# 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 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 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**. 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.

Beckman Foundation: Beckman Scholars Program. Co-PI (1 of 15). Submitted June 2015. Not funded.

**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)

"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

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

**Investigation of microplastics' physical and fluorescent properties**

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|---|---|---|
| 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**

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

**Investigation of $\beta$-adrenergic receptors**

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|---|---|---|
| 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**

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|---|---|---|
| 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**

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|---|---|---|
| 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)

## EQUITY, DIVERSITY, AND INCLUSION

American Physical Society Equity, Diversity, and Inclusion Fellow, 2022-2023
Inclusive STEM Teaching Project participant, 2021
Chair of department AIP TEAM-UP Implementation Workshops committee, 2021–present
Lead author of department anti-racism and inclusion action plan, Fall 2020
Anti-Racist Workspaces for White-Identifying Students, Facilitator, Fall 2020

## SERVICE

### Service to the Department

Chair of faculty-student committee on anti-racism and inclusion, 2020–present
Chair of search committee for full-time TE faculty member, Fall 2017, Fall 2018, & Fall 2019
New faculty mentor, 2017–18, 2019–20
Physics and astronomy student summer research coordinator, 2011–12, 2014–present
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

H&S Faculty Senate (natural sciences representative), 2012–15, 2016–present
- Vice president, 2018–19, 2020–21
- Elections Subcommittee 2017–2019
- Executive committee representative-at-large, 2014–15, 2016–17, 2019–20
- Student statement subcommittee, 2014

H&S Summer Scholars Advisory Committee (at-large representative), 2018–present
Physics department representative at admissions events, 2–3 annually
Women in STEM faculty advisor, 2012–13, 2015–16
Faculty Forum 2013: Focus on Faculty
- Led round table discussion on shifting research subfields as a new faculty member

### Service to the College

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

AAAS Sea Change Focus Group Participant, 2021
Ithaca College Chapter of Sigma Xi, Secretary, 2018–present
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–present
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 |