Kelley D. Sullivan

Ithaca College
Department of Physics and Astronomy
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EDUCATION

2005-2010 **University of Rochester**, *Rochester NY*
Ph.D. in Physics (2010)
Dissertation: Multiphoton Fluorescence Recovery After Photobleaching: Advancements for Novel *in Vivo* Applications
Advisor: Edward B. Brown
M.A. in Physics (2007)

2002-2004 **The Ohio State University**, *Columbus OH*
M.S. in Physics
Thesis: Van der Waals interaction between neutral cesium atoms and a smooth gold surface
Advisor: Gregory P. Lafyatis

1996-2000 **College of the Holy Cross**, *Worcester MA*
A.B. in Physics
Cum laude graduate; minor in Environmental Studies

TEACHING & RESEARCH EXPERIENCE

2019 - present **Associate Professor** – *Ithaca College, Ithaca NY*

Courses taught:
IISP 180: STEM Success Seminar
PHYS 102: Introduction to Physics II
PHYS 114: Professional Physics Seminar I
PHYS 214: Professional Physics Seminar II
PHYS 121: Light and Special Relativity
PHYS 117: Principles of Physics I - Mechanics
PHYS 217: Principles of Physics III - Waves, Optics, & Thermodynamics
PHYS 280: Learning Assistant Practicum
PHYS 305: Electromagnetism
PHYS 421: Quantum Mechanics
PHYS 360: Advanced Physics Laboratory
PHYS 493: Senior Project Proposal
PHYS 495: Senior Project
PHYS 398: Senior Thesis Proposal
PHYS 498: Senior Thesis II
PHYS 490: Physics and Astronomy Capstone
PHYS x99: Physics Research – Introductory, Intermediate, and Advanced

Research interests:
Fluorescence microscopy
Pedagogical physics

Supervised Senior Thesis Projects:
James Munro ('13): *Recreating the Tolman-Stewart Experiment*
Amy Parker ('17): *Characterizing Microplastics in Cayuga Lake*
Alexander Bredikin ('18): *Investigation of Protein Interactions in Breast Cancer*
Valerie Gugliada ('19): *Microplastics: Fluorescence Photobleaching and Toxin Adsorption*
Annie Cooney ('19): *The Coefficient of Restitution*

2011-2019 **Assistant Professor** – *Ithaca College, Ithaca NY*

2010-2011 **Post-doctoral Research Associate** – *University of Rochester, Rochester NY*
Conducted experimental research in fluorescence photo-activation localization microscopy (FPALM).

Fall 2010 **Lecturer** – *Ithaca College, Ithaca NY*
Taught introductory calculus-based mechanics (2 course load) using modern pedagogy consistent with the studio model.

2006-2010 **Graduate Research Assistant** – *University of Rochester, Rochester NY*
Conducted independent research in two-photon fluorescence microscopy. Specifically, studied modifications to the multi-photon fluorescence recovery after photobleaching (MP-FRAP) technique to expand applicability within *in vivo* systems.

Fall 2005 **Graduate Teaching Assistant** – *University of Rochester, Rochester NY*
Taught two sections of honors introductory physics workshops for majors. Graded homework, quizzes, and tests; held office hours.

2003-2004 **Graduate Research** – *The Ohio State University, Columbus OH*
Conducted independent research in atomic, molecular, and optical physics. Specifically, studied the Van der Walls interaction of cesium atoms with a smooth gold surface.

2003-2004 **National Science Foundation GK-12 Teaching Fellow** –
The Ohio State University and Pilgrim Elementary School, Columbus OH
Developed and co-taught hands-on, inquiry-based science lessons in two at-risk 5th grade classrooms. Collaborated with classroom teachers to improve their science knowledge and confidence. Selected to represent Ohio State at the national GK-12 conference in Washington, D.C.

2002-2003 **Graduate Teaching Assistant** – *The Ohio State University, Columbus OH*
Taught two sections of introductory physics recitation of non-majors (101, 102, 103). Graded homework, quizzes, and tests; held office hours. Honored with the Hazel Brown Outstanding Teaching Assistant Award.

Spring 2002 **Permanent Physics Substitute** – *Westwood High School, Westwood MA*
Taught two sections of honors physics (with lab), and one section each of APB and APC physics (each with an extensive lab component).

2000-2001 **Physics Teaching Fellow** – *Phillips Academy, Andover MA*
Taught two sections of college-preparatory physics and volunteered to teach one section of a discussion-based life-issues course for first year students. Coached sports every season and presided as a residence hall house counselor.

PEER REVIEWED PUBLICATIONS (*indicates undergraduate co-author)

Kelley D. Sullivan, Antara Sen, and M. C. Sullivan. 2023. "Investigating the Magnetic Field outside Small Accelerator Magnet Analogs via Experiment, Simulation, and Theory" *American Journal of Physics* 91: 432.

Kelley D. Sullivan. 2019. "What's in a name: why do we call a bouncy ball bouncy?" *The Physics Teacher.* 57: 229-231.

Kelley D. Sullivan. 2018. "Communicating scientific ideas: tutorials for professionally-styled laboratory reports." *2018 Physics Education Research Conference Proceedings [Washington, D.C., August 1–2, 2018]*, edited by A. Traxler, Y. Cao, and S. Wolf.

Kelley D. Sullivan and Valerie Gugliada*****. 2018. "Fluorescence photobleaching of microplastics: a cautionary tale." *Marine Pollution Bulletin.* 133: 622-625.

Kelley D. Sullivan, Ania K. Majewska, and Edward B. Brown. 2015. "Single and two-photon fluorescence recovery after photobleaching." *Cold Spring Harbor Protocols.* 2015: 13–23.

Kelley D. Sullivan and Edward B. Brown. 2011. "Multiphoton fluorescence recovery after photobleaching in bounded systems." *Physical Review E.* 83(5): 051916-1-12.

Kelley D. Sullivan and Edward B. Brown. 2010. "Measuring diffusion coefficients via two-photon Fluorescence Recovery After Photobleaching." *JoVE.* 36. `http://www.jove.com/index/details.stp?id=1636`

Jiahui Li, **Kelley D. Sullivan**, Edward Brown, and Mitchell Anthamatten. 2010. "Thermally activated diffusion in reversibly associating polymers." *Soft Matter.* 6: 235-238.

Kelley D. Sullivan, William H. Sipprell III*****, Edward B. Brown Jr. and Edward B. Brown III. 2009. "Improved model of fluorescence recovery expands the application of Multi-Photon Fluorescence Recovery After Photobleaching *in vivo*." *Biophysical Journal.* 96(12): 5082-5094.

BOOK CHAPTERS

Kelley D. Sullivan, Ania K. Majewska, and Edward B. Brown. Single and two-photon fluorescence recovery after photobleaching. In: Yuste R., Konnerth A. (eds). *Imaging: A Laboratory Manual.* Cold Spring Harbor Laboratory Press, Cold Spring Harbor, New York. 2011.

FUNDING AND GRANTS

External Grants

2019 National Science Foundation: NSF Scholarships in Science, Technology, Engineering, and Mathematics Program (S-STEM). PI. $648,416 over five years. Funded.

2017 Howard Hughes Medical Institute: HHMI Undergraduate Science Education Grant. Co-PI. $1,000,000 over five years. Pre-proposal submitted December 2016. Full proposal submitted October 2017. Not funded.

2015 Howard Hughes Medical Institute: HHMI Undergraduate Science Education Grant. Co-PI. $1,000,000 over five years. Pre-proposal submitted December 2015. Not invited to submit full proposal.

Ithaca College Internal Grants

2016 Ithaca College Science Research Fund. "Purchase of rocking platform for fluorescent anti-body labeling." Awarded $1000.

2014 Ithaca College Science Research Fund. "Purchase of optics for live-cell imaging and for a dual-illumination pathway on the lab's microscopy system." Awarded $2250.

Summer Research Grant. "Fluorescence imaging of cellular proteins in two highly-metastatic cell lines." Awarded $3350.

2013 Ithaca College Science Research Fund. "Developing protocols for cell passaging and antibody labeling with photoswitchable fluorophores." Awarded $2000.

Educational Grant Initiative. "Purchase of fluorescent anti-body labeling kits for super-resolution imaging." Awarded $600.

2012 Ithaca College Science Research Fund. "Department LABVIEW license to support faculty and student research." Awarded $2500.

Ithaca College Science Research Fund. "Design and construction of Tolman-Stewart apparatus for inclusion in Physics Intermediate Lab." Awarded $2400.

Student Grants

2017 Ithaca College Dana Internship Program. "The utilization of STORM imaging to study protein-protein interactions in human cancer cells." Alexander Bredikin ('18) awarded $5000 in stipend and scholarship.

2016 Ithaca College Dana Internship Program. "Examining microplastics and their environmental impact." Amy Parker ('17) awarded $5000 in stipend and scholarship.

2014 Ithaca College Dana Internship Program. "Protein labeling and quantification using fluorescence imaging." Cassandra Papaleo ('17) awarded $5000 in stipend and scholarship.

2012 Ithaca College Dana Internship Program. "Re-creating the Tolman-Stewart experiment." James Munro ('13) awarded $5000 in stipend and scholarship.

INVITED TALKS (*indicates undergraduate co-author)

"Super-resolution microscopy: the next generation in biological imaging." **Kelley D. Sullivan**. *Xavier University,* Cincinnati OH. (Virtual presentation.) 2016, 2018.

"The color of cancer: using super-resolution fluorescence microscopy to investigate the mechanism of tumor growth and metastasis." **Kelley D. Sullivan**. *Mount Holyoke College,* South Hadley MA. 2014.

"Tripping the light fantastic: studying biological dynamics with fluorescence microscopy." **Kelley D. Sullivan**. *Colgate University,* Hamilton NY 2013.

"Super-resolution fluorescence microscopy." **Kelley D. Sullivan**. *Ithaca College Natural Sciences Symposium,* Ithaca NY. 2011.

"Multiphoton fluorescence recovery after photobleaching: advancements for novel *in vivo* imaging." **Kelley D. Sullivan**. *Cornell University, Baird Group,* Ithaca NY. 2011.

"Frontiers of fluorescence microscopy: *in vivo* measurements and super-resolution imaging." **Kelley D. Sullivan**. *Smith College,* Northampton MA. 2011.

"Frontiers of fluorescence microscopy: *in vivo* measurements and super-resolution imaging." **Kelley D. Sullivan**. *Denison University,* Granville OH. 2010.

"Adventures in biophysics: Monte Carlo, photolithography, and fluorescence microscopy." **Kelley D. Sullivan**. *College of the Holy Cross,* Worcester MA. 2010.

"Seeing inside living tissue: multi-photon fluorescence recovery after photobleaching." **Kelley D. Sullivan**, William H. Sipprell*****, Edward B. Brown Jr. and Edward B. Brown III. *New York State Section of the American Physical Society Spring Meeting*, Rochester NY. 2009.

"Two-photon fluorescence recovery after photobleaching: understanding drug delivery to cancerous tumors." **Kelley D. Sullivan**, William H. Sipprell*****, Edward B. Brown Jr. and Edward B. Brown III. *Ithaca College*, Ithaca NY. 2008.

CONTRIBUTED TALKS (*indicates undergraduate co-author)

"Multi-photon fluorescence recovery after photobleaching applied to systems confined in one, two, or three dimensions." **Kelley D. Sullivan** and Edward B. Brown. *American Physical Society March Meeting,* Portland, OR. 2010.

"Expanding the applicability of multi-photon fluorescence recovery after photobleaching *in vivo* by incorporating convective flow into the recovery model." **Kelley D. Sullivan**, William H. Sipprell*****, Edward B. Brown Jr. and Edward B. Brown III. *American Physical Society March Meeting*, Pittsburgh, PA. 2009.

"Analysis of diffusion through dynamic network polymers using multi-photon fluorescence recovery after photobleaching." Jiahui Li, **Kelley D. Sullivan**, Edward Brown and Mitchell Anthamatten. *American Physical Society March Meeting*, Pittsburgh, PA. 2009.

Student Talks

"Microplastics: Fluorescence photobleaching and adsorption and emission of toxins," **Valerie R. Gugliada**. *James J. Whalen Symposium*, Ithaca, NY. 2019. *Winner: Best Presentation.*

"Determining the minimum frame rate for calculating the coefficient of restitution," **Annie Cooney**. *James J. Whalen Symposium*, Ithaca, NY. 2019. *Finalist: Best Presentation.*

"Optimizing a super-resolution microscopy system to study protein-protein interactions," **Alexander Bredikin** and Kelley D. Sullivan. *Eastern Colleges Science Conference*, Ithaca, NY. 2018.

"Optimizing a super-resolution microscopy system to study protein-protein interactions," **Alexander Bredikin**. *James J. Whalen Symposium*, Ithaca, NY. 2018.

"Characterization and toxicology of microplastics using fluorescence microscopy," **Amy Parker**. *James J. Whalen Symposium*, Ithaca, NY. 2017.

"Representation of women in STEM at Ithaca College," **Megan Lauree Kelleher**, *James J. Whalen Symposium.* Ithaca, NY. 2015.

"Re-creating the Tolman-Stewart Experiment," **James Munro**. *James J. Whalen Symposium*, Ithaca, NY. 2013.

CONTRIBUTED POSTERS (*indicates undergraduate co-author)

"Building community for success," **Kelley D. Sullivan**, John Barr, David Brown. *AAAS S-STEM Symposium*, Washington, D.C. 2022.

"Communicating wonderful ideas," **Kelley D. Sullivan**. *Physics Education Research Conference*, Washington, D.C. 2018.

"What carries the charge in a metal?: A modern version of the Tolman-Stewart Experiment," **Kelley D. Sullivan**. *The Advanced Laboratory Physics Association Conference on Laboratories Beyond the First Year*, Philadelphia, PA. 2012.

"Measuring diffusion coefficients in confined systems via multi-photon fluorescence recovery after photobleaching," **Kelley D. Sullivan** and Edward B. Brown. *Biophysical Society Annual Meeting*, San Francisco, CA. 2010.

"Expanding the applicability of the multi-photon fluorescence recovery after photobleaching technique *in vivo* using a new convective flow model," **Kelley D. Sullivan**, William H. Sipprell*****, Edward B. Brown Jr. and Edward B. Brown III. *Biophysical Society Annual Meeting*, Boston, MA. 2009.

Student Posters

"Analyzing the effects of fluorescence photobleaching on microplastics from recyclable plastics," **Valerie R. Gugliada, Salvatore Ferrone**, and Kelley D. Sullivan. *American Physical Society March Meeting*, Los Angeles, CA. 2018.

"The effects of photobleaching on microplastics," **Salvatore Ferrone** and Kelley D. Sullivan. *New York State Section of the American Physical Society Spring Meeting*, Buffalo, NY. 2017.

"A toxicology and characterization study of microplastics," **Amy J. Parker** and Kelley D. Sullivan. *National Council on Undergraduate Research*, Memphis, TN. 2017.

"Microplastics: a toxicology and characterization study using fluorescence microscopy," **Amy J. Parker** and Kelley D. Sullivan. *American Physical Society March Meeting*, New Orleans, LA. 2017. *Winner: Best Undergraduate Research and Presentation.*

"Microplastics: a toxicology and characterization study using fluorescence microscopy," **Amy J. Parker** and Kelley D. Sullivan. *2016 Quadrennial Physics Conference*, San Francisco, CA. 2016.

UNDERGRADUATE RESEARCH COLLABORATIONS

(Students in 300-400 level research are listed individually under project titles.
Underline denotes summer research intern; * indicates Dana Scholar)

Johnson noise experiment automation using an Arduino

Jack Hogan ('21)	2020–2021	Arduino and python programming for data taking and analysis.

Smartphone video analysis to measure the coefficient of restitution

Annie Cooney ('19)	2018–2019	Determination of necessary frame rate for video analysis.

Investigation of microplastics' physical and fluorescent properties

Valerie Gugliada ('19)	2017–2019	Photobleaching and recovery of autofluorescence. Adsorption and leaching of toxins in fresh water.
Salvatore Ferrone ('18)	2016–2017	Photobleaching and recovery of autofluorescence.
Amy Parker* ('17)	2015–2017	Characterization of microplastic size and shape.

Preparation of Brownian Motion experiment for inclusion in Advanced Lab

Adam Scott ('16)	2014	Updated experimental setup and wrote analysis programs.

Investigation of β-adrenergic receptors

Alexander Bredikin* ('18)	2016–2018	Cell culture and fixation w/ protocol development. Protein labeling and STORM imaging.
Nicolas DiNapoli ('17)	2015	Cell culture, antibody labeling, and imaging.
Cassandra Papaleo* ('17)	2014	Cell culture, antibody labeling, and imaging w/ protocol development.
Alisa Babcock ('15)	2014	Improvements to cell culture protocols.
Megan Grover ('14)	2013	Development of cell culture protocols.

STORM system design and setup

Cassandra Papaleo ('17)	2014	Alignment of laser pathway.
Nicolas DiNapoli ('17)	2014	Characterization of objective lenses.
Joshua Hathaway ('15)	2012	Programmed variable filter feedback loop to stabilize sample fluorescence output.

Recreating the Tolman-Stewart experiment for inclusion in Advanced Lab

James Munro* ('13)	2012-2013	Design improvements for function and safety; noise reduction testing. (Thesis project.)
Alex Viola ('13)	2012	Improvements to the braking mechanism.
Julia Russ ('14)	2011-2012	Improvements to the basic apparatus.
Emily Backus ('12)	2011	Safety measures, including innovative electrical connection; measurement automation via LabVIEW.

200-level Introductory Research Experiences

Mitchell Israel (transfer), Colleen Mahoney ('15), Alisa Babcock ('15), Schnayder Termidor ('16), Paul Lapre (transfer), Brenna Dowd ('17), Andrea Santiago-Boyd ('17), Alexander Tuong ('19), Chidi Anyata ('19), Hannah McFarland (transfer), Brady Elster ('22), Antara Sen ('22), Izzy Mahoney ('25)

SERVICE

Service to the Department

Department EIB coordinator, 2023 – present
Chair of faculty-student committee on anti-racism and inclusion, 2020–2021
Physics and astronomy student summer research coordinator, 2011–12, 2014–2021, 2022–present
Chair of search committee for full-time TE faculty member, Fall 2017, Fall 2018, & Fall 2019
New faculty mentor, 2017–18, 2019–20
Coordinator of *Women in Physics* seminar, 2015, 2016
Physics and astronomy seminar coordinator, 2011–15
CNS laser safety committee liaison, 2011–present
ITS department liaison, 2012–15

Service to the School of Humanities and Sciences

Co-chair Faculty Mentoring Group: Grading for Equity in STEM, 2022 – 2023
H&S Faculty Senate (natural sciences representative), 2012–15, 2016–2021
- Vice president, 2018–19, 2020–21
- Executive committee representative-at-large, 2014–15, 2016–17, 2019–20
- Elections Subcommittee 2017–2019
- Student statement subcommittee, 2014

H&S Summer Scholars Advisory Committee (at-large representative), 2018–2021
Physics department representative at admissions events, 2–3 annually
Women in STEM faculty advisor, 2012–13, 2015–16
Faculty Forum 2013: Focus on Faculty Discussion Leader

Service to the College

Faculty Council, H&S rep, 2024 – present
Dana Teaching Fellow, Center for Faculty Excellence, 2023–2024
Anti-Racist Workspaces for White-Identifying Students, Facilitator, Fall 2020
Committee for College-wide Requirements, 2015–17
- Subcommittee liaison for Quantitative Literacy designation, 2015–17

Whalen Symposium moderator, 2012–14, 2016–19
Guest interviewee for ICIC 12000 Insight: Combining Expertise, Spring 2017 & Spring 2018

Service to the Profession

American Physical Society Equity, Diversity, and Inclusion Fellow, 2022–2023
Co-chair Local Organizing Committee Conference for Undergraduate Women in Physics, 2022–2023
Chair of department AIP TEAM-UP Implementation Workshops committee, 2021–2022
Ithaca College Chapter of Sigma Xi, Secretary, 2018–2021
AAAS Sea Change Focus Group Participant, 2021
Referee for *The Physics Teacher*, 2018, 2020
Referee for *Physics Education Research Conference Proceedings*, 2018
American Physical Society TV Featured Physics Department, March 2013

Service to the Community

South Hill Elementary School Parent-Teacher Association, President, 2021–2022
South Hill Elementary School Parent-Teacher Association, Secretary, 2020–2021
Newfield Middle School Career Day (speaker), 2012
South Hill Science Day, 2011

PROFESSIONAL AFFILIATIONS

2012 - present	Sigma Xi
2008 - present	American Physical Society
2008 - 2020	Biophysical Society
1998 - present	Sigma Pi Sigma