

SARAH WALTERS

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EDUCATION

University of Rochester, Rochester, NY

Doctor of Philosophy, Optics	anticipated 2018
Master of Science, Technical Entrepreneurship and Management	2015
Bachelor of Science, Optical Engineering	2013

FELLOWSHIPS AND SCHOLARSHIPS

National Science Foundation Graduate Research Fellow	2013-present
Edmund A. Hajim Engineering Scholarship	2009-2013

HONORS AND AWARDS

Member of Phi Beta Kappa and Tau Beta Pi Honor Societies	
OSA Fall Vision Meeting Young Investigator Award, Honorable Mention	2016
Travel Award, XVIIth International Symposium on Retinal Degenerations	2016
University of Rochester Kearney Travel Award	2016
Sigma Xi Grant-in-Aid of Research Award	2015
Charles L. Newton Prize for Excellence in Engineering Research	2013
Newport Outstanding Academic Performance Award	2012
Edmund Optics Excellence in Optics Award	2012
Dean's Award in Undergraduate Research	2012
U. Rochester Phi Beta Kappa Iota Book Award for Outstanding First-Year Students	2010

RESEARCH EXPERIENCE

Graduate Research Assistant, University of Rochester, Rochester, NY 2014-present

Performed retinal imaging research in the labs of David R. Williams and Jennifer J. Hunter using adaptive optics light scanning ophthalmoscopy. Areas of research include: (1) Optical system design and modification for intrinsic two-photon excitation fluorescence in the retina, using intensity and fluorescence lifetime imaging, as well as spectroscopy. (2) Characterization of a non-human primate model of retinal degeneration to be used in vision restoration research, including assessment of photoreceptor structure and function with two-photon, offset aperture, and confocal reflectance imaging.

Undergraduate Research Assistant, Laboratory for Laser Energetics, Rochester, NY 2010-2013

Liquid Crystal Alignment Research (2011-2013): Worked independently under the advising of Dr. Stephen Jacobs on the characterization of liquid crystal alignment using unconventional alignment methods. Fabricated liquid crystal devices and analyzed alignment uniformity.

Designed and implemented an optical setup to measure surface anchoring strength. Investigated mechanical and chemical properties of the alignment surface using an atomic force microscope, scanning electron microscope, and x-ray photoelectron spectroscopy.

Diffraction Grating Research (2010): Worked alongside senior scientist Dr. Stephen Jacobs to formulate a novel cleaning process for meter-scale diffraction gratings used in high-energy laser systems in an attempt to increase the laser damage threshold for the gratings.

INDUSTRY EXPERIENCE

Optical Engineering Intern, Ball Aerospace, Boulder, CO 2013

Contributed to testing of a satellite-based hyperspectral imaging spectrometer in development for NASA to investigate dynamics of coastal marine ecosystems. Incorporated as-built optical data from manufacturer reports into Code V model of the system and calculated smile and keystone distortions. Designed and built optical test bed for testing of MTF and aberrations of prototype spectrometer. Designed and built optical test bed for characterizing out of channel response that resulted from spectral image overlap as a consequence of multiple slits imaging onto a single focal plane array.

Optical Engineering Intern, BAE Systems, Inc., Nashua, NH 2012

Performed optical surface quality inspections for field-returned units. Performed ray tracing analysis of CAD models using FRED. Measured laser diode power and numerical aperture, imaged fiber emitters to ensure product specifications were met. Assisted in diagnosing a problem induced by misaligned birefringent crystals which led to undesirable polarization and loss of efficiency. Wrote Matlab program to interface with ZEMAX and calculate ensquared energy using the point spread function the code determined in nominal and aberrated conditions in order to tolerance optical systems.

ENTREPRENEURIAL EXPERIENCE

Cataract Innovations, Rochester, NY 2015

Performed market research and developed a business plan for a start-up seeking to make cataract removal surgery more accessible in developing countries. Entered the 2015 New York State Business Plan Competition and won third place overall in the Social Entrepreneurship/Non-Profit category.

SCHOLARSHIP

RECENT PUBLICATIONS

Williams, D. R. & **Walters, S.** (2017). Possibilities in physiological optics. In P. Artal (Ed.), *Handbook of Visual Optics Vol. 1*. Boca Raton, FL: CRC Press.

Rossi, E., Granger, C., Sharma, R., Yang, Q., Saito, K., Schwarz, C., **Walters, S** . . . Williams, D. R. (2017). Imaging individual neurons in the retinal ganglion cell layer of the living eye. *Proceedings of the National Academy of Sciences*, 114(3), 586-591. doi:10.1073/pnas.1613445114

CONFERENCE COMMUNICATIONS

McGregor, J. E., Phillips, M. J., **Walters, S.**, Zhang, J., Strazzeri, J., DiLoreto, D.,... Merigan W. H. (2017). Non-invasive retinal imaging of fluorescent hESC-derived photoreceptor precursors in the living primate. *Investigative Ophthalmology & Visual Science*, 58(8), 4576. [Poster]

Feeks, J., **Walters, S.**, Schwarz C., Hunter, J. J. (2017). Two-photon fluorescence lifetime ophthalmoscopy of intrinsic fluorophores on a cellular scale in the living macaque. *Investigative Ophthalmology & Visual Science*, 58(8), 3431. [Talk]

Walters, S., Schwarz, C., Sharma, R., Fischer, W. S., DiLoreto Jr., D. A., . . . Merigan, W. H. (2017). *In vivo* imaging of photoreceptor structure and function in a non-human primate model of retinal degeneration. *Journal of Vision*, 17(7), 53. doi: 10.1167/17.7.53 [Poster]

Walters, S., Schwarz, C., Sharma, R., Fischer, W. S., DiLoreto Jr., D. A., . . . Merigan, W. H. Characterization of photoreceptor structure and function in a non-human primate model of retinal degeneration. XVIIth International Symposium on Retinal Degenerations, Kyoto, Japan, September 2016. [poster number] [Poster]

Walters, S., Schwarz, C., Fischer, W. S., DiLoreto Jr., D. A., Nelidova, D., . . . Merigan, W. H. (2016). Evaluation of damaged photoreceptors in a macaque model of viral vector induced retinal degeneration using an AOSLO. *Investigative Ophthalmology & Visual Science*, 57(12), 2219. [Poster]

Campbell, M., Emptage, L., Schwarz, C., **Walters, S.**, Kisilak, M., Brooks, M. L., Hunter, J. J. (2016). *In vivo* and *ex vivo* multi-modal images in the canine model of Alzheimer's disease. *Investigative Ophthalmology & Visual Science*, 57(12), 2217. [Poster]

TEACHING EXPERIENCE

Guest Lecturer, University of Rochester, Rochester, NY 2017

Gave multiple guest lectures for Vision and the Eye course. Topics included optical modeling of the eye, refractive error, phototransduction, the visual cycle, retinal pigment epithelium functions, light and dark adaptation, and visual thresholds.

Graduate Teaching Assistant, University of Rochester, Rochester, NY 2014-2015

Appointment involved two courses: Introductory Optics, Vision and the Eye. Responsible for teaching workshops (intensive problem solving and concept reinforcing sessions with 10 to 20 students), grading homework and exams, and preparing in-class demonstrations and labs.

Undergraduate Teaching Assistant, University of Rochester, Rochester, NY 2011-2012

Appointment involved two courses: Geometrical Optics, Introductory Optics. Responsible for teaching workshops.