illumination and sub-Airy detection.** *Optica*
  Lu, R., Aguilera, N., Liu, T., Liu, J., Giannini, J. P., Li, J., Bower, A. J., Dubra, A., Tam, J.
  2021; 8 (3): 333-343

- **Persistent Dark Cones in Oligocone Trichromacy Revealed by Multimodal Adaptive Optics Ophthalmoscopy** *FRONTIERS IN AGING NEUROSCIENCE*
  Li, J., Liu, T., Flynn, O. J., Turriff, A., Liu, Z., Ullah, E., Liu, J., Dubra, A., Johnson, M. A., Brooks, B. P., Hufnagel, R. B., Hammer, D. X., Huryn, et al
  2021; 13: 629214

- **Integrating adaptive optics-SLO and OCT for multimodal visualization of the human retinal pigment epithelial mosaic.** *Biomedical optics express*
  Bower, A. J., Liu, T., Aguilera, N., Li, J., Liu, J., Lu, R., Giannini, J. P., Huryn, L. A., Dubra, A., Liu, Z., Hammer, D. X., Tam, J.
  2021; 12 (3): 1449-1466

- **multimodal visualization of the human retinal pigment epithelial mosaic** *BIOMEDICAL OPTICS EXPRESS*
  BOWER, A. J., LIU, T. O., AGUILERA, N. Y., LI, J. E., LIU, J. I., LU, R. N., GIANNINI, J. P., HURYN, L. A., DUBRA, A. O., LIU, Z. N., HAMMER, D. X., TAM, J. Y.
  2021; 12 (3): 1449–66

- **Comparison of confocal and non-confocal split-detection cone photoreceptor imaging.** *Biomedical optics express*

Sredar, N., Razeen, M., Kowalski, B., Carroll, J., Dubra, A.
2021; 12 (2): 737-755

- **Comparison of confocal and non-confocal split-detection cone photoreceptor imaging** *Biomedical Optics Express*
  Sredar, N., Razeen, M., Kowalski, B., Carroll, J., Dubra, A.
  2021; 12 (2): 737–55
- **Dynamic wavefront distortion in resonant scanners** *Applied Optics*
  Akondi, V., Kowalski, B., Dubra, A.
  2021; 60 (36): 11189-11195
- **Novel Foveal Features Associated With Vision Impairment in Multiple Sclerosis.** *Investigative ophthalmology & visual science*
  Hargrave, A., Sredar, N., Khushzad, F., Yarp, J., Tomczak, A., Han, M., Kipp, L., Dubra, A., Moss, H. E.
  2021; 62 (12): 27
- **Shack-Hartmann wavefront sensor optical dynamic range** *Optics Express*
  Akondi, V., Dubra, A.
  2021; 29 (6): 8417-8429
- **Multi-layer Shack-Hartmann wavefront sensing in the point source regime.** *Biomedical optics express*
  Akondi, V., Dubra, A.
  2021; 12 (1): 409-432
- **Multi-layer Shack-Hartmann wavefront sensing in the point source regime** *Biomedical Optics Express*
  Akondi, V., Dubra, A.
  2021; 12 (1): 409-432
- **Dynamic distortion in resonant galvanometric optical scanners.** *Optica*
  Akondi, V., Kowalski, B., Burns, S. A., Dubra, A.
  2020; 7 (11): 1506-1513
- **Discovery and clinical translation of novel glaucoma biomarkers.** *Progress in retinal and eye research*
  Beykin, G., Norcia, A. M., Srinivasan, V. J., Dubra, A., Goldberg, J. L.
  2020: 100875
- **Quadrant Non-Confocal AOSLO Imaging of Retinal Vasculature**
  Migacz, J. V., Sredar, N., Zhou, D. B., Toral, M., Pinhas, A., Dubra, A., Rosen, R., Chui, T. Y. P.
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- **Intraobserver Repeatability and Interobserver Reproducibility of Foveal Cone Density Measurements in CNGA3- and CNGB3-Associated Achromatopsia** *TRANSLATIONAL VISION SCIENCE & TECHNOLOGY*
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