

## DAVID R. WILLIAMS

William G. Allyn Professor of Medical Optics  
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Married to Inger M. Williams, Ph.D.  
Children, Erika and Kristoffer.

### EDUCATION

1980 Postdoctoral Research Associate, Bell Laboratories, Murray Hill, NJ  
1979 Ph.D., Department of Psychology, Univ. of California, San Diego  
1976 M.A., Department of Psychology, Univ. of California, San Diego  
1975 B.S., Department of Psychology, Denison University, Granville, OH

### PRIMARY APPOINTMENTS

2011-2019 Dean for Research, University of Rochester's School of Arts, Science & Engineering  
2009-pres Professor, Institute of Optics, University of Rochester  
1995-2009 Professor, Department of Brain and Cognitive Sciences, University of Rochester  
1991-pres Director, Center for Visual Science, University of Rochester.  
1990-1995 Professor, Department of Psychology, University of Rochester  
1988-1991 Associate Director, Center for Visual Science, University of Rochester  
1984-1990 Associate Professor, Department of Psychology, University of Rochester  
1981-1984 Assistant Professor, Department of Psychology, University of Rochester

### JOINT APPOINTMENTS

2009-pres Professor, Department of Brain and Cognitive Sciences, University of Rochester  
2001-pres Professor, Department of Biomedical Engineering, University of Rochester  
1997-1998 Visiting Professor, Department of Biological Structure, University of Washington, Seattle, WA  
1997-pres Department of Ophthalmology, School of Medicine and Dentistry, University of Rochester  
1988-2009 Institute of Optics, College of Engineering and Applied Science, University of Rochester  
1981-pres Center for Visual Science, College of Arts and Science, University of Rochester

### AWARDS

2016 Jay Pepose Award in Vision Sciences from Brandeis University  
2016 The Association for Research in Vision and Ophthalmology Foundation Honoree  
2015 Beckman-Argyros Award from the Arnold and Mabel Beckman Foundation  
2015 Procter Prize from Sigma Xi, the Scientific Research Society

2015 Association for Research in Vision and Ophthalmology Distinguished Service Award

2015 Stein Innovation Award, Research to Prevent Blindness

2014 Member, National Academy of Sciences

2013 Edridge Green Medal, The Royal College of Ophthalmologists

2012 Champalimaud Vision Award

2012 Gold Fellow, Association for Research in Vision and Ophthalmology

2009 Robert M. Boynton Lecture, Optical Society of America (OSA) Fall Vision Meeting, University of Washington

2009 Silver Fellow, Association for Research in Vision and Ophthalmology

2008 Rochester Business Journal Health Care Achievement Award for Innovation

2007 Bressler Prize, Jewish Guild for the Blind

2007 Honorary Doctor of Science, The State University of New York, State College of Optometry

2006 Fellow, American Association for the Advancement of Science.

2006 Friedenwald Award, Association for Research in Vision and Ophthalmology

2004 University of Rochester Center for Electronic Imaging Systems Technology Transfer Award

2004 Archie Mahan Prize, Optical Society of America

2003 Founders Award, Wavefront Congress, San Francisco, CA.

2003 R&D 100 Award for the MEMS-based Adaptive Optics Phoropter, given by R&D Magazine

2001 Best of What's New Award in the Medical Technology category for the Zyoptix laser vision correction system

2001 Honorary Doctor of Science, Denison University

1998 Semifinalist for Discover Award for Technological Innovation

1998 Tillyer Medal, Optical Society of America

1997-pres William G. Allyn Professor of Medical Optics at the Institute of Optics, University of Rochester

1997-98 John Simon Guggenheim Memorial Fellowship

1992-pres Fellow, Optical Society of America

1986 Distinguished Scientific Award for an Early Contribution to Psychology, American Psychological Association

1985-1990 National Eye Institute Research and Career Development Award

1987-1988 University of Rochester Mentor Award, for excellence in teaching, research, and service to the University

1979-1980 Bell Laboratories Postdoctoral Fellowship

1976-1979 National Science Foundation Graduate Fellowship

1977 Association for Research in Vision and Ophthalmology Travel Fellowship

1974 Psychology Student Fellow, Denison University

## **OTHER LEADERSHIP POSITIONS**

2010 Chair of the JOV Editor-in-Chief Nominating Committee

2009-2012 OSA Representative to the U.S. Advisory Committee to the International Commission for Optics

2010 Member, Organization Committee of EOS, for the 5th European Meeting on Visual and Physiological Optics

2010-2015 Member, Arnold and Mabel Beckman Foundation External Grant Committee

2010-pres Advisory Editor, Biomedical Optics Express

- 2003-2013 Lead Investigator, Adaptive Optics Instrumentation for Advanced Ophthalmic Imaging, a National Eye Institute Bioengineering Research Partnership, PAR 02-010
- 2001-2013 Editorial Board and reviewer, Journal of Vision
- 2000-2007 Associate Director, Vision Science, National Science Foundation Science and Technology Center for Adaptive Optics, UC, Santa Cruz

Optical Society of America:

- 2018 Member, MacLeod Symposium Organizing Committee
- 2011-2013 Member, 2012 Distinguished Service Award Committee
- 1997-1998 Chair, Societal Objectives and Planning Committee
- 1996-1998 Director-at-large, Board of Directors.
- 1988-1990 Chair, Vision and Medical Optics Division
- 1988-1989 Chair, Color Technical Group, Vice-Chair, 1986-1987

Association for Research in Vision and Ophthalmology:

- 2018-pres Treasurer, ARVO Foundation for Eye Research
- 2018-pres Member, Board of Governors, ARVO Foundation for Eye Research
- 2017-2021 Member, Awards Committee
- 2011-2013 Chair, Association for Research in Vision and Ophthalmology (ARVO) Finance Committee
- 2013 Vice President
- 2009-2014 Member, Board of Trustees
- 2012 Vice President-elect
- 1989 Chair, Visual Psychophysics Program Committee, 1989
- 1986-1989 Member, Visual Psychophysics Program Committee, 1986-1989

**GRANTS AND CONTRACTS**

Federal:

- 1982-1985 National Eye Institute Research Grant, R01 EY04367, "Retinal Mechanisms and Visual Resolution," Total Costs: \$275,000.
- 1984-1987 United States Air Force Grant, AFOSR-85-0019, "Peripheral Limitations on Spatial Vision," Total Costs: \$461,738.
- 1985-1990 National Eye Institute Research Grant, R01 EY04367, "Retinal Mechanisms and Visual Resolution," Total Costs: \$450,000.
- 1985-1990 National Eye Institute Research and Career Development Award, K04 EYO0269, Total Costs: \$225,000.
- 1987-1991 United States Air Force Grant, AFOSR-88-0292, "Peripheral Limitations on Spatial Vision," Total Costs: \$380,962.
- 1990-1995 National Eye Institute Research Grant, R01 EY04367, "Retinal Mechanisms and Visual Resolution," Total Costs: \$935,000.
- 1992-1995 National Eye Institute Research Grant, R01 EY09625, "Topography of Primate Cone Classes," Total Costs: \$365,000.
- 1995-1998 National Eye Institute Research Grant, R01 EY09625, "Topography of Primate Cone Classes," Total Costs: \$410,036.
- 1995-2001 National Eye Institute Research Grant, R01 EY04367, "Retinal Mechanisms and Visual Resolution," Total Costs: \$1,354,644.

- 2002-2008 National Eye Institute Research Grant, R01 EY04367, "Retinal Mechanisms and Visual Resolution," Total Costs: \$1,555,021.
- 2008-2012 National Eye Institute Research Grant, R01 EY04367, "Retinal Mechanisms and Visual Resolution," Total Costs: \$1,461,790.
- 2012-2016 National Eye Institute Research Grant, R01 EY04367-SI, "Retinal Mechanisms and Visual Resolution," Total Costs: \$2,617,206.
- 2016-2021 National Eye Institute Research Grant, R01 EY04367-SI, "Retinal Mechanisms and Visual Resolution," Total Costs: \$1,117,372.
- 2015-2020 National Eye Institute Research Grant, U01EY025497, "Audacious Goals Initiative," Total Costs: \$3,799,699.

Shared Federal:

- 1993-1998 National Eye Institute Grant, P30 EY1319, "Core Grant for Vision Research", David Williams, PI, Total Costs: \$1,428,701.
- 1998-2003 National Eye Institute Grant, P30 EY1319, "Core Grant for Vision Research", David Williams, PI, Total Costs: \$2,106,983.
- 2003-2008 National Eye Institute Grant, P30 EY1319, "Core Grant for Vision Research", David Williams, PI, Total Costs: \$3,289,652.
- 2008-2013 National Eye Institute Grant, P30 EY1319, "Core Grant for Vision Research", David Williams, PI, Total Costs: \$3,624,385.
- 2013-2018 National Eye Institute Grant, P30 EY1319, "Core Grant for Vision Research", David Williams, PI, Total Costs: \$3,070,000.
- 2018-2023 National Eye Institute Grant, P30 EY1319, "Core Grant for Vision Research", David Williams, PI, Total Costs: \$3,080,000.
- 2001-2003 DOE (Department of Engineering), "High-Resolution Ophthalmic Imaging Systems," Scot Olivier, PI. David Williams, Co-PI. Total costs \$346,888.
- 1999-2004 National Science Foundation Science and Technology Center, "Center for Adaptive Optics," Jerry Nelson, PI. David Williams, Associate Director. Total costs to Center: \$20M. Total costs to Williams' laboratory per year: \$200,000.
- 2004-2009 National Science Foundation Science and Technology Center, "Center for Adaptive Optics," Jerry Nelson, PI. David Williams, Associate Director. Total costs to Center: \$20M. Total costs to Williams' laboratory per year: \$200,000.
- 2004-2015 NEI Training Grant, T 32 EY07125, "Training in Visual Science," David Knill, PI, \$411,719 per year.
- 2003-2008 National Eye Institute Bioengineering Research Partnership, "Adaptive Optics Instrumentation for Advanced Ophthalmic Imaging," Total costs: \$9,881,821. David Williams, PI.
- 2008-2014 National Eye Institute Bioengineering Research Partnership, "Adaptive Optics Instrumentation for Advanced Ophthalmic Imaging," Total costs: \$5M. David Williams, PI.
- 2010-2011 SBIR, Phase I, "2 Photon Imaging with AO," Grazyna Palczewska, PI Total costs: \$50,000.
- 2010-2012 NIH – R21, "Developing models for studying how tobacco smoke contributes to AMD pathogenesis," Total costs: \$6,000.
- 2011-2014 National Eye Institute Grant, "Functional Imaging of Ganglion Cells in the Living Mammalian Eye," William Merigan, PI Total costs: \$1,968,454.
- 2012-2015 SBIR, Phase II, R44AG043645 "Subcellular imaging of biochemical processes within human retina," Grazyna Palczewska, PI Total costs: \$1,865,561.

2014-2019 National Eye Institute Research Grant, R01EY021166, "Functional Imaging of Ganglion Cells in the Living Mammalian Eye," William Merigan, PI Total Costs: \$2,778,616.

Corporate:

1994-1995 Rochester Eye and Human Parts Bank, "Recovery of Retinal Image Quality Following Corneal Transplantation," Total Costs: \$9,000, PI, Junzhong Liang.

1997-1998 Bausch and Lomb, "Wavefront Sensor for the Human Eye," Total Costs: \$39,500.

1998-1999 Bausch and Lomb, "The Increase in Visual Performance Expected with Supercorrecting Contact Lenses," Total Costs: \$66,700 plus NYSSTF matching funds, Center for Electronic Imaging, \$45,000.

1999-2000 Bausch and Lomb, "Advanced Vision Correction and Wavefront Sensing," Total costs: \$267,728 plus NYSSTF matching funds, Center for Electronic Imaging, \$45,000.

2000-2005 Bausch and Lomb, "Vision Alliance" "Advanced Vision Correction and Wavefront Sensing," Total costs: \$200,000 plus NYSSTAR matching funds, Center for Electronic Imaging, \$40,000.

2006-2011 Bausch and Lomb, "Vision Alliance," Project in collaboration with Bill Merigan: Total costs: \$240,652 per year, reviewed annually.

2006-2011 Bausch and Lomb, "Vision Alliance," Project in collaboration with Mina Chung: Total costs: \$157,429 per year, reviewed annually.

2008 Qioptiq, "Structure illumination imaging for lateral superresolution and axial optical sectioning." Shared with Jim Fienup, Total costs, \$42,000 plus NYSSTAR matching funds, Center for Electronic Imaging, \$42,000.

2012-2015 Polgenix, Inc., "Subcellular imaging of biochemical processes within human retina," \$784,388.

2013-2016 Canon research agreement – "Joint development of AOSLO," \$334,000.

2018-2021 Warby Parker, "Objective autorefracton with smartphone," \$234,737.

Private Foundations:

2015 Alcon Research Institute Award, Total costs: \$100,000

2012 Champalimaud Foundation, "Visualizing the Living Human Retina in Health and Disease: Optical Coherence Tomography (OCT) and Adaptive Optics Technologies (AO)," Total costs: \$652,562

2001-2004 Steinbach Foundation, "High-resolution Imaging of Patients with Age- related Macular Degeneration," Total costs: \$90,910 per year.

2009-2010 Lowy Foundation, "AO Imaging of Early Macular Telangiectasia," Total costs: \$148,000.

2015-2017 Research to Prevent Blindness (RPB), Stein Innovation Award, Total costs: \$300,000.

2015-2018 Beckman Foundation, Beckman Argyros Award in Vision Research, Total Costs \$300,000

2015-2017 LV Prasad Eye Inst., AOSLO construction, Total Costs \$200,000

## **UNDERGRADUATE COURSES TAUGHT**

Sensation and Perception. A one semester survey of the human senses including vision, hearing, touch, taste, smell, proprioception, and balance.

Perception and Action. A course that evolved from Sensation and Perception but also addresses sensori-motor coordination and perceptual control of motor behavior.

Perception Laboratory. A one-semester lab course that follows Sensation and Perception.

## **GRADUATE COURSES TAUGHT**

Spatial Vision. Optical, retinal, and cortical limits on human spatial vision.

Principles of Eye Design. Diversity of imaging systems in nature. Factors controlling the evolution of simple and compound eyes.

Physiological Optics. Optics of the human eye and implications for visual performance.

Instrumentation and Methods for Vision Research. Covers psychophysical methods, optics systems for the eye, radiometry, photometry, colorimetry, display technology such as CRTs, eye movement recording, single unit recording, optical imaging of neural activity, FMRI.

Color Vision. Trichromacy, color matching, colorimetry, color discrimination and appearance, opponent color theory, photometry, color constancy.

## **CONTRIBUTED PRESENTATIONS**

1. Williams, D.R., MacLeod, D.I.A. Interchangeable backgrounds for cone afterimages. Association for Research in Vision and Ophthalmology, 1977.
2. Williams, D.R. Foveal cones often disobey the anterior pointing hypothesis. Optical Society of America, San Francisco, 1978.
3. Williams, D.R., MacLeod, D.I.A., Hayhoe, M.M. Distribution of blue-sensitive cones in the fovea. Association for Research in Vision and Ophthalmology, 1978.
4. Hayhoe, M.M., Williams, D.R. Suppression of signals from retinal regions shadowed by the head. Association for Research in Vision and Ophthalmology, 1980.
5. Krauskopf, J., Heeley, D.W., Williams, D.R. Computer controlled color mixer with laser primaries. Association for Research in Vision and Ophthalmology, 1980.
6. Williams, D.R., Krauskopf, J., Heeley, D.W. In search of the cardinal directions in color space. Optical Society of America, Chicago, 1980.
7. Krauskopf, J., Williams, D.R. Temporal frequency response of chromatic and luminance mechanisms. Association for Research in Vision and Ophthalmology, 1981.
8. Williams, D.R., Collier, R.J. Detection of high frequency gratings by the blue-sensitive mechanism. Association for Research in Vision and Ophthalmology, 1982.
9. Krauskopf, J., Brown, A., Williams, D.R. Discrimination and detection of chromatic variation. Association for Research in Vision and Ophthalmology, 1983.

10. Williams, D.R. Detection of high frequency gratings with an improved laser interferometer. Optical Society of America, New Orleans, 1983.
11. Williams, D.R., D'Zmura, M., Lennie, P. New interferometric estimate of neural contrast sensitivity. Association for Research in Vision and Ophthalmology, 1984.
12. Williams, D.R. Aliasing in human vision. Center for Visual Science, Symposium on Spatial Vision, University of Rochester, 1984.
13. Williams, D.R. Topography of the foveal cone mosaic. Association for Research in Vision and Ophthalmology, 1985.
14. MacLeod, D.I.A., Williams, D.R., Makous, W. Difference frequency gratings above the resolution limit. Association for Research in Vision and Ophthalmology, 1985.
15. Makous, W., MacLeod, D.I.A., Williams, D.R. Nonlinear transformation in human vision. Optical Society of America, Washington, DC, 1985.
16. Williams, D.R., Coletta, N.J., Korte, R. Extrafoveal grating resolution and sampling theory. Association for Research in Vision and Ophthalmology, 1986.
17. Coletta, N., Williams, D.R. Psychophysical estimate of parafoveal cone spacing. Optical Society of America, Seattle, 1986.
18. Williams, D.R. Seeing through the photoreceptor mosaic. Interdisciplinary Conference, Whistler, British Columbia, 1986.
19. Hayhoe, M.M., Williams, D.R. Spatial frequency dependence of the color of monochromatic light. Optical Society of America, Rochester, NY, 1987.
20. Williams, D.R. Photoreceptor sampling and aliasing in the human retina. Optical Society of America, Rochester, NY, 1987.
21. Coletta, N.J., Williams, D.R. Motion reversal in peripheral retina. Optical Society of America, Rochester, NY, 1987.
22. Coletta, N.J., Williams, D.R. Under sampling by cones reverses perceived direction of motion. Association for Research in Vision and Ophthalmology, Sarasota, FL, 1987.
23. Williams, D.R. Peripheral limitations on spatial vision. Review of AFOSR Program, Visual Information Processing, Annapolis, MD, 1987.
24. Chen, B., Makous, W., Williams, D.R. Serial spatial filters in vision. Association for Research in Vision and Ophthalmology, Sarasota, FL, 1988.
25. Hayhoe, M.M., Williams, D.R., Chen, B. Spatial frequency affects color appearance of monochromatic gratings. Association for Research in Vision and Ophthalmology, Sarasota, FL, 1988.

26. Chen, B., Makous, W., Williams, D.R. A nonlinearity localized in the outer plexiform layer. Association for Research in Vision and Ophthalmology, Sarasota, FL, 1989.
27. Packer, O., Williams, D.R., Sekiguchi, N., Coletta, N.J., Galvin, S. Effect of chromatic adaptation on foveal acuity and aliasing. Association for Research in Vision and Ophthalmology, Sarasota, FL, 1989.
28. Lennie, P., Haake, P.W., Williams, D.R. Chromatic opponency through random connections to cones. Association for Research in Vision and Ophthalmology, Sarasota, FL, 1989.
29. Lennie, P., Haake, P.W., Williams, D.R. Chromatic opponency through indiscriminate connections to cones. Optical Society of America, Orlando, FL, October 1989.
30. Packer, O., Williams, D.R. Eye movements and visual resolution. Association for Research in Vision and Ophthalmology, Sarasota, FL, April 1990.
31. Koh, K., Lennie, P., Williams, D.R. Mechanisms of adaptation to chromatic fringes. Association for Research in Vision and Ophthalmology, Sarasota, FL, April 1990.
32. Williams, D.R., Sekiguchi, N, Packer, O. Spatial aliasing by chromatic mechanisms. Association for Research in Vision and Ophthalmology, Sarasota, FL, April 1990.
33. Sekiguchi, N., Packer, O., Williams, D.R. Spatial sampling by chromatic mechanisms in human vision. Society for Photographic Science and Engineering, Rochester, NY, 1990.
34. Packer, O., Williams, D.R. Do eye movements affect visual resolution? Society for Photographic Science and Engineering, Rochester, NY, 1990.
35. Sekiguchi, N., Williams, D.R., Brainard, D.H. Foveal resolution limit for chromatic interference fringes. Optical Society of America annual meeting, San Jose, CA, November 3-8, 1991.
36. Navarro, R., Artal, P., Williams, D.R. Optical quality of the human eye across the visual field. Ophthalmic and Visual Optics, OSA meeting, Santa Fe, NM, January 28-30, 1992.
37. Sekiguchi, N., Williams, D.R., Brainard, D.H. Contrast sensitivity for isoluminant and isochromatic interference fringes. Advances in Color Vision, OSA meeting, Irvine, CA, January 31-February 1, 1992.
38. Brainard, D.H., Williams, D.R. Spatial reconstruction of signals from short- wavelength cones. Advances in Color Vision, OSA meeting, Irvine, CA, January 31-February 1, 1992.
39. Artal, P., Navarro, R., Brainard, D., Galvin, S., Williams, D.R. Off-axis optical quality of the eye and retinal sampling. The Association for Research in Vision and Ophthalmology (ARVO), May 1992.
40. Brainard, D., Williams, D.R., Sekiguchi, N. Supra-Nyquist resolution in the extrafovea? The Association for Research in Vision and Ophthalmology (ARVO), May 1992.



41. Brainard, D.H., Williams, D.R. Bayes estimator for reconstruction from samples. The Association for Research in Vision and Ophthalmology (ARVO), May 1993.
42. Galvin, S.J., Williams, D.R., Coletta, N.J. Two-stage spatial sampling model predicts motion reversal effects. The Association for Research in Vision and Ophthalmology (ARVO), May 1993.
43. Sekiguchi, N., Williams, D.R., Brainard, D.H. Neural limits on isoluminant and isochromatic contrast sensitivity. The Association for Research in Vision and Ophthalmology, May 1993.
44. O'Shea, R.P., Williams, D.R. Binocular rivalry with stimuli visible only to short-wavelength-sensitive cones. *Internat'l. J. Neurosci.*, 71, 124-125, 1993.
45. Sekiguchi, N., Williams, D.R., Brainard, D.H. Neural limits on human spatial contrast sensitivity. *Frontiers in Information Optics Conference*, Kyoto, Japan, April 1994.
46. Packer, O., Williams, D.R., Bensinger, D. Photopigment transmission imaging of the primate photoreceptor mosaic. *The John Dalton Conference*, Manchester, UK, September 1994.
47. Liang, J., Williams, D.R. Measurement of the wave aberrations of human eyes with a lens array wavefront sensor. *Imaging Science and Technology Conference*, Rochester, NY, May 1994.
48. Packer, O., Bensinger, D.G., Williams, D.R. In vitro angular tuning of single primate rods and cones and the Stiles-Crawford effect. *The Association for Research in Vision and Ophthalmology (ARVO)*, May 1994.
49. Miller, D.T., Williams, D.R., Morris, G.M. Images of the photoreceptor mosaic in the living human eye. *Optical Society of America Annual Meeting*, Dallas, TX, October 1994.
50. Liang, J., Williams, D.R. Effect of higher order aberrations on image quality in the human eye. *Vision Science and its Applications*, Vol. 1, 1995 OSA Technical Digest Series, Optical Society of America, Washington, D.C., 70-73, 1995.
51. Williams, D.R., Miller, D., Morris, G.M. Images of the cone mosaic in the living human eye. *Vision Science and its Applications*, Vol. 1, 1995 OSA Technical Digest Series, Optical Society of America, Washington, D.C., 98-101, 1995.
52. Miller, D.T., Williams, D.R., Morris, G.M., Liang, J. Images of cone photoreceptors in the living human eye, *Invest. Ophthalmol. Vis. Sci. Suppl.* 36, 8188, 1995.
53. Liang, J., Williams, D.R. New objective measurements of the wave aberrations of the human eye. *Invest. Ophthalmol. Vis. Sci. Suppl.* 36, 8188, 1995.
54. McMahon, M.J., Lankheet, M., Lennie, P., Williams, D.R. Fine structure of P-cell receptive fields in the fovea revealed by laser interferometry. *Invest. Ophthalmol. Vis. Sci. Suppl.* 36, 84, 1995.

55. Williams, D.R., Liang, J. Adaptive optics for high resolution retinal imaging. Investigative Research in Vision and Ophthalmology, Fort Lauderdale, FL, April 1996.
56. Packer, O.S., Williams, D.R. Axial absorptances of individual primate photoreceptors. investigative research in vision and ophthalmology, Fort Lauderdale, FL, April 1996.
57. Liang, J., Williams, D.R., Miller, D.T. Adaptive optics for correcting the wave aberration of the eye. OSA Annual Meeting & Exhibit, Optics & Imaging in the Information Age, Rochester, NY, October 1996.
58. Packer, O.S., Williams, D.R. The quantum efficiency and directional sensitivity in peripheral primate photoreceptor mosaic. OSA Annual Meeting & Exhibit, Optics & Imaging in the Information Age, Rochester, NY, October 1996.
59. Packer, O., Williams, D.R. Angular tuning of single primate photoreceptors and the Stiles-Crawford effect. The Jay M. Enoch Vision Science Meeting, School of Optometry, University of California, Berkeley, April 1996.
60. Liang, J., Williams, D.R., Miller, D. Adaptive optics for high resolution retinal imaging. The Jay M. Enoch Vision Science Meeting, School of Optometry, University of California, Berkeley, April 1996.
61. Liang, J., Williams, D.R. Adaptive optics for high-resolution imaging of the Living Human Retina. Conference on Lasers and Electro-Optics, Anaheim, CA, June 1996.
62. Liang, J., Williams, D.R., Miller, D.T. High resolution imaging of the living human retina with adaptive optics. Investigative Research in Vision and Ophthalmology, Fort Lauderdale, FL, April 1997.
63. Roorda, A., Williams, D.R. Spectrally and spatially resolved imaged of the human cone mosaic, Optical Society of America, Long Beach, CA, October 1997.
64. Hofer, H.J., Williams, D.R. Dynamics of the eye's wave aberration, Optical Society of America Annual Meeting, Baltimore, MD, October 1998.
65. Roorda, A., Williams, D.R. The arrangement of the three cone classes in the living human eye, Optical Society of America Annual Meeting, Baltimore, MD, October 1998.
66. Hofer, H.J., Porter, J., Williams, D.R. Dynamic measurement of the wave aberration of the human eye [ARVO Abstract]. Invest Ophthalmol Vis Sci., 39(4), S203, Abstract nr 955, 1998.
67. Roorda, A., Williams, D.R. Objective identification of M and L cones in the living human eye [ARVO Abstract]. Invest Ophthalmol Vis Sci., 39(4), S204, Abstract nr 957, 1998.
68. Roorda, A., Williams, D.R. The arrangement of the three cone classes in the living human eye, Optical Society of America Annual Meeting, Baltimore, MD, October 1998.

69. Metha, A., Roorda, A., Williams, D.R., Lennie, P. Determining L, M, and S cone photoreceptor distribution in the primate retina. Australian Ophthalmic and Visual Science Meeting, Australian National University, Canberra, Australia, November 1998.
70. Yoon, G.Y., Cox, I., Williams, D.R. The visual benefit of static correction of the monochromatic wave aberration [ARVO abstract]. Invest Ophthalmol Vis Sci., 40(4), B171, Abstract nr. 211, 1999.
71. Verweij, J., Diller, L.C., Williams, D.R. The relative strength of L and M cone inputs to H1 horizontal cells in primate retina [ARVO abstract]. Invest Ophthalmol Vis Sci., 40(4), B176, Abstract nr. 1268, 1999.
72. Roorda, A., Metha, A.B., Lennie, P., Williams, D.R. The Packing Arrangement of S, M and L Cones in the Living Primate Retina. [ARVO abstract]. Invest Ophthalmol Vis Sci., 40(4), Abstract nr. 1938, 1999.
73. Hofer, H., Artal, P., Aragon, J.L., Williams, D.R. Temporal Characteristics of the Eye's Aberrations [ARVO abstract]. Invest Ophthalmol Vis Sci., 40(4), Abstract nr. 1939, 1999.
74. Diller, L.C., Verweij, J., Williams, D.R. Dacey, D.M. L and M Cone Inputs to Peripheral Parasol and Midget Ganglion Cells in Primate Retina [ARVO abstract]. Invest Ophthalmol Vis Sci., 40(4), Abstract nr. 4302, 1999.
75. Artal, P., Guirao, A., Williams, D.R. Aberrations of the Internal Ocular Surfaces Measured in Vivo with a Hartmann-Shack Sensor [ARVO abstract] Invest Ophthalmol Vis Sci., 40(4), S206, Abstract nr B166, 1999.
76. Yoon, G.Y., Williams, D.R. Optimized Hartmann-Shack wave-front sensor for the human eye. Optical Society of America Annual Meeting, Santa Clara, CA, September 1999.
77. Artal, P., Hofer, H.J., Williams, D.R., Aragon, J.L. Dynamics of ocular aberrations during accommodation. Optical Society of America Annual Meeting, Santa Clara, CA, September 1999.
78. Brainard, D.H., Calderone, J.B., Jacobs, G.H., Roorda, A., Neitz, M., Neitz, J., Williams, D.R. Functional consequences of individual variation in relative L/M cone numerosity. Optical Society of America Annual Meeting, Santa Clara, CA, September 1999.
79. Guirao, A., Artal, P., Williams, D.R. Localization of ocular aberrations in the human eye. XIV International Congress for Eye Research, Santa Fe, NM, October 2000.
80. Hofer, H., Singer, B., Yoon, G.Y., Chen, L., Yamauchi, Y., Williams, D.R. Performance of the Rochester 2nd generation adaptive optics system for the eye. Optical Society of America Annual Meeting, 2000.
81. Yoon, G.Y., Chen, L., Singer, B., Yamauchi, Y., Hofer, H., Porter, J., Williams, D.R. Design of the Rochester 2nd generation adaptive optics system for the eye. Optical Society of America (OSA) Annual Meeting, 2000.

82. Yamauchi, Y., Williams, D.R., Brainard, D.H., Calderone, J.B., Roorda, A., Neitz, M., Neitz, J., Jacobs, G.H. Is unique yellow determined by the relative numbers of L and M cones? *Investigative Ophthalmology and Visual Science* 41, S526, 2000.
83. Yoon, G.Y., Williams, D.R. Visual benefit of correcting higher order monochromatic aberrations and chromatic aberration in the eye. *Optical Society of America Meeting on Visual Science and Its Applications*, Santa Fe, NM, 2000.
84. Cox, I., Potvin, R., Lagana, M., Williams, D.R., Porter, J. Wavefront aberrations of the human eye- a large population sample [Poster]. *British Contact Lens Association Annual Meeting*, Poster nr 14, 2000.
85. Porter, J., Cox, I., Guirao, A., Potvin, R., Lagana, M., Williams, D.R. A compact description of the eye's aberrations in a large population [ARVO Abstract]. *Investigative Ophthalmology Visual Science*, 41(4), S428, Abstract nr 2265, 2000.
86. Guirao, A., Artal, P., Williams, D.R. Localization of ocular aberrations in the human eye. *XIV International Congress of Eye Research*, Santa Fe, NM, 2000.
87. Guirao, A., Williams, D.R. Higher order aberrations in the eye and the best subjective refraction. *Optical Society of America Annual Meeting*, Providence, RI, October, 2000.
88. Guirao, A., Williams, D.R., Cox, I. Effect of rotation and translation on the expected benefit of ideal contact lenses [ARVO Abstract]. *Invest. Ophthalmol. Vis. Sci.*, 41(4), Abstract nr 2269, 2000.
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170. Shroff, S., Fienup, J., Williams, D.R. OTF compensation in structured illumination superresolution images. Unconventional Imaging IV, San Diego, CA, August 11, 2008.
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175. Hunter, J., Morgan, J., Norris, J., Williams, D.R. Multiple lipofuscin fluorophores are involved in photochemically-induced autofluorescence reduction. Annual Meeting, The Association for Research in Vision and Ophthalmology (ARVO), Ft. Lauderdale, FL, May 2009.

176. Dubra, A., Sulai, Y., Williams, D.R. Microscopic in vivo imaging of human inner retina with a phase adaptive optics scanning laser ophthalmoscope. Annual Meeting, The Association for Research in Vision and Ophthalmology (ARVO), Ft. Lauderdale, FL, May 2010.
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179. Sliney, D.H., Hunter, J.J., Delori, F.C., Williams, D.R., Mellerio, J. Competing photochemical retinal damage mechanisms from visible light: Implications for human retinal exposure limits. Annual Meeting, The Association for Research in Vision and Ophthalmology (ARVO), Ft. Lauderdale, FL, May 2010.
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181. Rossi, E.A., Achtman, R.L., Guidon, A., Williams, D.R., Roorda, A., Bavelier, D., Carroll, J. Visual function and cortical organization in carriers of blue cone monochromacy. Annual Meeting, The Association for Research in Vision and Ophthalmology (ARVO), Ft. Lauderdale, FL, May 2010.
182. Dubra, A., Sulai, Y., Williams, D.R. In vivo high resolution imaging of the nerve fiber layer using an adaptive optics scanning laser ophthalmoscope. Center for Visual Science, 27th Symposium on Photons and Neurons, University of Rochester, June 4-6, 2010.
183. Geng, Y., Schery, L.A., Ahmad, K., Libby, R.T., Williams, D.R. Wave aberration of the mouse eye. Center for Visual Science, 27th Symposium on Photons and Neurons, University of Rochester, June 4-6, 2010.
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185. Yin, L., Dalkara, D., Greenberg, K., Hunter, J.J., Kolstad, K.D., Masella, B.D., Visel, M., Libby, R.T., DiLoreto Jr., D., Flannery, J., Williams, D.R., Merigan, W.H. AAV-mediated gene delivery to retinal ganglion cells in the macaque eye. Center for Visual Science, 27th Symposium on Photons and Neurons, University of Rochester, June 4-6, 2010.
186. Chung, M., Williams, D.R. Adaptive optics imaging in age-related macular degeneration. First Biennial Symposium on AMD, Schepens Eye Center, Harvard Medical School, Boston, MA, September 30-October 2, 2010.

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189. Yin, L., Dalkara, D., Greenberg, K., Hunter, J.J., Masella, B.D., Visel, M., Diloreto Jr, D., Flannery, J., Williams, D.R., Merigan, W.H. AAV-mediated gene delivery to retinal ganglion cells in the macaque eye. Optical Society of America (OSA) Fall Vision Meeting, October 2010.
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191. Zhou, J., Hunter, J.J., Masella, B.D., Williams, D.R., Sparrow, J.R. Bleaching and recovery of RPE autofluorescence. Annual Meeting, The Association for Research in Vision and Ophthalmology (ARVO), May 2011.
192. Dubra, A., Sulai, Y, Williams, D.R., Carroll, J. In vivo imaging of the rod photoreceptor mosaic. Annual Meeting, The Association for Research in Vision and Ophthalmology (ARVO), May 2011.
193. Schallek, J.B., Masella, B., Hunter, J.J., Williams, D.R. Stimulus-dependent changes in capillary blood velocity revealed with adaptive optics scanning laser ophthalmoscopy. Annual Meeting, The Association for Research in Vision and Ophthalmology (ARVO), May 2011.
194. Masella, B., Hunter, J.J., Yin, L., Strazzeri, J., Dubra, A., Merigan, W.H., Williams, D.R. No loss of photopigment kinetics or contrast sensitivity seen after photochemical insult to the retinal pigment epithelium. Annual Meeting, The Association for Research in Vision and Ophthalmology (ARVO), May 2011.
195. Chung, M.M., Rossi, E.A., Song, H., Dubra, A., Gonzalez, M.O., Stone, E.M., Riley, J., Williams, D.R. In vivo adaptive optics imaging of the cone photoreceptor mosaic in autosomal dominant cone rod dystrophy (AD-CRD) in a three-generation family carrying the I143NT mutation in the guanylate cyclase activator A1A (GUCA1A) gene. Annual Meeting, The Association for Research in Vision and Ophthalmology (ARVO), May 2011.
196. Geng, E., Sharma, R., Dubra, A., Ahmad, K., Twietmeyer, T., Masella, B., Hunter, J.J., Libby, R.T., Williams, D.R. High resolution in vivo imaging of the mouse retina using an adaptive optics scanning laser ophthalmoscope. Annual Meeting, The Association for Research in Vision and Ophthalmology (ARVO), May 2011.

197. Merigan, W.H., Strazzeri, J., DiLoreto, D.A. Jr., Fischer, W., Hunter, J., Masella, B., Williams, D.R. Visual recovery after outer retinal damage in the macaque. Optical Society of America (OSA) Fall Vision Meeting, September 2011.
198. Schallek, J.B., Geng, Y., Williams, D.R. In vivo adaptive optics imaging of retinal sericites and capillary blood velocity in mice. Annual Meeting, The Association for Research in Vision and Ophthalmology (ARVO), May 2012.
199. Yin, L., Cetin, A.H., Geng, Y., Sharma, R., Ahmad, K., Callaway, E.M., Williams, D.R., Merigan, W.H. In vivo optical recording from mouse retinal ganglion cells. Annual Meeting, The Association for Research in Vision and Ophthalmology (ARVO), May 2012.
200. Sharma, R., Geng, Y., Yin, L., Merigan, W.H., Williams, D.R., Hunter, J.J. In vivo two-photon imaging of mouse retina. Annual Meeting, The Association for Research in Vision and Ophthalmology (ARVO), May 2012.
201. Song, H., Williams, D.R., Latchney, L., Dubra, A., Chung, M.M. Fluorescence adaptive optics scanning laser ophthalmoscopy demonstrates intraretinal spots and low cone density in fundus albipunctatus. Annual Meeting, The Association for Research in Vision and Ophthalmology (ARVO), May 2012.
202. Masella, B.D., Hunter, J.J., Williams, D.R. Spatially-resolved adaptive optics photopigment densitometry for assessing photoreceptor function. Annual Meeting, The Association for Research in Vision and Ophthalmology (ARVO), May 2012.
203. Rossi, E.A., Williams, D.R., Dubra, A., Song, H., Folwell, M.A., Latchney, L.R., Chung, M.M. Photoreceptor and RPE disruptions observed outside clinically visible geographic atrophy lesions in the living eye with fluorescence adaptive optics scanning laser ophthalmoscopy (FAOSLO). Annual Meeting, The Association for Research in Vision and Ophthalmology (ARVO), May 2012.
204. Chung, M.M., Song, H., Chew, E.Y., Folwell, M., Latchney, L., Williams, D.R., Dubra, A. Adaptive optics scanning laser ophthalmoscopy demonstrates reduced foveal cone density in early idiopathic macular telangiectasia. Annual Meeting, The Association for Research in Vision and Ophthalmology (ARVO), May 2012.
205. Yin, L., Masella, B., Dalkara, D., Flannery, J.G., Schaffer, D.V., Williams, D.R., Merigan, W.H. In vivo imaging of ganglion cell physiology in macaque fovea using a calcium indicator. Optical Society of America (OSA) Fall Vision Meeting, September 2012.
206. Schallek, J.B., Nguyen, H.N., Schwarz, C., Williams, D.R. Non-invasive adaptive optics imaging of retinal pericytes and capillary blood velocity in mice. Optical Society of America (OSA) Fall Vision Meeting, September 2012.
207. Sharma, R., Yin, L., Geng, Y., Merigan, W.H., Williams, D.R., Hunter, J. In vivo two-photon imaging of the mouse retina. Optical Society of America (OSA) Fall Vision Meeting, September 2012.

208. Rossi, E.A., Williams, D.R., Dubra, A., Latchney, L., Folwell, M., Fischer, W., Song, H., Chung, M. Individual retinal pigment epithelium cells can be imaged in vivo in age related macular degeneration. Annual Meeting, The Association for Research in Vision and Ophthalmology (ARVO), May 2013.
209. Rangel-Fonseca, P., Gomez-Vieyra, A., Malacara-Hernandez, D., Wilson, M., Williams, D.R., Rossi, E.A. Automated segmentation of retinal pigment epithelium cells in fluorescence adaptive optics images. Optical Society of America (OSA) Fall Vision Meeting, October 2013.
210. Masella, B.D, Hunter, J., Williams, D.R. Rod photopigment kinetics after disruption of the retinal pigment epithelium with visible light exposure. Annual Meeting, The Association for Research in Vision and Ophthalmology (ARVO), May 2014.
211. Hunter, J., Masella, B.D., Fischer, W., Rossi, E., Williams, D.R. Long-term reduction of infrared autofluorescence caused by infrared light below the maximum permissible exposure. Annual Meeting, The Association for Research in Vision and Ophthalmology (ARVO), May 2014.
212. Saito, K, Nozato, K., Suzuki, K., Roorda, A., Dubra, A., Song, H., Hunter, J., Williams, D.R., Rossi, E. Rods and cones imaged with a commercial adaptive optics scanning light ophthalmoscope (AOSLO) prototype. Annual Meeting, The Association for Research in Vision and Ophthalmology (ARVO), May 2014.
213. Yang, Q., Zhang, J., Nozato, K, Saito, K. Suzuki, K., Williams, D.R., Rossi, E.A. Real-time optical stabilization and digital registration for high-resolution retinal imaging. Annual Meeting, The Association for Research in Vision and Ophthalmology (ARVO), May 2014.
214. Zhang, J., Saito, K., Yang, Q., Nozato, K., Suzuki, K., Hunter, J., Williams, D.R., Rossi, E.A. An integrated adaptive optics scanning light ophthalmoscope (AOSLO) and wide-field SLO (WF-SLO) for steerable high resolution retinal imaging. Annual Meeting, The Association for Research in Vision and Ophthalmology (ARVO), May 2014.
215. Nozato, K., Yang, Q., Saito, K., Zhang, J., Williams, D.R., Rossi, E.A. Automatic correction of sinusoidal distortion and drift in resonant scanning retinal imaging systems. Annual Meeting, The Association for Research in Vision and Ophthalmology (ARVO), May 2014.
216. Schallek, J.B., Parkins, K., Williams, D.R. In vivo retinal blood flow cytometry and velocimetry. Annual Meeting, The Association for Research in Vision and Ophthalmology (ARVO), May 2014.
217. Yang, Q., Song, H., Granger, C.E., Nozato, K., Saito, K., Zhang, J., Latchney, L.R., Chung, M.M., Williams, D.R., Rossi, E.A. Safe real-time imaging of human retinal pigment epithelial cells in the living eye. Annual Meeting, The Association for Research in Vision and Ophthalmology (ARVO), May 2015.

218. Nozato, K., Yang, Q., Saito, K., Suzuki, K., Zhang, J., Latchney, L.R., Williams, D.R., Rossi, E.A. Compact adaptive optics scanning light ophthalmoscope (AOSLO) with real-time optical stabilization and digital registration. Annual Meeting, The Association for Research in Vision and Ophthalmology (ARVO), May 2015.
219. Sharma, R., Schwarz, C., Palczewska, G., Williams, D.R., Hunter, J. In vivo two-photon fluorescence kinetics of primate rods and cones during light and dark adaptation. Annual Meeting, The Association for Research in Vision and Ophthalmology (ARVO), May 2015.
220. Hunter, J., Sharma, R., Palczewska, G., Palczewski, K., Williams, D.R. In vivo two-photon fluorescence imaging of primate inner retina. Annual Meeting, The Association for Research in Vision and Ophthalmology (ARVO), May 2015.
221. Guevara-Torres, A., Williams, D.R., Schallek, J.B. Split-detector imaging reveals photoreceptors, outer nuclear layer somata and horizontal cells without contrast agents in the living mouse retina. Annual Meeting, The Association for Research in Vision and Ophthalmology (ARVO), May 2015.
222. Rossi, E., Saito, K., Granger, C.E., Nozato, K., Yang, Q., Kawakami, T, Zhang, J., Fischer, W., Williams, D.R., Chung, M.M. Adaptive optics imaging of putative cone inner segments with geographic atrophy lesions. Annual Meeting, The Association for Research in Vision and Ophthalmology (ARVO), May 2015.
223. Joseph, A., Guevara-Torres, A., Williams, D.R., Schallek, J.B. Measurement of blood flow in the largest vessels and smallest capillaries in the living mouse retina using an adaptive optics scanning light ophthalmoscope. Annual Meeting, The Association for Research in Vision and Ophthalmology (ARVO), May 2015.
224. Schallek, J.B., Guevara-Torres, A., Williams, D.R. Imaging the morphology, rheology and flux of single red blood cells in the living mouse eye without contrast agents. Annual Meeting, The Association for Research in Vision and Ophthalmology (ARVO), May 2015.
225. Sharma, R., Williams, D.R., Palczewska, G., Palczewski, K., Hunter, J.J. Two-photon autofluorescence imaging reveals cellular structures throughout the retina of the living primate eye. Multidisciplinary Ophthalmic Imaging, The Association for Research in Vision and Ophthalmology (ARVO), May 2016.
226. Granger, C., Song, H., Yang, Q., Saito, K., Nozato, K., Williams, D.R., Chung, M.M., Rossi, E.A. Contiguous mapping of retinal pigment epithelium (RPE) cell morphometry across the horizontal meridian of the living human eye. The Association for Research in Vision and Ophthalmology (ARVO), May 2016.
227. Rossi, E.A., Sharma, R., Granger, C., Schwarz, C., Yang, Q., Hunter, J.J., Williams, D.R. Individual inner retinal neurons imaged in the living eye of monkey and human. The Association for Research in Vision and Ophthalmology (ARVO), May 2016.



228. Cheong, S.K., Zegarra, F.Z., Williams, D.R., Merigan, W.H. In vivo functional imaging of retinal neurons using red and green fluorescent calcium indicators. The Association for Research in Vision and Ophthalmology (ARVO), May 2016.
229. Sharma, R., Schwarz, C., Williams, D.R., Palczewska, G., Palczewski, K., Hunter, J.J. In vivo two-photon fluorescence kinetics of primate rods and cones. Multidisciplinary Ophthalmic Imaging, The Association for Research in Vision and Ophthalmology (ARVO), May 2016.
230. Granger, C.E., Williams, D.R., Rossi, E. Near-infrared autofluorescence imaging reveals the retinal pigment epithelial mosaic in the living human eye. Annual Meeting, The Association for Research in Vision and Ophthalmology (ARVO), May 2017.
231. Guevara-Torres, A., Schwarz, C., Williams, D.R., Schallek, J. Retinal cell refractive model describes the source of the contrast in split-detector ophthalmoscopy. Annual Meeting, The Association for Research in Vision and Ophthalmology (ARVO), May 2017.
232. Schwarz, C., Sharma, R., Keller, M., Williams, D.R., Hunter, J. Intense ultrashort pulsed light in the infrared selectively damages putative S cones. Annual Meeting, The Association for Research in Vision and Ophthalmology (ARVO), May 2017.
233. McGregor, J., Phillips, M.J., Walters, S., Zhang, J., Strazzeri, J., DiLoreto, D., Walker, A., Fischer, W., Yang, Q., DiVincenti, L., Gamm, D., Williams, D.R., Hunter, J., Merigan, W. non-invasive retinal imaging of fluorescent hESC-derived photoreceptor precursors in the living primate. Annual Meeting, The Association for Research in Vision and Ophthalmology (ARVO), May 2017.
234. Dhakal, K., Walter, S., Schwarz, C., Strazzeri, J., Bateman, B., Aboualizadeh, E., Hunter, J., Williams, D.R., Merigan, W. Ultrafast laser induced retinal degeneration model in macaque using adaptive optics. Optical Society of America (OSA) Fall Vision Meeting, September 2018.
235. McGregor, J., Walter, S., Parkins, K., Dhakal, K., Strazzeri, J., Bateman, B., Williams, D.R., Merigan, W. Optogenetic vision restoration in the living macaque. Optical Society of America (OSA) Fall Vision Meeting, September 2018.
236. Williams, D.R., Sharma, R., Cheong, SK., Keller, M., Hunter, J., Schwarz, C. Two photon ophthalmoscopy reveals a new oddity of S cones. Optical Society of America (OSA) Fall Vision Meeting, September 2018.
237. Dhakal K, Walters S, Schwarz C, Strazzeri J, McGregor J, Aboualizadeh E, Bateman B, Hunter J, Williams D, Merigan W. (2019) Spatially localized photoreceptor ablation in macaque using a femtosecond laser and adaptive optics. IOVS 60: ARVO E-Abstract 4744 (paper).
238. Aboualizadeh E, Phillips MJ, Strazzeri J, Diloreto D, Dhakal K, Bateman B, Hunter J, Merigan W, Gamm D, Williams D. (2019) Survival and migration of photoreceptor precursors following transplantation into a macaque eye with host photoreceptors ablated. IOVS 60: ARVO E-Abstract 6397 (paper).

239. Hunter JJ, Dhakal K, Walters S, Schwarz C, Strazzeri J, Bateman B, Williams D, Merigan W. (2019) Femtosecond Pulses Delivered with Adaptive Optics Selectively Damage the Photoreceptor Layer in Macaque. International Laser Safety Conference. Paper 102.

### **INVITED PRESENTATIONS**

1. Distribution of blue-sensitive cones in the fovea. Kenneth Craik Club, University of Cambridge, Cambridge, England, 1978.
2. Punctate sensitivity of the blue-sensitive mechanism. Bell Telephone Laboratories, 1979.
3. Spatial organization of the blue cone system. Cambridge, England, 1980.
4. Punctate sensitivity of the blue sensitive cones. Department of Ophthalmology, University of Washington, 1980.
5. Punctate sensitivity of the blue sensitive cones. Department of Psychology, University of Rochester, 1980.
6. Williams, D.R., Collier, R.J. Spatial resolution of the short wavelength mechanism. Conference on Colour Vision, University of Cambridge, 1982.
7. Aliasing by a human photoreceptor mosaic. Institute for Sensory Research, Syracuse University, 1983.
8. Optical and neural constraints on the human visual resolution. Laboratory of Laser Energetics, University of Rochester, 1984.
9. Optical and neural constraints on human visual resolution. University of Washington, 1984.
10. Optical and neural constraints on human visual resolution. Stanford University, California, 1984.
11. Optical and neural constraints on human visual resolution. University of California, Irvine, 1984.
12. Optical and neural constraints on human visual resolution. University of California, San Diego, 1984.
13. Optical and neural constraints on human visual resolution. University of California, Berkeley, 1984.
14. Williams, D.R. Human visual resolution. Image Technology, Society of Photographic Scientists and Engineers, Boston, MA, 1984.

15. Yellott, J., Williams, D.R. Imaging sampling properties of photoreceptors. Rank Prize Symposium on Biological Engineering Aspects of Visual Hyperacuity, Cambridge, England, 1984.
16. Krauskopf, J., Williams, D.R., Mandler, M., Brown, A. Cardinal directions and beyond. Workshop on System Approaches to Vision, Amsterdam, The Netherlands, 1984.
17. Limits of human visual resolution. Johns Hopkins University School of Medicine, Wilmer Eye Institute, 1985.
18. Human visual resolution. Cornell University, 1985.
19. How well can the eye really see? Denison University Alumni Scholar Colloquium, Department of Psychology, 1985.
20. The limits of human vision. Provost's Wednesday Evening Lecture Series, University of Rochester, 1985.
21. Neural contrast sensitivity. Cornell University, 1986.
22. Limits of vision. Nazareth College, 1986.
23. Seeing through the photoreceptor mosaic. Good Samaritan Hospital, Department of Ophthalmology, Portland, Oregon, 1986.
24. The limits of human vision. Department of Radiology, University of Rochester, 1986.
25. Williams, D.R. Visual Resolution and the photoreceptor mosaic. Conference on Vision, Nordita, Nordisk Institut for Teoretisk Atomfysik, Copenhagen, Denmark, 1986.
26. Williams, D.R. Seeing through the photoreceptor mosaic. Interdisciplinary Conference, Whistler, British Columbia, 1986.
27. The limits of human vision. Department of Psychology, Dartmouth College, 1987.
28. Visual resolution and the photoreceptor mosaic. Brain and Cognitive Sciences, Massachusetts Institute of Technology, 1987.
29. Visual resolution and the photoreceptor mosaic. Institute of Optics, University of Rochester, 1987.
30. Williams, D.R. Color, space, and the cone mosaic. The Cuernavaca Workshop on Vision, Cuernavaca, Mexico, 1987.
31. Williams, D.R. Visual resolution and the photoreceptor mosaic. Society for Neuroscience, New Orleans, LA, 1987.
32. Visual resolution and the grain of the cone mosaic. University of Pennsylvania, 1988.
33. Color vision and the cone mosaic. New York University, 1988.

34. Limits of spatial vision. University of Alabama, 1988.
35. Williams, D.R. The Unobtrusive Photoreceptor Mosaic. Symposium on Photoreception, Frontiers of Visual Science, National Research Council, Washington, DC, 1988.
36. A nonlinearity in early spatial vision. Columbia University, 1989.
37. Aliasing in human foveal vision. Columbia University, 1989.
38. Spatial sampling in human vision. University of Texas, Austin, 1989.
39. Image motion and spatial sampling. University of California, San Diego, 1989.
40. On measuring the cone mosaic in the living human eye. Eye Research Institute, Boston, MA, 1989.
41. There is more to seeing than meets the eye. University Forum, University of Rochester, 1989.
42. Williams, D.R., Coletta, N., Tiana, C., Haake, W. Spatial sampling & image motion. Workshop on Computational Models of Visual Processing, Cold Spring Harbor, June, 1989.
43. Lennie, P. Haake, P.W., Williams, D.R. Chromatic opponency through indiscriminate connections to cones. Workshop on Computational Models of Visual Processing, Cold Spring Harbor, NY, June 1989.
44. Williams, D.R. Photoreceptor sampling of moving images. Applied Vision Topical Meeting, San Francisco, CA, July 1989.
45. Williams, D.R., Coletta, N., Tiana, C., Packer, O. Spatial sampling, image motion, and visual resolution. "Optics, Physiology and Vision," The Westheimer Symposium, Berkeley, CA, August 1989.
46. Spatial sampling in human vision. University of Waterloo, Waterloo, Canada, 1990.
47. Spatial aliasing by chromatic mechanisms in human vision. Polaroid Corporation, Boston, MA, 1990.
48. Spatial aliasing by chromatic mechanisms in human vision. University of Michigan, Ann Arbor, MI, 1990.
49. The cost of trichromacy for spatial vision. Laboratoire de Physique Appliquée du Museum, Paris, France, 1990.
50. The cost of trichromacy for spatial vision. University of Valencia, Valencia, Spain, 1990.
51. The cost of trichromacy for spatial vision. C.S.I.C. Instituto de Optica, Madrid, Spain, 1990.

52. Williams, D.R., Sekiguchi, N., Packer, O. Spatial sampling by the human foveal cone mosaic and its implications for color vision. International Congress of Eye Research, Helsinki, Finland, July 1990.
53. Williams, D.R. Interpolation and trichromatic spatial sampling in foveal vision. Advances in Understanding Visual Processes. Roros, Norway, August 1990.
54. Williams, D.R. Spatial sampling in human vision. Curso Interuniversitario para Postgraduados Sobre meeting, Madrid, Spain, November 1991.
55. Williams, D.R. The cost of trichromacy for human vision. Curso Interuniversitario para Postgraduados Sobre, Madrid, Spain, November 1991.
56. Williams, D.R. Spatial sampling in human vision. Conference on Vision, Funcacion Ramon Areces, Madrid, Spain, November 1991.
57. Williams, D.R. The Limits of Vision. Educator's Day, Optical Society of America, San Jose, CA, November 1991.
58. The cost of trichromacy for spatial vision. Rochester Institute of Technology, Rochester, NY, 1991.
59. Williams, D.R. The mechanisms that prevent aliasing in the visual system. Ophthalmic and Visual Optics, OSA Topical Meeting, Santa Fe, NM, January 1992.
60. Williams, D.R. Perceptual consequences of the trichromatic cone mosaic. Advances in Color Vision, OSA Topical meeting, Irvine, CA, January 1992.
61. Williams, D.R. Implications of Photoreceptor Sampling for Spatial and Color Vision. FASEB Summer Research Conference on Vision, Saxtons River, VT, June 1992.
62. Color, contrast sensitivity, and the cone mosaic. Rockefeller University, 1992.
63. Williams, D.R. The optical quality of the human eye. Workshop on Physical Optics and Human Vision, Rochester, NY, June 1993.
64. Williams, D.R., McMahon, M., Brainard, D.H., Navarro, R. Comparison of noninvasive measures of the optical quality of the eye. Vision Science and its Applications, Technical Digest Series, Vol. 2, Optical Society of America, Washington DC, 68-71, 1994.
65. Williams, D.R., Brainard, D.H., McMahon, M.J., Navarro, R. Comparison of noninvasive measures of the optical quality of the human eye. Frontiers in Information Optics Conference, Kyoto, Japan, April 1994.
66. Packer, O., Williams, D.R., Bensinger, D.G. Photopigment transmittance imaging of the primate photoreceptor mosaic. FASEB Conference on the Biology, Chemistry, and Modeling of Vision, June 1994.

67. The passage of light through primate photoreceptors. Universidad de Murcia, Murcia, Spain, 1995.
68. Images of cone photoreceptors in the living human eye. University of Chicago, 1995.
69. Images of cone photoreceptors in the living human eye. University of California, San Diego, 1995.
70. Images of cone photoreceptors in the living human eye. Institute for Sensory Research, Syracuse University, 1995.
71. Images of cone photoreceptors in the living human eye. School of Optometry, University of Waterloo, Waterloo, Ontario, 1995.
72. Williams, D.R. Aberrations of the eye measured with wavefront sensing. Noninvasive Optical Methods in Vision and Ophthalmology, Madrid, Spain, March 1995.
73. Williams, D.R. Prospects for improving spatial resolution in fundus imaging. Noninvasive Optical Methods in Vision and Ophthalmology, Madrid, Spain, March 1995.
74. Williams, D.R. Applications of Adaptive Optics in Human Vision. Adaptive Optics Working Group Meeting, SPIE, San Diego, CA, 1995.
75. High resolution imaging of the living human retina. Department of Biological Structure, University of Washington, Seattle, Washington, May 1996.
76. Photopigment transmittance imaging. Vision Group, University of Washington, Seattle, Washington, May 1996.
77. Pushing the optical limits of the human eye. Section of Neurobiology and Behavior Seminar, Cornell University, Ithaca, NY, Ma, 1996.
78. Williams, D.R. Visual Aspects of Night Flying. Holiman Air Force Base, NM, January 1996.
79. Williams, D.R. Pushing the Optical Limits of the Human Eye. Twelfth Annual James M. Sprague Lecture, Thirteenth Annual Neuroscience Retreat, University of Pennsylvania, April 1996.
80. Williams, D.R. High Resolution Fundus Imaging. 41st Annual Rochester Ophthalmology Conference, Rochester, NY, May 1996.
81. Williams, D.R., Liang, J., Miller, D.T. Adaptive Optics for the Human Eye. OSA Topical Meeting on Adaptive Optics, Maui, HI, July 1996.
82. Williams, D.R., Liang, J., Miller, D.T. Adaptive Optics for High Resolution Retinal Imaging. Mopane Conference on Refraction and Keratometry, Kruger National Park, South Africa, August 1996.

83. Adaptive optics for the human eye. University of Houston College of Optometry, April 1997.
84. Williams, D.R. Adaptive Optics for the Human Eye. Plenary talk for colocated meetings, Laser Munich and Nonastronomical Adaptive Optics, Munich, Germany, June 1997.
85. Roorda, A., Williams, D.R. Adaptive Optics for the Human Eye. International Workshop Adaptive Optics for Industry and Medicine, Shatura, Russia, June 1997.
86. Williams, D.R. Imaging Photoreceptors in Vivo. 27th Cambridge Ophthalmological Symposium, Cambridge, England, September 1997.
87. Williams, D.R. Toward Supernormal Vision. National Science Writers Seminar, Research to Prevent Blindness, Universal City, CA, September 1997.
88. Adaptive optics for the human eye. University of California, Berkeley, February 1998.
89. Microscopic imaging of the living human retina. University of Washington, March 1998.
90. Adaptive Optics for the Human Eye. Center for Neural Science, NYU, New York, NY, April 1998.
91. Adaptive Optics for the Human Eye. Department of Ophthalmology, Mt. Sinai School of Medicine, New York City, NY, April 1998.
92. Adaptive Optics for the Human Eye. Bioengineering, UCB, Berkeley, CA, November 1998.
93. High Resolution Retinal Imaging through Adaptive Optics. Stanford University, Palo Alto, CA, December 1998.
94. Adaptive Optics for the Human Eye. Lawrence Livermore National Laboratory, Livermore, CA, December 1998.
95. Williams, D.R. The Arrangement of the Three Cone Classes in the Living Human Eye. FASEB Research Conference on Retinal Neurobiology and Visual Processing, Saxtons River, VT, July 1998.
96. Williams, D.R. Adaptive Optics for the Human Eye. American Academy of Optometry Annual Meeting and 75th Anniversary of the UC Berkeley College of Optometry, San Francisco, CA, December 1998.
97. Adaptive Optics for the Human Eye. Broadhurst Distinguished Lecture, Schepens Eye Research Institute, Boston, MA, March 1999.
98. Williams, D.R. Microscopic Imaging of the Living Human Retina through Adaptive Optics. Symposium on Frontiers in Imaging, ARVO, Ft. Lauderdale, FL, May 1999.
99. Williams, D.R. Adaptive Optics for the Human Eye [Plenary talk]. Annual Meeting of the Australian Optical Society, University of Sydney, Sydney, Australia, July 1999.

100. Williams, D.R. Evaluating Multifocal Contact Lenses with Wavefront Sensing. Keynote Address, International Society for Contact Lens Research, Phuket, Thailand, August 1999.
101. Williams, D.R. Tillyer Award lecture: Exceeding the Resolution Limit of the Human Eye. Optical Society of America Annual Meeting, Santa Clara, CA, September 1999.
102. Williams, D.R. High Resolution Imaging of the Living Human Fundus. Opening Ceremony, Interuniversitair Oogheekundig Instituut, Amsterdam, Netherlands, October 1999.
103. Williams, D.R. High Resolution Imaging of the Retina with Adaptive Optics. National Eye Institute Predoctoral Trainees' Meeting, NIH, Bethesda, MD, November 1999.
104. Williams, D.R. Adaptive Optics: From Astronomy to Visual Neuroscience. New Directions in Biomedical Engineering, Stanford University, February 2000.
105. Williams, D.R. Magnitude of ocular aberrations: Visual and imaging significance. First International Congress of Wavefront Sensing and Aberration-Free Refractive Correction, Santa Fe, NM, February 2000.
106. Williams, D.R. The new wavefront technology. Refractive Alliance 2000, Boston, MA, May 2000.
107. Williams, D.R. Adaptive Optics for the Human Eye [Plenary Talk]. American Academy of Astronomy, June 2000.
108. Williams, D.R. Fundamentals of visual science. Center for Adaptive Optics Summer School, June 2000.
109. Williams, D.R. Correction of the eye's wave aberration. Center for Adaptive Optics Summer School, June 2000.
110. Williams, D.R. High Resolution Imaging of the Human Retina with Adaptive Optics. Columbia University, January 2001.
111. Williams, D.R. Wavefront Sensing and Visual Performance. Columbia University, January 2001.
112. Williams, D.R. History and Principles of Hartmann-Shack Wavefront Sensing. 2nd International Congress of Wavefront Sensing and Aberration-Free Refractive Correction, Monterey, CA, February 2001.
113. Williams, D.R. The Visual Benefit of Correcting Higher Order Aberrations. Visual Science and its Applications, Monterey, CA, February 2001.
114. Williams, D.R. Visual Acuity and How It May Be Improved. AAPT Meeting, Rochester, NY, July 2001.
115. Williams, D.R. American Association of Physics Teachers [Invited Talk]. The Limits of Human Vision, Rochester, NY, July 2001.



116. Williams, D.R. Clinical Applications of Adaptive Optics [Invited Talk]. CfAO Summer School, August 2001.
117. Williams, D.R. Adaptive Optics for Vision Correction. Industrial Physics Forum, October 2001.
118. Williams, D.R. When Correcting the Eye's Aberrations Makes Vision Worse. UC Irvine Satellite Meeting, October 2001.
119. Williams, D.R. Wavefront Approach to Laser Refractive Surgery [Invited Talk]. Food and Drug Administration, October 2001.
120. Williams, D.R. Wavefront basics, New Orleans Academy of Ophthalmology, 51st Annual Symposium, New Orleans, LA, February 2002.
121. Williams, D.R. What can adaptive optics do for refractive surgery. New Orleans Academy of Ophthalmology, 51st Annual Symposium, New Orleans, LA, February 2002.
122. Williams, D.R. The limits of human vision. GSFC Scientific Colloquium, NASA Goddard Space Flight Center, Greenbelt, MD, March 2002.
123. Williams, D.R. A role for high resolution retinal imaging with adaptive optics in clinical research? Steinbach Fund Meeting, New York City, NY, April 2002.
124. Williams, D.R. Limits of human vision. Department of Physics and Astronomy Colloquium, UCLA, May 2002.
125. Williams, D.R. Assessment of optical aberrations of the eye: wavefront sensing and adaptive optics. ARVO, Ft. Lauderdale, FL, May 2002.
126. Williams, D.R. What adaptive optics can do for the eye. 1st Aegean Summer School in Visual Optics and Aegean Cornea VI, Thesoloniki, Greece, July 2002.
127. Williams, D.R. Color Vision. 1st Aegean Summer School in Visual Optics and Aegean Cornea VI, Thesoloniki, Greece, July 2002.
128. Williams, D.R. Subjective impact of higher order aberrations. 1st Aegean Summer School in Visual Optics and Aegean Cornea VI, Thesoloniki, Greece, July 2002.
129. Williams, D.R. Photoreceptors and resolution. 1st Aegean Summer School in Visual Optics and Aegean Cornea VI, Thesoloniki, Greece, July 2002.
130. Williams, D.R. International Conference on Image Processing [Plenary Talk]. Rochester, NY, September 25, 2002.
131. Williams, D.R. Measurement and correction of higher order aberrations. International Symposium on the Eye & Vision, Montreal, Canada, October 26 2002.

132. Williams, D.R. Progress and puzzles at Rochester. CfAO Fall Retreat, Santa Cruz, CA, November 8, 2002.
133. Williams, D.R. Vision technology showcase presentation. Vision Technology Showcase, Lake Arrowhead, CA, November 9, 2002.
134. Williams, D.R. Wavefront research at Rochester. Lasik plus VIP Tour/Visit, Rochester, NY, December 11, 2002.
135. Williams, D.R. Limits of human vision. Helmholtz Club, Irvine, CA, February 12, 2003.
136. Williams, D.R. Color and the cone mosaic. Salk Institute, February 13, 2003.
137. Williams, D.R. Ophthalmic wavefront sensing: An historical perspective. Fourth International Congress of Wavefront Sensing & Aberration-Free Refractive Correction Meeting, San Francisco, CA, February 15, 2003.
138. Williams, D.R. Adaptive optics for vision: Metrics for image quality in the human. Fourth International Congress of Wavefront Sensing & Aberration-Free Refractive Correction Meeting, San Francisco, CA, February 16, 2003.
139. Williams, D.R. Implications of trichromatic cone sampling for color vision. UH College of Optometry's 50th Anniversary Symposium, Houston, TX, March 1, 2003.
140. Williams, D.R. Adaptive optics for the human eye. Willmer Eye Institute, Johns Hopkins University, March 14, 2003.
141. Williams, D.R. Vision science overview. CfAO Spring Retreat, San Jose, CA, March 21, 2003.
142. Williams, D.R. Correction from wavefront data discussion. CfAO Spring Retreat, San Jose, CA, March 21, 2003.
143. Williams, D.R. Vision science results and future plans. CfAO Spring Retreat, San Jose, CA, March 22, 2003.
144. Williams, D.R. Adaptive optics for the eye. Carl Zeiss Meditec, Dublin, CA, March 25, 2003.
145. Williams, D.R. Predicting subjective image quality from the eye's wave aberration. B&L Global Symposium, Monte Carlo, Monaco, April 5, 2003.
146. Williams, D.R. Predicting subjective image quality from the eye's wave aberration. ASCRS Meeting, San Francisco, CA, April 12, 2003.
147. Williams, D.R. Progress with adaptive optics in vision science. CfAO Site Visit, Santa Cruz, CA, April 15, 2003.
148. Williams, D.R. The limits of human vision. CSHL Summer Seminars at the Banbury Conference Center, Cold Spring Harbor, NY, June 4, 2003.

149. Williams, D.R. High resolution imaging of the human retina with adaptive optics. Cornell University, June 19, 2003.
150. Williams, D.R. The limits of human vision. Distinguished Lecture Series presented at the Cole Eye Institute, Cleveland Clinic Foundation, Cleveland, OH, July 17, 2003.
151. Williams, D.R. Adaptive optics for the human eye [Plenary Talk]. IEEE/LEOS Optical MEMS, International Conference on Optical MEMS and Their Applications, Marriott Waikoloa Beach, HI, August 18, 2003.
152. Williams, D.R. Adaptive optics for the human eye. The 87th OSA Annual Meeting, Tucson, AZ, October 6, 2003.
153. Williams, D.R. AO instrumentation for advanced ophthalmic imaging. The Center for Adaptive Optics Fall Retreat, (Tenaya Lodge) Fish Camp, CA, November 1, 2003.
154. Color and the Cone Mosaic. Neuroscience Meeting, University of Pennsylvania, February 2004.
155. Williams, D.R. Predicting subjective image quality from the eye's wave aberration. The Annual ARVO Meeting, Ft. Lauderdale, FL, April 27, 2004.
156. Williams, D.R. Adaptive Optics for the Human Eye. Rochester Eye Institute Opening Celebration, Rochester, NY, May 5, 2004.
157. Williams, D.R. Ophthalmic Adaptive Optics. Center for Biophotonics, UCSF, May 28, 2004.
158. Williams, D.R. What's new on the wavefront. The 49th Annual Rochester Ophthalmology Conference for the Future, Rochester, NY, June 4-5, 2004.
159. Williams, D.R. Applications of adaptive optics in the human eye. ICO '04 Tokyo, Makuhari Messe, Chiba, Japan, July 14, 2004.
160. Williams, D.R. Adaptive optics for vision correction and high resolution retinal imaging. Japanese Vision Society, Kochi, Japan, July 22, 2004.
161. Williams, D.R. Adaptive Optics Instrumentation for Advanced Ophthalmic Imaging, Meeting of Principle Investigators, NIH Bioengineering Research Partnerships, Bethesda, MD, July 30, 2004.
162. Williams, D.R. Image processing in the visual system: from eye to retina to cortex. Advanced Summer School on Visual Optics, Adaptive Optics, High Resolution Retinal Imaging and Related Topics, Murcia, Spain, September 16, 2004.
163. Williams, D.R. Applications of adaptive optics for vision correction and retinal imaging. II EOS Topical Meeting on Physiological Optics, Granada, Spain, September 21, 2004.
164. Williams, D.R. The limits of human vision. Society for Neuroscience 34th Annual Meeting, San Diego, CA, October 26, 2004.

165. Williams, D.R. Introduction to state of the art aberrometry. American Academy of Optometry 2004 Conference, Tampa, FL, December 10, 2004.
166. Applications of High Resolution Retinal Imaging with Adaptive Optics. Institute of Optics and Electronics, Chinese Academy of Science, Chengdu, China, August 16, 2005.
167. Retinal Mechanisms of Color and Spatial Vision Revealed with Adaptive Optics. National Institutes of Health, Washington DC, December 12, 2005.
168. Williams, D.R. In vivo imaging of the human cone mosaic with adaptive optics. The Ninth Annual Vision Research Conference - Neuroimaging the Retina, Ft. Lauderdale, FL, April 29, 2005.
169. Williams, D.R. Optical limits to vision. The 4th Aegean Summer School in Visual Optics, University of Crete, Greece, June 29, 2005.
170. Williams, D.R. Neural limits to vision. The 4th Aegean Summer School in Visual Optics, University of Crete, Greece, June 29, 2005.
171. Williams, D.R. Adaptive optics for imaging the retina. The 4th Aegean Summer School in Visual Optics, University of Crete, Greece, June 30, 2005.
172. Williams, D.R. Imaging the photoreceptor mosaic in pathologic retinas. The 4th Aegean Summer School in Visual Optics, University of Crete, Greece, June 30, 2005.
173. Williams, D.R. Applications of adaptive optics for vision correction and retinal imaging. The 5th International Workshop on Adaptive Optics for Industry and Medicine, Beijing, China, August 29, 2005.
174. The Limits of Human Vision. Rochester Institute of Technology Astronomy Club, Rochester, NY, September 8, 2006.
175. Adaptive Optics. University of Pennsylvania, Scheie Eye Institute, Ophthalmology Grand Rounds and Visiting Professor and Guest Lecture Series, Philadelphia, PA, December 14, 2006.
176. Williams, D.R. High Resolution Imaging Strategy for Drug Development in Glaucoma. Bausch and Lomb, Rochester, NY, January 3, 2006.
177. Williams, D.R. Adaptive Optics for High Resolution Imaging of the Human Retina. Bausch and Lomb Global Symposium, Athens, Greece, April 9, 2006
178. Williams, D.R. The limits of human vision. Freidenwald award lecture, Ft Lauderdale, FL, May 2006.
179. Williams, D.R. The limits of human vision. Welch Allyn award celebration in honor of David Williams' receipt of the ARVO Friedenwald Award, Welch Allyn, Skaneateles, NY, July 12, 2006.

180. Williams, D.R. The limits of human vision. Friday Science Social Series, University of Rochester, July 14, 2006.
181. Williams, D.R. The Limits of Human Vision. Rochester Institute of Technology Astronomy Club, Rochester, NY, September 8, 2006.
182. Williams, D.R. Translating technology from academia to industry: a case study from a university perspective. Annual Meeting of the Optical Society of America, Rochester, NY, October 12, 2006.
183. Williams, D.R. Color and the Cone Mosaic. Fourteenth Color Imaging Conference, Scottsdale, AZ, November 8, 2006.
184. Williams, D.R. Adaptive Optics. Scheie Eye Institute, University of Pennsylvania, December 13, 2006.
185. Williams, D.R. Adaptive optics for high resolution retinal imaging. Ophthalmology Grand Rounds and Visiting Professor and Guest Lecture Series, Philadelphia, PA, December 14, 2006.
186. High Resolution Imaging of the Living Retina with Adaptive Optics. Washington University, Ophthalmology, Jay and Rebekah Enoch Lecture, St Louis, MO, March 14, 2007.
187. High Resolution Imaging with Adaptive Optics. New York University, Center for Neural Science, New York City, NY, March 26, 2007.
188. High Resolution Imaging with Adaptive Optics. SUNY College of Optometry, New York City, NY, June 4, 2007.
189. The Role of High Resolution Imaging with Adaptive Optics in Retinal Disease. National Eye Institute/NIH, Bethesda, MD, June 27, 2007.
190. Adaptive Optics Imaging in Retinal Disease. Merck Research Laboratories, West Point, PA, July 11, 2007.
191. Williams, D.R. Which are the hottest topics in Visual Optics? II Meeting of the Spanish Visual Optics Network, Murcia, Spain, March 6, 2007.
192. Williams, D.R. The retina: diagnosing retinal disease and advanced imaging techniques in retinal research. Building cures for eye disease: A Celebration of Scientific Discovery, Rochester, NY, March 16, 2007.
193. Williams, D.R. High resolution retinal imaging with adaptive optics. Annual ARVO Meeting, Ft Lauderdale, FL, May 6, 2007.
194. Williams, D.R. In vivo imaging of monkey retinal ganglion cells. Annual ARVO Meeting, May 8, 2007.

195. Williams, D.R. The limits of human vision. Cold Spring Harbor Laboratory/Banbury Seminars/Structure, Function and Development of the Visual System, Cold Spring Harbor, NY, July 6, 2007.
196. Williams, D.R. Imaging retinal mosaics in the living eye. 19th Symposium of the International Colour Vision Society, Belem, Brazil, July 27, 2007.
197. Williams, D.R. There is more to seeing than meets the eye. Alumni Lecture Series, University of Rochester, September 26, 2007.
198. Williams, D.R. Applications of adaptive optics. The Alfred W. Bressler Vision Science Symposium, New York City, NY, October 19, 2007.
199. How We See in Color. Institute of Optics, University of Rochester, January 28, 2008.
200. Imaging Retinal Mosaics in the Living Eye. UT Austin Center for Perceptual Systems, University of Texas at Austin, April 14, 2008.
201. Williams, D.R. Imaging retinal mosaics with adaptive optics. Novel Approaches to Bio-imaging, Washington, DC, March 10, 2008.
202. Williams, D.R. Imaging retinal mosaics in the living eye with adaptive optics. J. Donald Gass Memorial Lecture, Los Angeles, CA, March 15, 2008.
203. Williams, D.R. Extreme Optical Imaging of Eye and Brain. IBM Headquarters in Yorktown Heights, NY, May 28, 2008.
204. Williams, D.R. Color Vision and the Cone Mosaic. 2008 Summer Institute in Cognitive Neuroscience, July 2, 2008.
205. Williams, D.R. Visual System Development. Salve Regina University in Newport, RI, August 10, 2008.
206. Seeing Through Retinal Mosaics. Neuroscience Cluster Symposium, University of Chicago, January 13, 2009.
207. Seeing Through Retinal Mosaics. Oxyopia Lecture, Indiana University School of Optometry, January 16, 2009.
208. Imaging Retinal Mosaics in the Living Eye. Mount Sinai, School of Medicine in New York, NY, March 20, 2009.
209. Imaging Retinal Mosaics in the Living Eye. Patrick Wallace/Mark Evans Named Lecture, Casey Eye Institute, Portland, OR, September 18, 2009.
210. Williams, D.R. Past and Future Application of Adaptive Optics in Vision and Eye Care. Lens, Refractive & Wavefront Summit ARI/WFC 2009, March 5, 2009.
211. Williams, D.R. Autofluorescence imaging of the RPE cell mosaic in the living eye. Annual ARVO Meeting, Ft. Lauderdale, FL, May 7, 2009.

212. Williams, D.R. High Resolution Retinal Imaging with Adaptive Optics; Seeing Through the Photoreceptor/RPE Complex. Annual Buffalo Ophthalmology Symposium, The State University of New York at Buffalo, May 29, 2009.
213. Williams, D.R. High Resolution Fluorescence Imaging with Adaptive Optics. Advances in Optical Imaging and Biomedical Science Symposium, NIH Twinbrook Campus, Rockville, MD, June 1-2, 2009.
214. Williams, D.R. Imaging retinal mosaics in the living eye. Lasker/IRRF Initiative for Innovation in Vision Research, Woods Hole, MA, August 12-13, 2009.
215. Williams, D.R. Imaging retinal mosaics in the living eye. Robert M. Boynton Lecture, Optical Society of America (OSA) Fall Vision Meeting, University of Washington, October 2009.
216. Imaging Retinal Mosaics in the Living Eye. LV Prasad Eye Institute, Hyderabad, India, March 10, 2010.
217. Imaging Retinal Mosaics in the Living Eye. Laboratory of Laser Energetics, University of Rochester, April 2010.
218. Wavefront Technology at the University of Rochester. Flaum Eye Institute Technology Showcase at ARVO, Annual ARVO Meeting, May 2-6, 2010.
219. Emerging Imaging Technologies for Ophthalmology. Glaxo Smith Kline, Inc., September 20-21, 2010.
220. Imaging Retinal Mosaics in the Living Eye. Case Western Reserve University, Cleveland, OH, October 14-15, 2010.
221. Williams, D.R. Recent Breakthroughs in Imaging the Retina: Implications for Eye Care. Kemin Health, Dallas, TX, February 18-19, 2010.
222. Williams, D.R. Recent breakthroughs in Adaptive Optics Imaging of the Retina. The 55th Annual Ophthalmology Conference, Flaum Eye Institute, Rochester, NY, March 19-20, 2010.
223. Williams, D.R. Conflict and synergy between commercial interests and science in the academic laboratory. Annual ARVO Meeting, Ft Lauderdale, FL, May 2-6, 2010.
224. Williams, D.R. More than Meets the Eye: The Limits of Human Vision. Thomas McArthur, Alumni Relations, Jersey City, NJ, June 12-13, 2010.
225. Hunter, J.J., Morgan, J., Masella, B., Merigan, W., Delori, F., Sliney, D., Williams, D.R. Progress on New Thresholds for Photochemical Damage from Ophthalmic Exposures. American Society for Photobiology, Providence, RI, June 14, 2010.
226. Hunter, J.J., Masella, B., Dubra, A., Sharma, R., Palczewska, G., Palczewski, K., Williams, D.R. Advances in in vivo two-photon retinal imaging. International Society for Eye Research, Montreal, QC, Canada, July 20, 2010.

227. Williams, D.R. Adaptive optics imaging of the retina. Gordon Research Conference on Lasers in Medicine & Biology, Holderness, NH, July 25-30, 2010.
228. Williams, D.R. In vivo two-photon imaging of macaque retina. EOS Topical Meeting: 5th European Meeting on Visual and Physiological Optics (EMVPO), August 22-24, 2010.
229. Williams, D.R. Imaging individual cones. XL Cambridge Ophthalmological Symposium, September 2-3, 2010.
230. Williams, D.R. Overview of new imaging technology for ophthalmology. Ophthalmology Technology Day, Upper Providence, PA, September 21, 2010.
231. Williams, D.R. Seeing through retinal mosaics. Form & Function in Ocular Disease: A multi-disciplinary clinical and basic science symposium, Halifax, Canada, October 2, 2010.
232. Williams, D.R. Imaging retinal mosaics in the living eye. Rich Lecture Series, Birmingham, AL, November 17, 2010.
233. Williams, D.R. Applications of wavefront correction in ophthalmology. Rich Lecture Series, Birmingham, AL, November 18, 2010.
234. Williams, D.R. High Resolution Retinal Imaging for Accelerating Drug Development. Fort Worth, TX, November 19, 2010.
235. Williams, D.R. Microscopy of the Living Retina. 4th Annual Translational Research Conference, Berkeley, CA, November 21, 2010.
236. Imaging Retinal Mosaics in the Living Eye. NYU Center for Neural Science Colloquium, New York City, NY, April 18, 2011.
237. Williams, D.R. Color and the Cone Mosaic. The Russell DeValois Lecture Series, Berkeley, CA, March 15, 2011.
238. Williams, D.R. Fluorescence Microscopy of the Retina in the Living Eye. Upstate Neuroscience Symposium, Syracuse, NY, June 17, 2011.
239. Williams, D.R. Vision Correction with Wavefront Technology. 62nd Annual Post-Graduate Review Course: Ophthalmology – AMA CME Program, Syracuse, NY, December 2, 2011.
240. Williams, D.R. High Resolution Retinal Imaging with Adaptive Optics. 62nd Annual Post-Graduate Review Course: Ophthalmology – AMA CME Program, Syracuse, NY, December 3, 2011.
241. Williams, D.R. Let's Talk Imaging: Rochester is making a Difference. Rochester Engineer Live, Rochester, NY, March 12, 2012.



242. Williams, D.R. Seeing Through Retinal Mosaics. 4th Annual SEI Meeting, Buffalo, NY, September 8, 2012.
243. Williams, D.R. Imaging Single Cells in the Living Retina. The Optical Society's Annual 96<sup>th</sup> Annual Meeting, Frontiers in Optics, Oct 14 – 18, 2012.
244. Williams, D.R. Functional Imaging of Single Cells in the Living Eye. LV Prasad Eye Institute, Hyderabad, India, January 30, 2013.
245. Williams, D.R., The Retinal Mosaic. Symposium on Colour Vision, Paris, France, April 18, 2013
246. Williams, D.R. Imaging Single Cells in the Living Eye. The Royal College of Ophthalmologists, Edridge Green Lecture, Liverpool, UK, May 21, 2013.
247. Williams, D.R. Functional Imaging of Single Cells in the Living Eye. 9th International Workshop on Adaptive Optics for Industry and Medicine, Stellenbosch, South Africa, September 4, 2013.
248. Williams, D.R. Shedding New Light on the Brain and Eye. Meliora Weekend, University of Rochester, October 12, 2013.
249. Williams, D.R. Functional Imaging of Single Cells in the Living Eye. Distinguished Lecture Series at Cardiff University, Wales, UK, October 30, 2013.
250. Williams, D.R. Research, Impact and Future Application. Invited Speaker at SPIE Photonics West Conference, San Francisco, CA, February 2, 2014.
251. Williams, D.R. Functional Imaging of Single Cells in the Living Eye. Institute of Physics, Imperial College of London, London, UK, Sept. 1 – 4, 2014.
252. Functional Imaging of Single Cells in the Living Eye. Richard M. Hill Lecture Series, Ohio State University, Cleveland, OH, March 10, 2015.
253. Williams, D.R. Functional Imaging of Single Cells in the Living Eye. Invited Speaker at GE Symposium on Optics, Schenectady, NY, April 2, 2015.
254. William, D.R. Limits of Visual Perception. Invited speaker at the Department of Neurology Grand Rounds, University of Rochester, April 3, 2015.
255. Williams, D.R. Functional Imaging of Single Cells in the Living Eye. Invited speaker at 5th Annual Spring Vision Research Symposium Technology and Imaging in the Visual System, University of Minnesota, April 10, 2015.
256. Williams, D.R. Two-photon functional imaging of the photoreceptor mosaic. Annual ARVO Meeting, May 3-7, 2015.
257. Williams, D.R. Accelerating vision restoration with in vivo cellular imaging of retinal function. National Eye Institute (NEI) Audacious Goals Initiative (AGI) Imaging Consortium, June 29, 2015.

258. Williams, D.R. Functional Imaging of Single Cells in the Living Eye. Alcon Research Institute, Sept. 18-19, 2015.
259. Williams, D. R. Functional imaging of the living retina at cellular resolution. Vanderbilt Vision Festival, November 9, 2015.
260. Williams, D.R. Research in Arts Sciences and Engineering. Invited speaker at National Council of Arts Sciences and Engineering, New York, New York, March 11, 2016.
261. Williams, D.R. Seeing Through Retinal Mosaics. 2016 Pepose Award Lecturer, Brandeis University, April 11 – 13, 2016.
262. Williams, D.R. Individual inner retinal neurons imaged in the living eye of monkeys and humans. 2016 Annual Meeting, The Association for Research in Vision and Ophthalmology (ARVO), May 1 – 5, 2016.
263. Williams, D.R. Seeing through the retina. Beckman-Argyros Award in Vision Lecture, The Association for Research in Vision and Ophthalmology (ARVO), May 5, 2016.
264. Williams, D.R. Optical recording of the light response from ganglion cells in the living mammalian eye. Optical Society of America (OSA) 100<sup>th</sup> Annual Meeting, Frontiers in Optics, October 2016.
265. Williams, D.R. Seeing bright futures in optics. Optical Society of America (OSA), Student Leadership Conference 2016, 100<sup>th</sup> Annual Meeting, Frontiers in Optics, October 2016.
266. Williams, D.R. Seeing through the retina. Princeton University, Lewis-Sigler Institute of Integrative Genomics, December 2016.
267. Williams, D.R. Imaging cellular function in the living eye. 9<sup>th</sup> Annual Beckman Initiative for Macular Research (BIMR) Conference, January 2017.
268. Williams, D.R. Seeing through the retina. 2017 OSA Biophotonics Congress: Optics in the Life Sciences, April 2017.
269. Williams, D.R. Imaging the function of single cells in the living eye. UCLA Stein Eye Institute Clinical and Research Seminar and 50th Anniversary Celebration, June 2017.
270. Williams, D.R. Two photon ophthalmoscopy reveals a new oddity of S cones. 2018 OSA Fall Vision Meeting, September 2018.
271. Williams, D.R. Functional imaging of single cells in living eye. Wavefront Congress, Santa Fe, NM, March 2019.
272. Williams, D.R. Functional imaging and control of single cells in a primate eye. Distinguished Professor Lecture Series, University of Washington, May 2019.
273. Williams, D.R. Seeing through the retina. Facebook Reality Labs, Seattle, WA, May 2019.

## **BOOKS EDITED**

1. Handbook of Optics, Optical Society of America, Editor in Chief, Michael Bass, Assoc. Editors, E.W Van Stryland, D.R. Williams, and W.L. Wolfe, 2nd edition, McGraw-Hill, Inc., 1995.

## **BOOK CHAPTERS, BOOK REVIEWS, AND UNREFEREED PUBLICATIONS**

1. Williams, D.R., Collier, R., Thompson, B.J. (1983). Spatial resolution of the short wavelength mechanism. In Mollon, J.D. and Sharpe, L.T. (Eds.) *Colour Vision: Physiology and Psychophysics*. London: Academic Press.
2. Wagner, S.H., Williams, D.R. (1983). Out of the eyes and ears of babes. *Contemporary Psych.*, 28, 531-532. (Review of "Development in Infancy" by J.G.R. Bower.)
3. Williams, D.R. (1986). Seeing through the photoreceptor mosaic. *Trends in Neuroscience*, 9, 193-198.
4. Williams, D.R. (1986). The mind's eye. *Quarterly Review of Biology*, 61, 574-575. (Review of readings from *Scientific American*, with introductions by Jeremy M. Wolfe.)
5. Williams, D.R. (1990). Seeing in the light and in the dark. *Optics and Photonics News*, 1, 36-37.
6. Williams, D.R. (1990). The invisible cone mosaic. *Advances in Photoreception, Proceedings of a Symposium on Frontiers of Visual Science*, 135-148. Washington, DC: National Academy Press.
7. Williams, D.R. (1990). Photoreceptor sampling and aliasing in human vision. In Moore, D.T. (Ed.), *Tutorials in Optics*, Optical Society of America.
8. Tiana, C.L.M., Williams, D.R., Coletta, N.J., Haake, P.W. (1991). A model of aliasing in extrafoveal human vision. In Landy, M., and Movshon, A. (Eds.) *Computational Models of Visual Processing*, 36-56. MIT Press.
9. Lennie, P., Haake, W., Williams, D.R. (1991). The design of chromatically opponent receptive fields. In Landy, M., and Movshon, A. (Eds.), *Computational Models of Visual Processing*, 71-82. MIT Press.
10. Williams, D.R., Sekiguchi, N., Haake, W., Brainard, D., Packer, O. (1991). The cost of trichromacy for spatial vision. In Lee, B. and Valberg, A (Eds.) *From Pigments to Perception*, 11-22. New York: Plenum Press.
11. Williams, D.R. (1991). Progress in vision research. *Optics & Photonics News*, 2, 8-9.
12. Roorda, A., Williams, D.R. (1997). New directions in imaging the retina. *Optics & Photonics News*, 8, 23-29.

13. Liang, J., Williams, D.R., Miller, D.T. (1997). Imaging photoreceptors in the living eye with adaptive optics. In Lakshminarayanan, V. (Ed.), Basic and Clinical Applications of Vision Science, The Professor Jay M. Enoch Festschrift Volume, Documeta Ophthalmologica Proceedings Series 60, Kluwer Academic Publishers, Dordrecht, the Netherlands, 43-46.
14. Packer, O.S., Williams, D.R. (1997). Photopigment absorptance and directional sensitivity in peripheral primate retina. Lakshminarayanan, V. (Ed.), Basic and Clinical Applications of Vision Science, The Professor Jay M. Enoch Festschrift Volume, Documeta Ophthalmologica Proceedings Series 60, 47-50. Dordrecht, the Netherlands: Kluwer Academic Publishers.
15. Williams, D.R., Roorda, A. (1999). The trichromatic cone mosaic in the human eye. In Gegenfurtner, K.R., and Sharpe, L.T. (Eds.), Color Vision: From Genes to Perception, 113-122. Cambridge University Press.
16. Williams, D.R., Liang, J., Miller, D.T., Roorda, A. (2000). Wavefront Sensing and Adaptive Compensation for the Human Eye. In Tyson, R.K. (Ed.), Adaptive Optics Engineering Handbook, 287-310. Marcel Dekker.
17. Roorda, A., Williams, D.R. (2000). Adaptive Optics and Retinal Imaging. In Lakshminarayanan, V. (Ed.), OSA Trends in Optics and Photonics Vol. 35, Vision Science and its Applications, 151-162. Washington, DC: Optical Society of America.
18. Porter, J., Guirao, A., Williams, D.R., Cox, I., (2000). A compact description of the eye's monochromatic aberrations in a large population. In Lakshminarayanan, V. (Ed.), OSA Trends in Optics and Photonics Vol. 35, Vision Science and its Applications, 199-204. Washington, DC: Optical Society of America.
19. Yoon, G.Y., Williams, D.R., (2000). Visual benefit of correcting the higher order monochromatic aberrations and the chromatic aberration in the eye. In Lakshminarayanan, V. (Ed.), OSA Trends in Optics and Photonics Vol. 35, Vision Science and its Applications, 205-211. Washington, DC: Optical Society of America.
20. Williams, D.R., Yoon, G.Y., Guirao, A., Hofer, H., Porter, J., (2001). How far can we extend the limits of human vision? In MacRae, S.M., Krueger, R.R., Applegate, R.A. (Eds.), Customized Corneal Ablation: The Quest for SuperVision, 11-32. Thorofare, NJ: Slack, Inc.
21. Roorda, A., Williams, D.R., (2001). Retinal imaging using adaptive optics. In MacRae, S.M., Krueger, R.R., Applegate, R.A. (Eds.), Customized Corneal Ablation: The Quest for SuperVision, 41-50. Thorofare, NJ: Slack, Inc.
22. Doble, N., Yoon, G.Y., Chen, L., Williams, D.R. (2001). Alternative Wavefront Correctors for Adaptive Optics in the Human Eye. Proceedings of the 3rd International Conference on the Use of Adaptive Optics for Industry and Medicine. Albuquerque, NM.
23. Hofer, H., Williams, D.R. (2002). The eye's mechanisms for autocalibration. Optics & Photonics News, 02/01, 34-39.

24. Applegate, R., Azar, D., Klyce, S., Williams, D.R. (2002). Corneal Topography versus Wavefront Sensing, 3(3), 7-13. (Review of Refractive Surgery)
25. Williams, D.R. (2002). What Adaptive Optics Can Do for The Eye, 3(3), 14-20. (Review of Refractive Surgery)
26. Packer, O., Williams, D.R. (2003). Light, the retinal image, and photoreceptors. In Shevell, S. (Ed.), *The Science of Color*, 2nd Edition, 41-102. Oxford: Elsevier.
27. Williams, D.R. (2003). Wavefront basics. In Koury, J.B. (Ed.), *Wavefront and Emerging Refractive Technologies*, Proceedings of the 51st Annual Symposium of the New Orleans Academy of Ophthalmology, New Orleans, LA, USA, February 22-24, 2002, 3-16. The Hague, The Netherlands: Kluger
28. Williams, D.R. (2003). What Adaptive Optics Can Do for The Eye? In Koury, J.B. (Ed.), *Wavefront and Emerging Refractive Technologies*, Proceedings of the 51st Annual Symposium of the New Orleans Academy of Ophthalmology, New Orleans, LA, USA, February 22-24, 2002, 147-157. The Hague, The Netherlands: Kluger
29. Artal, P., Chen, L., Fernandez, E., Singer, B., Manzanera, S., Williams, D.R. (2003). Adaptive Optics for Vision: The Eye's Adaptation to Its Point Spread Function. Supplement to the *Journal of Refractive Surgery*, 19, S585-S587.
30. Williams, D.R., Hofer, H. (2003). Formation and acquisition of the retinal image. In Chalupa, L.M., Werner, J.S. (Eds.) *The Visual Neurosciences*, 795-810. Cambridge, MA: MIT Press.
31. Kurczynski, P., Bogart, G., Lai, W., Lifton, V., Mansfield, B., Tyson, J.A., Sadoulet, B., Williams, D.R. (2003). Electrostatically actuated membrane mirrors for adaptive optics. *Proceedings of SPIE*, 4983, 250-258.
32. Artal, P., Chen, L., Fernandez, E., Singer, B., Manzanera, S., Williams, D.R. (2003). Adaptive optics for vision: the eye's adaptation to its point spread function. Supplement to the *Journal of Refractive Surgery*.
33. Williams, D.R., Porter, J., Yoon, G.Y., Guirao, A., Hofer, H., Chen, L., Cox, I., MacRae, S. (2004). How far can we extend the limits of human vision? In MacRae, S.M., Krueger, R.R., Applegate, R.A. *Wavefront Customized Visual Correction: The Quest for SuperVision II*, 19-38. Thorofare, NJ: Slack, Inc.
34. Williams, D.R., Applegate, R., Thibos, L. (2004). Metrics to predict the subjective impact of the eye's wave aberration. In MacRae, S.M., Krueger, R.R., Applegate, R.A. *Wavefront Customized Visual Correction: The Quest for SuperVision II*, 77-84. Thorofare, NJ: Slack, Inc.
35. Roorda, A., Williams, D.R. (2004). Retinal imaging using adaptive optics. In MacRae, S.M., Krueger, R.R., Applegate, R.A. *Wavefront Customized Visual Correction: The Quest for SuperVision II*, 43-54. Thorofare, NJ: Slack, Inc.

36. Williams, D.R. (2004). Center for Visual Science 61. In Stroud, C. R. Jr. (Ed.), *A Jewel in the Crown: Essays in Honor of the 75th Anniversary of The Institute of Optics*, 320-323. Rochester, NY: Meliora Press.
37. Carroll, J., Gray, D., Roorda, A. Williams, D.R. (2005). Recent advances in retinal imaging with adaptive optics. *Optics and Photonics News* 16(1), 36-42.
38. Roorda, A., Venkateswaran, K., Romero-Borja, F., Williams, D.R., Carroll, J., Hofer, H. (2006). Adaptive Optics Ophthalmoscopy. In Huang, D., Kaiser, P.K., Lowder, C.Y., Traboulsi, E. (Eds.), *Atlas of Posterior Segment Imaging*, 125-133. Philadelphia, PA: Elsevier Science.
39. Williams, D.R. (2006). Foreword to Adaptive Optics for Vision Science. In Porter, J., Queener, H., Lin, J., Thorn, K., Awwal, A.A.S. (Eds.), *Adaptive Optics for Vision Science*, xvii-xix. Hoboken, NJ: John Wiley & Sons, Inc.
40. Williams, D.R., Porter, J. (2006). Development of Adaptive Optics in Vision Science and Ophthalmology. In Porter, J., Queener, H., Lin, J., Thorn, K., Awwal, A.A.S. (Eds.), *Adaptive Optics for Vision Science*, 3-29. Hoboken, NJ: John Wiley & Sons, Inc.
41. Hofer, H., Porter, J., Yoon, G.Y., Chen, L., Singer, B., Williams, D.R. (2006). Rochester Adaptive Optics Ophthalmoscope. In Porter, J., Queener, H., Lin, J., Thorn, K., Awwal, A.A.S. (Eds.), *Adaptive Optics for Vision Science*, 397-415. Hoboken, NJ: John Wiley & Sons, Inc.
42. Shroff, S., Fienup, J.R., Williams, D.R. (2008). OTF compensation in structured illumination superresolution images. *Proc. Of SPIE*, 7094, 709402-1-709402- 11.
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