

Wilson R Adams

Ph.D. Candidate | Biomedical Engineering
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Education

2015 - Present Ph.D. Candidate | Biomedical Engineering | Vanderbilt University
Dissertation Title: *Exploring the Biophysical Mechanisms of Pulsed Infrared Excitability of Neurons and Astrocytes*
Advisor: Dr. Anita Mahadevan-Jansen, Ph.D.

2015 B.S. in Bioengineering, Minor in Physics | University of Maine, Orono

Research Experience

2015 – Present Dissertation Research | Dr. Anita Mahadevan-Jansen, Vanderbilt University
Nonlinear and Coherent Raman Microscopy, Neuroscience, Glia, Image Analysis

2014 – 2015 Microscopy & Spectroscopy | Dr. Michael Mason, University of Maine
Fluorescence, Reflectance, Raman Microscopy design and applications.

2014 – 2015 Laboratory Automation | Dr. Paul Millard, University of Maine
Instrumentation design for automating zebrafish experimental preparation

Summer 2014 NSF REU Sensors Program | Dr. Paul Millard, University of Maine
Instrumentation design for automating zebrafish experimental preparation

2012 – 2013 R&D Internship | Dr. John Brogan & Dr. Eugene Chan, IDEXX Laboratories
Benchtop analyzer and rapid diagnostic development of colloidal gold ELISA

2011 – 2013 Chemical Engineering Research | Dr. David Neivandt, University of Maine
Mass production of carbon nanofiber. Lobster shell golf ball R&D.

Teaching Experience

2018 - 2019 Vanderbilt Biophotonics Center Laboratory Tour Coordinator
Distilling research information to young scientists and general public

2017 Vanderbilt CIRTTL Associate Instruction Certification
Training in effective evidence-based teaching strategies in STEM.

2015 Graduate Teaching Asst – Senior Design Lab | Vanderbilt University
Developed lessons and experimental exercises in biomedical magnetic resonance

2015 Summer Camp Instructor | Mad Science of Maine
Lead instruction in hands-on STEM activities for children's day camps

2015 Teaching Asst. – Intro to Bioengineering | Dr. Paul J Millard, Univ. of Maine

Guided and helped develop class exercises for LabView, Mathcad, Excel.

- 2014 Lab Instructor – Bioengineering Design | Dr. Michael Mason, Univ. of Maine
Created & instructed laboratory module in CAD, prototyping, image analysis.
- 2012 Teaching Asst. – Intro to Bioengineering | Dr. Paul Millard, Univ. of Maine
Guided and helped develop class exercises for LabView, Mathcad, Excel.
- 2012 Teaching Asst. – Statistical Process Control | Dr. Sara Walton, Univ. of Maine
Grading course materials. Applications of statistical for chemical engineering.

Publications:

Wilson R Adams, Brian Mehl, Eric Leiser, Manqing Wang, Shane Patton, Graham A Throckmorton, John Logan Jenkins, Jeremy B Ford, Rekha Gautam, Jeff Brooker, E Duco Jansen, Anita Mahadevan-Jansen. *Multimodal Nonlinear Optical and Thermal Imaging Platform for Label-Free Characterization of Biological Tissue*. 7 Apr 2020. [bioRxiv: <https://doi.org/10.1101/2020.04.06.023820>] [In Review]

Ana I Borrachero-Conejo*, **Wilson R Adams***, Emanuela Saracino, Manqing Wang, Tamara Posati, Roberto Zamboni, E Duco Jansen, Marco Caprini, Grazia Paola Nicchia, Valentina Benfenati, Anita Mahadevan-Jansen. *Stimulation of water and calcium dynamics in astrocytes with pulsed infrared light*. The FASEB Journal. 23 March 2020.

*Shared first authorship

John Quan Minh Nguyen, Giju Thomas, Melanie McWade, **Wilson R Adams**, Isaac J Pence, Anita Mahadevan-Jansen. *Endogenous protoporphyrin-IX responsible near-infrared-excited autofluorescence in somatic tissues*. [In Review]

Lauren E. Himmel, Troy A. Hackett, Jessica L. Moore, **Wilson R. Adams**, Giju Thomas Tatiana Novitskaya, Richard M. Caprioli, Andries Zijlstra, Anita Mahadevan-Jansen, Kelli L. Boyd. *Beyond the H&E: advanced technologies for in situ tissue biomarker imaging*. ILAR Journal. [Accepted. May 2018]

Conference Presentations

Oral Presentations:

Wilson R Adams, Ana I Borrachero-Conejo, Emanuela Saracino, Tamara Posati, Graham A Throckmorton, J Logan Jenkins, Jeremy B Ford, Roberto Zamboni, Marco Caprini, Grazia Paola Nicchia, E Duco Jansen, Valentina Benfenati, Anita Mahadevan-Jansen. *Astrocytic sensitivity to pulsed infrared light: Molecular, physiological, and mechanistic insights*. SPIE Photonics West: Optogenetics & Optical Manipulation 2020. Feb 2020.

Wilson R Adams, Rekha Gautam, Graham Throckmorton, Laura Masson, Jeremy B Ford, J Logan Jenkins, E Duco Jansen, Anita Mahadevan-Jansen. *Probing the mechanisms of infrared neural stimulation with stimulated Raman scattering microscopy*. SPIE Photonics West: Advanced Chemical Microscopy for Life Sciences. Feb 2020. [Presentation Award]

Graham A. Throckmorton, **Wilson R. Adams**, Jonathan Cayce, E. Duco Jansen, and Anita Mahadevan-Jansen. *Comparing the efficacy of infrared diode and Ho:YAG lasers for infrared neural stimulation*. SPIE Photonics West: Optogenetics and Optical Manipulation 2020. Feb 2020

Wilson R Adams, Manqing Wang, Roberto Zamboni, Valentina Benfenati, Anita Mahadevan-Jansen. *Excitability of Astrocytes in vitro with infrared neural stimulation*. OSA Biophotonics Congress 2019: Optics in the Brain.

Wilson R Adams, Manqing Wang, Roberto Zamboni, Valentina Benfenati, Anita Mahadevan-Jansen. *Excitability of Astrocytes in vitro with infrared neural stimulation*. SPIE BIOS 2018

F Chen, G Thomas, **W Adams**, A Mahadevan-Jansen. *Evaluating breast cancer risk factors using Raman spectroscopy in live cells*. ASLMS 2017 Annual Meeting

Wilson R Adams, Anita Mahadevan-Jansen. *Exploring Infrared Neural Stimulation with Multimodal Nonlinear Imaging*. SPIE BIOS 2017

Poster Presentations:

W.R. Adams, I. Borrachero-Conejo, E. Saracino, G.P. Nicchia, M.G. Mola, F. Formaggio, M. Caprini, T. Posati, R. Zamboni, M. Muccini, A. Mahadaven-Jansen, V. Benfenati. *Infrared laser photostimulation elicits calcium signaling and water transport involving trpv4 and aqp4 in primary and differentiated rodent astrocytes*. GLIA 2019.

Wilson R Adams, Manqing Wang, Rekha Gautam, Jansen ED, Mahadevan-Jansen A. *Probing the biophysical mechanisms of infrared neural stimulation with nonlinear Raman imaging*. Biophysics 2019.
Ana I Borrachero-Conejo, **Wilson R Adams**, Emanuela Saracino, Tamara Posati, Roberto Zamboni, Anita Mahadevan-Jansen, Valentina Benfenati. *Excitability of astrocytes with pulsed infrared light*. Neuroscience 2018.

Ana I Borrachero-Conejo, **Wilson R Adams**, Emanuela Saracino, Tamara Posati, Roberto Zamboni, Anita Mahadevan-Jansen, Valentina Benfenati. *Excitability of astrocytes with pulsed infrared light*. Materials 2018.

Wilson R. Adams, Ana I Borrachero-Conejo, Manqing Wang, Emanuela Saracino, E. Duco Jansen, Valentina Benfenati, Anita Mahadevan-Jansen. *Excitability of Astrocytes by Pulsed Infrared Light*. Gordon Research Conference: Lasers in medicine and Biology 2018.

Ana I Borrachero-Conejo, **Wilson R Adams**, Emanuela Saracino, Grazia Paola Nicchia, Maria Grazia Mola, Francesco Formaggio, Marco Caprini, Tamara Posati, Roberto Zamboni, Anita Mahadevan-Jansen, Valentina Benfenati. *Pulsed infrared laser photostimulation elicits calcium signalling and modulate ion channel conductance in primary differentiated rodent astrocytes*. FENS 2018

Wilson R Adams, Jansen ED, Mahadevan-Jansen A. *Coherent Raman imaging to study infrared neural stimulation*. SPIE BIOS 2018

Wilson R. Adams, Anita Mahadevan-Jansen. *Multimodal Nonlinear Imaging to Explore Infrared Neural Stimulation*. Society for Neuroscience 2016

Research Interests

Biomedical Optics
Microscopy

Applications of novel techniques *in vitro* and *in vivo*
Instrumentation design, development, integration. Fluorescence, nonlinear, coherent Raman imaging. Applications of microscopy technology towards scientific research.

Neuroscience

Large-scale cellular and network dynamics, multiscale imaging of live cell populations, subcellular biophysics, glial influence on neural physiology.

Image Analysis Development of targeted and simplified image analysis workflows to increase experimental throughput and analysis efficiency.

Professional Membership

2012 – 2014 American Institute for Chemical Engineering (AIChE)
2015 – Present Society for Photo-optical Instrumentation Engineers (SPIE)
2017 – Present Optical Society of America (OSA)
2016 Society for Neuroscience (SfN)
2018 – Present Biophysical Society (BPS)

Service

2019 – Present Peer Reviewer – Applied Optics
2019 – Present Peer Reviewer – Biomedical Optics Express
2018 – Present Co-Editor-in-Chief, Peeriodicals: Label-free Microscopy
2017 – Present Social Media (Twitter) Coordinator – Vanderbilt Biophotonics Center
2017 Contributor, Interstellate – Artistic exhibition in Neuroscience
2017 – 2018 SPIE Vanderbilt Student Chapter President
2017 Seminar Series Coordinator - Vanderbilt Biophotonics Center
2017 Social Event Coordinator – Vanderbilt Biophotonics Center
2016 – 2017 Research Critique Panel Coordinator - Vanderbilt Biophotonics Center
2016 – 2020 SPIE Vanderbilt Student Chapter Secretary

Honors and Awards

2020 SPIE Presentation Award – Advanced Chemical Microscopy 2020
2019 Biophysical Society Graduate Travel Scholarship
2016 – 2019 National Defense Science and Engineering Graduate (NDSEG) Fellowship
2014 – 2015 University of Maine Center for Undergraduate Research Grant
2015 America East Man-of-the-Year Nominee (NCAA Athletic Conference)
2015 Dean Smith Award – M Club / University of Maine Athletics
2015 Co-Captain – University of Maine NCAA Div. I Men’s Track and Field Team
2014 NSF REU Sensors Fellowship
2011 – 2015 America-East All-Academic Team (5x)
2011 – 2015 Dean’s List (x6) , University of Maine
2011 – 2015 Scholar Athlete Award (x5). University of Maine Athletics
2014 University of Maine School Record – Hammer and Weight Throw
2012 Durst Scholarship Recipient
2012 ICAAAA All-Eastern Team, Hammer Throw
2010 NSSF Nike All-America, Weight Throw
2009 Eagle Scout, Bronze Palm

Technical Skills

Laboratory: General laser safety, experience with Class IV lasers, optical alignment, imaging system design and construction, spectroscopy, cell culture (primary cells, immortalized lines, human derived), live cell imaging, live animal handling (IACUC protocols, husbandry, surgeries, imaging), pharmacology, electrophysiology, instrumentation design and integration, rapid prototyping (additive and deductive), soldering, custom computer hardware and construction.

Programming: MATLAB, LabVIEW, ImageJ/FIJI, Python

Software: Autodesk Inventor (CAD), Inkscape (Adobe Illustrator), GIMP (Adobe Photoshop), Endnote, Digital Audio Workstations and Audio Recording, basic Zemax. Blender (3D Animation). MS Office.

Outreach

2016 – 2018

Optics Outreach | Vanderbilt SPIE & Nashville Adventure Science Center

2015 – 2017

Elementary Engineering | Vanderbilt Graduate Student Association / SPIE

2015

Glenclyff High School Engineering Outreach | Vanderbilt Graduate Student Assn.

2015

Engineering and Athletic Outreach | Boy Scouts of America, Orrington, Maine