Douglas S. Martin
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Education

1997 - 2003	University of Texas at Austin Ph.D. in Physics, Thesis Advisors: Josef Käs; Harry Swinney
1993 - 1997	Pomona College B.A. in Physics and Mathematics, *cum laude*

Professional Appointments

2013-	Associate Professor of Physics, Lawrence University
2015-2018	Chair, Department of Physics, Lawrence University
2014-2015	Honorary Associate Professor, University of Warwick
2007-2013	Assistant Professor of Physics, Lawrence University
2003-2007	Postdoctoral Fellow, Brandeis University [advisor: Jeff Gelles]
2005	Adjunct Professor, Simmons College
2001-2002	Graduate Teaching Assistant, University of Texas

Grants, Awards, and Fellowships

2018-2023	Howard Hughes Medical Foundation, Inclusive Excellence Award, $1,000,000 (Co-I)
2018-2021	Henry Luce Foundation, Clare Booth Luce Undergraduate Research Award, $154,240 (Co-I)
2013-2017	NSF MCB Cellular Dynamics and Function Grant, "Connecting microtubule mechanical and structural properties using a novel millimeter-length gliding assay," $200,000.
2011-2016	Sherman Fairchild Foundation, "Scientific Sense and Sense-ability," $500,000 (Co-I)
2009-2012	NSF DUE, "Teaching Physics Students to Innovate," $150,000 (Co-I)
2009-2012	Research Corporation for Scientific Advancement CCSA Grant, "Measuring the bending stiffness of microtubules with varying protofilament number," $39,574.
2005-2007	NIH NRSA Individual Postdoctoral Fellowship, "Biophysics of kinesin motion by single-pair FRET"
2004-2005	NIH NRSA Institutional Postdoctoral Fellowship
1998-2001	NSF IGERT Fellowship
1997-1998	University of Texas Research Internship
1996	SIAM and MAA winner of the Mathematical Contest in Modeling

Professional Memberships

American Physical Society, American Society for Cell Biology, Biophysical Society, Sigma Xi, ALPhA

Courses Designed and Taught

Optics (PHYS 340): Practical optics, with a focus on innovation. Covers such skills as use of spatial light modulators and interferometric metrology, in addition to imaging, beam manipulation, and polarization. 75 contact hours. 2019, 2018, 2015, 2014, 2012, 2010, 2008.

Principles of Modern Physics (PHYS 160): Treats basic ideas developed since 1900: special relativity, quantum aspects of nature, elementary wave mechanics, atomic and nuclear structure, fundamental particles. 35 contact hours + lab. 2018, 2017, 2016.

Victorian Engineering (PHYS 119): Taught at the Lawrence University London Centre. A field course using a dozen engineering artifacts still in use in London, combined with classroom development of engineering design principles. 35 contact hours. 2018.

The Royal Society and the Birth of Modern Science (PHYS 115): Taught at the Lawrence University London Centre. A course using the history of the Royal Society (1665-present) as a lens through which to view the rise of science as it is now practiced. Included visits to the RS reading room and archives, the Royal Institution, and original articles from Philosophical Transactions. 35 contact hours. 2018.

General Relativity (PHYS 500): "Spacetime tells matter how to move and matter tells spacetime how to curve" – Wheeler. Developed the mathematical and physical tools to understand this quote, through the behavior of matter near black holes, the expansion of the universe, and the discovery of gravitational waves. 35 contact hours. 2017.

Principles of Classical Physics (PHYS 151): Second term of calculus-based introductory physics, heavily influenced by Eric Mazur. 70 contact hours. 2020, 2014, 2013, 2012, 2011

Freshman Studies (FRST 101): Lawrence University's hallmark course, covering texts from Plato to Bechdel to Feynman. 35 contact hours. 2018, 2016, 2015, 2013, 2009, 2008.

Quantum Mechanics (PHYS 310): A junior level quantum mechanics course, taught spin-first following John Townsend. Can one photon really be emitted by two lasers? Yes! 35 contact hours. 2020, 2016, 2013, 2012, 2011.

Electricity and Magnetism (PHYS 230): Thank you David Griffiths for Electrodynamics! 35 contact hours. 2012, 2010, 2008.

Advanced Laboratory (PHYS 330): In which physics majors learn the practice of experimental physics. 90 contact hours. 2020, 2018, 2017, 2016, 2012, 2011, 2009, 2008.

Biological Physics (PHYS/BIOL 570): An upper division course for physicists, biologists and chemists on building quantitative models to understand quantitative biological data (with apologies to Phillips, Kondev and Theriot). 35 contact hours. 2011, 2009, and as a tutorial in 2016, 2014, 2008.

Foundations of Physics I (PHYS 120): Introductory algebra-based physics course focused on conceptual understanding, heavily influenced by Eric Mazur. 35 contact hours. 2009, 2008, 2007.

Physics on Your Feet (PHYS 350/351): Quick thinking, intuitive approach to physics for juniors. 10 contact hours. 2020, 2019, 2015, 2013, 2011, 2010, 2009, 2008.

Senior Seminar (PHYS 650): Course focused explicitly on scientific presentations. 10 contact hours. 2020, 2017, 2016.

University Service

Tenure, Promotion, Reappointment Committee (2020-): "Evaluate individually all candidates for tenure and promotion in accordance with the University's guidelines."

Freshman Studies Advisory Committee (2019-20): "The committee should foster an ongoing conversation about Freshman Studies, thereby sustaining the culture of collaboration and communication that is essential to the program."

Governance Committee (2015-2017): "The Governance Committee serves three basic roles: as a committee on committees, a committee on planning for all university activities affecting the academic enterprise, and a committee on faculty welfare."

Curriculum Committee (2011-2013): "The purpose of the Curriculum Committee is to serve as the primary agency of the Faculty in overseeing the coherence and integrity of the curriculum and in facilitating curricular innovation and reform."

Enrollment Committee (2009-2011; Chair 2010-2011): "The purpose of the Enrollment Committee is to engage the Faculty in enrollment-related efforts, monitor enrollment and serve as the liaison between the Faculty and the Admissions Office."

Health Careers Advisory Committee (2009-; Chair 2013-2014): "The Health Careers Advisory Committee works closely with students as they apply to medical schools and other programs to prepare for health science and allied health careers."

Biochemistry Program (2007-): Faculty advisor for and member of the Lawrence biochemistry major (there is no independent biochemistry department).

Publications (underlining indicates undergraduate research student)

Journal Articles & Book Chapters

Huang, J., Chew, T. G., Gu, Y, Palani, S., Kamnev, A., Martin, D. S., Carter, N. J., Cross, R. A., Oliferenko, S., Balasubramanian, M. K., "Curvature-induced expulsion of actomyosin bundles during cytokinetic ring contraction," *eLife* **5**, e21383 (2016).

Hussman, F., Drummond, D. R., Peet, D., Martin, D. S., Cross, R. A., "Alp7/TACC-Alp14/TOG generates long-lived, fast-growing MTs by an unconventional mechanism," *Scientific Reports* **6**, 20653 (2016).

Martin, D. S., "Measuring microtubule persistence length using a microtubule gliding assay," *Methods in Cell Biology* **115**, 13-25 (2013).

Martin, D. S., Yu, L., Van Hoozen, B. L., "Flexural rigidity measurements of biopolymers using gliding assays," *Journal of Visualized Experiments* **69**, e50117 (2012).

Anderson, E. A., Martin, D. S. "A fluorescent GTP analog as a specific, high-precision label of microtubules," *Biotechniques* **50**: 43 (2011).

Martin, D. S., Fathi, R., Mitchison, T. M., Gelles, J. "FRET measurements of kinesin neck orientation reveal a structural basis for processivity and asymmetry," *PNAS* **107(12)**: 5453 (2010).

Forstner, M. B., Martin, D. S., Selle, C., Kas, J. A. "Attractive membrane domains control lateral diffusion," *Phys Rev E* **77** 151906 (2008).

Selle, C., Ruckerl, F., Martin, D. S., Forstner, M. B., Kas, J. A., "Measurement of diffusion in Langmuir monolayers by single-particle tracking," *Phys Chem Chem Phys* **6(24)**: 5535 (2004).

Forstner, M. B., Martin, D. S., Navar, A. M., Kas J. A., "Simultaneous single particle tracking and visualization of domain structure on lipid monolayers," *Langmuir* **19(12)**: 4876 (2003).

Martin, D. S,. Forstner, M. B., Kas J. A., "Apparent subdiffusion inherent to single particle tracking," *Biophys J*, **83**: 2109 (2002).

Forstner, M. B., Kas, J., Martin, D., "Single lipid diffusion in langmuir monolayers," *Langmuir*, **17(3)**: 567 (2001).

Martin, D., Moody, R., Wong, W., "The submarine detection problem: gone fishin'," *UMAP J*, **17**: 207 (1996).

Colloquia, Conference Presentations, and Abstracts

Niederriter, G., Martin, D. S., "Length-Dependent Persistence Length for Microtubules Shorter Than 3 Micrometers," Biophysical Society Annual Meeting, February 2019.

Martin, D. S., "The Resolution Revolution: Building a super-resolution microscopy at an undergraduate institution, or, why is it so hard to see single molecules?," University of Wisconsin – La Crosse, February 2017.

Lowry, A. J., Hoang, A. T. N., Martin, D. S., "Revised model, with experimental verification, for motor densities in gliding assays," Biophysical Society Annual Meeting, February 2017.

Martin, D. S., Carter, N., and Cross, R.A., "Super-resolution imaging of slowly depolymerizing microtubules reveals no curved protofilaments with a lifetime longer than seconds," Biophysical Society Annual Meeting, March 2016.

Martin, D. S., "Microtubule mechanics and dynamics," University of Cambridge Neuroscience Seminar, June 2016.

Martin, D. S., "'Microtubule mechanics and dynamics," University of Leipzig Soft Matter Seminar, May 2015.

Martin, D. S., "Mechanosensation and Microtubules," University of Warwick Biomedical Cell Biology Seminar, October 2014.

Martin, D. S., "The Higgs Boson: Without you, we can't have Mass!" Lawrence University Alumni College, June 2014.

Betzold, A. C., Coenen, A. R., Thoresen, D. T., Martin, D. S., "Automated, long-distance microtubule tracking in gliding assays," *Biophysical Journal* **106(2)**: 783a (2014).

Martin, D. S., "Measuring microtubule bending and rolling in vitro: a physicist's attempt to connect microtubule mechanics, structure, and function," University of Wisconsin-Madison Biochemistry Seminar, October 2013.

Martin, D. S., "Teaching optics with a focus on innovation," AAPT/APS New Faculty Workshop poster, Nov. 2012.

Martin, D. S., O'Leary, S., "Using spatial light modulators and spatial filtering to teach students experimental Fourier optics," (invited talk) *ALPhA Topical Conference*, July 2012.

Black, A. M., Klocke, M. A., Zhao, L., Martin, D. S., "Simultaneous measurement of microtubule protofilament number and bending stiffness," *Biophysical Journal* **102(3)**: 699a (2012).

Martin, D. S., "A single molecule study of the cell's skeleton: a physicist's perspective on biology." University of Wisconsin-Stevens Point Physics Colloquium, December 2011.

Yu, L., Van Hoozen, B. L., Bodnar, C. E., Martin, D. S., "A new microtubule gliding assay analysis of microtubule persistence length," *Biophysical Journal* **100(3)**: 450A (2011).

Anderson, E. A., Martin, D. S., "A fluorescent GTP analogue as a single molecule fluorescence label of microtubules," *Biophysical Journal* **98(3)**: 363A (2010).

Martin, D. S., "A fluorescent look at kinesin: using biological physics to study a nanometer scale engine," Marquette University Physics Colloquium March, 2008.

Martin, D. S., Mitchison, T. J., Gelles, J., "Kinesin neck orientation determined by neck-microtubule fluorescence resonance energy transfer," *Biophysical Journal* 498A Supplement S (2007).

Martin, D. S., "Structure and function of kinesin: a fluorescent look at a molecular motor," Williams College Physics Colloquium October, 2006.

Martin, D. S., "Speed and propagation of diffusive signals in spatially inhomogeneous membranes," Brandeis University Condensed Matter Seminar March 17, 2004.

Martin, D. S., Rückerl, F., Forstner, M. B., Bordag, N., Käs, J. A., Selle, C., "Single-particle diffusion in monolayers as biomimetic membranes," *Biophysical Journal* **86(1)** 369A Part 2 (2004).

Martin, D., Forstner, M. B., Navar, A. M., Käs, J., "Edge crawling of single particles in inhomogeneous membranes," *Biophysical Journal* **84(2)**: 375A Part 2 (2003).

Martin, D., Forstner, M., Käs, J., "Motion of single lipids in a langmuir monolayer," *Biophysical Journal*, **78(1)**: 273A Part 2 (2000).

Martin, D., Forstner, M., Käs, J., "Single particle tracking: brownian and subdiffusive motion in the fluid-crystalline coexistence phase of langmuir monolayers," *Bulletin of the American Physical Society*, **44(1)**: 1935 Part II (1999).