Matthew Duk-Ying Lew

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lewlab.wustl.edu | 0000-0002-5614-3292 | Google Scholar | WashU Profile | Lew-Lab

My lab pushes the frontier of nanoscale imaging technologies.

The Lew Lab builds computational optical imaging systems to study biological and chemical systems at the nanoscale. Our technology leverages innovations in applied optics, signal and image processing, design optimization, and physical chemistry. We partner with scientists and engineers from all disciplines to develop technologies to solve unmet needs in science, medicine, and society.

Appointments and Experience

Associate Professor, Washington University in St. Louis Jul 2022 – present

- Preston M. Green Department of Electrical and Systems Engineering
- Affiliate of the Department of Biomedical Engineering; the DBBS Biochemistry, Biophysics, and Structural Biology Program; and the Institute of Materials Science & Engineering.
- Member of the Center for Biomolecular Condensates and the Center for Quantum Leaps.

Associate Chair for Academic Programs, Washington University in St. Louis Jul 2022 – present

Preston M. Green Department of Electrical and Systems Engineering

Assistant Professor, Washington University in St. Louis Jul 2015 – Jun 2022

Preston M. Green Department of Electrical and Systems Engineering

Postdoctoral Scholar, Stanford University School of Medicine Nov 2014 – Jun 2015

Department of Structural Biology
Research Advisor: Adam de la Zerda

Research Intern, Google[x] 2014

Mountain View, CA

Engineering Intern, Southwest Research Institute 2004, 2005

San Antonio, TX

Education

2008 – 2015 **Ph.D. in Electrical Engineering** at Stanford University (GPA: 4.0/4.0)
Engineering New Capabilities into Optical Microscopes: Toward Measuring the Three-Dimensional Position and Orientation of Single Molecules in Living Cells
Research Advisor: W. E. Moerner

2008 – 2010 **M.S. in Electrical Engineering** at Stanford University (GPA: 3.9/4.0)

2004 – 2008 **B.S. with Honor in Electrical Engineering** at the California Institute of Technology (GPA: 4.0/4.0)
Quantitative Differential Phase Imaging and Phase Reconstruction
Research Advisor: Changhuei Yang

Awards and Recognitions

Fellow, Class of 2026, *Optica*	2025
Outstanding Faculty Award, *Washington University Graduate Student Senate*	2023
Senior Member, Class of 2021, *Optica*	2021
Scialog: Advancing Bioimaging Fellow, *Research Corporation for Science Advancement*	2021
Excellence in Teaching Award, *Emerson Electric Co.*	2020
Outstanding Teaching Award, *Preston M. Green Department of Electrical & Systems Engineering*	2020
Full Membership Inductee, *Sigma Xi, The Scientific Research Honor Society*	2020
CAREER Award, *National Science Foundation*	2017
Hiruma/Wagner Award, *16th Conference of Peace through Mind/Brain Science*	2016
Winner of 2015 After Image Photo Contest, *Optics & Photonics News*	2015
Second Place Poster Award, *Gordon Research Conferences: Single-Molecule Approaches to Biology*	2012
Travel Award, *Stanford Bio-X*	2010, 2011
Young Investigator Award, *PicoQuant GmbH*	2010
Graduate Research Fellowship, *National Science Foundation*	2008
3Com Corporation Stanford Graduate Fellow	2008
Fellow No. 762, *Tau Beta Pi*	2008
Research Excellence Travel Award, *Newport-Spectra Physics*	2008
Carnation Merit Award, *California Institute of Technology*	2007
Record No. 273 Scholarship, *Tau Beta Pi*	2007
Inductee, *Tau Beta Pi, The Engineering Honor Society*	2007
Caremark Rx Scholarship	2006, 2007
Rita A. and Φistein Skjellum Summer Undergraduate Research Fellow, *California Institute of Technology*	2006
Perpall Speaking Competition Finalist, *California Institute of Technology*	2006
MasterCard Alamo Bowl Scholarship	2004
National Advanced Placement Scholar, *College Board*	2004
National Merit Scholarship	2004

Research Support

Current Projects

Six-Dimensional Single-Molecule Nanoscopy for Elucidating the Dynamic Organization of Biomolecules — 5/1/2023 – 4/30/2028
National Institute of General Medical Sciences (NIH) Grant No. R35GM124858 — $2,021,222
Role: PI

Completed Projects

Livtronics: Living Electronics for Biologically-Enhanced Sensing, Computing, and Signal Transmission — 6/1/2018 – 10/31/2024
Office of Naval Research Grant No. N00014-18-1-2632 — $7,500,000 ($608,408 to WashU)
Role: Co-I. PI: M. El-Naggar (USC); Co-Is: J. Q. Boedicker (USC); D. R. Bond and J. A. Gralnick (U. Minnesota), C. R. Buie

and C. A. Voigt (MIT); A. K. Jones (ASU)

Five-Dimensional Single-Molecule Nanoscopy for Sensing and Imaging the Dynamic Functions of Biomolecules 8/15/2017 – 4/30/2023
National Institute of General Medical Sciences (NIH) Grant No. R35GM124858 $1,640,282
Role: PI

CAREER: Nanoscale Sensing and Imaging using Computational Single-Molecule Nanoscopy 2/1/2017 – 1/31/2023
National Science Foundation Grant No. 1653777 $500,022
Role: PI

PUBLICATIONS H-INDEX: 31, I10-INDEX: 47 | JOURNAL COVERS, CITATION & ATTENTION METRICS

cover article | editor's pick/hot paper | *equal contribution | +co-corresponding authors

Peer-Reviewed Publications

44. N. A. Erkamp*, M. Farag*, Y. Qiu*, D. Qian, T. Sneideris, T. Wu, T. J. Welsh, H. Ausserwöger, T. J. Krug, G. Chauhan, D. A. Weitz, **M. D. Lew**+, T. P. J. Knowles+, R. V. Pappu+, Differential Interactions Determine Anisotropies at Interfaces of RNA-based Biomolecular Condensates. *Nature Communications* **16**, 3463 (2025). 10.1038/s41467-025-58736-z PMC11992113
43. T. Wu*, M. R. King*, Y. Qiu, M. Farag, R. V. Pappu+, **M. D. Lew**+, Single-Fluorogen Imaging Reveals Distinct Environmental and Structural Features of Biomolecular Condensates. *Nature Physics* **21**, 778–786 (2025). 10.1038/s41567-025-02827-7 PMC12084160
42. Y. Chen, Y. Qiu, **M. D. Lew**, Resolving the Orientations of and Angular Separation Between a Pair of Dipole Emitters. *Physical Review Letters* **134**, 093805 (2025). 10.1103/PhysRevLett.134.093805 PMC11937548
41. E. Bruggeman, O. Zhang, L.-M. Needham, M. Körbel, S. Daly, M. Cheetham, R. Peters, T. Wu, A. S. Klymchenko, S. J. Davis, E. K. Paluch, D. Klenerman, **M. D. Lew**, K. O'Holleran, S. F. Lee, POLCAM: Instant Molecular Orientation Microscopy for the Life Sciences. *Nature Methods* **21**, 1873–1883 (2024). 10.1038/s41592-024-02382-8 PMC11466833
40. W. Zhou, T. Wu, **M. D. Lew**, Fundamental Limits in Measuring the Anisotropic Rotational Diffusion of Single Molecules. *The Journal of Physical Chemistry A* **128**, 5808–5815 (2024). 10.1021/acs.jpca.4c03160 PMC11298152 Cover
39. B. Sun, T. Ding, W. Zhou, T. S. Porter, **M. D. Lew**, Single-Molecule Orientation Imaging Reveals the Nano-Architecture of Amyloid Fibrils Undergoing Growth and Decay. *Nano Letters* **24**, 7276–7283 (2024). 10.1021/acs.nanolett.4c01263 PMC11612035 Correction
38. M. R. King, K. M. Ruff, A. Z. Lin, A. Pant, M. Farag, J. M. Lalmansingh, T. Wu, M. J. Fossat, W. Ouyang, **M. D. Lew**, E. Lundberg, M. D. Vahey, R. V. Pappu, Macromolecular Condensation Organizes Nucleolar Sub-Phases to Set up a pH Gradient. *Cell* **187**, 1889–1906.e24 (2024). 10.1016/j.cell.2024.02.029 PMC11938373
37. W. Zhou, C. L. O'Neill, T. Ding, O. Zhang, J. S. Rudra, **M. D. Lew**, Resolving the Nanoscale Structure of β-Sheet Peptide Self-Assemblies Using Single-Molecule Orientation–Localization Microscopy. *ACS Nano* **18**, 8798–8810 (2024). 10.1021/acsnano.3c11771 PMC11025465 Cover
36. J. Lu, **M. D. Lew**, Single-Molecule Electrochemical Imaging Resolves the Midpoint Potentials of Individual Fluorophores on Nanoporous Antimony-Doped Tin Oxide. *Chemical Science* **15**, 2037–2046 (2024). 10.1039/D3SC05293A PMC10848685 Cover
35. O. Zhang, Z. Guo, Y. He, T. Wu, M. D. Vahey, **M. D. Lew**, Six-Dimensional Single-Molecule Imaging with Isotropic Resolution Using a Multi-View Reflector Microscope. *Nature Photonics* **17**, 179–186 (2022). 10.1038/s41566-022-01116-6 PMC10035538
34. J. M. Jusuf, **M. D. Lew**, Towards Optimal Point Spread Function Design for Resolving Closely Spaced Emitters in Three Dimensions. *Optics Express* **30**, 37154 (2022). 10.1364/OE.472067

33. T. Wu, P. Lu, M. A. Rahman, X. Li, **M. D. Lew**, Deep-SMOLM: Deep Learning Resolves the 3D Orientations and 2D Positions of Overlapping Single Molecules with Optimal Nanoscale Resolution. *Optics Express* **30**, 36761 (2022). 10.1364/OE.470146 PMC9662599

32. M. Shen, T. Ding, C. Tan, W. H. Rackers, D. Zhang, **M. D. Lew**, B. Sadtler, *In Situ* Imaging of Catalytic Reactions on Tungsten Oxide Nanowires Connects Surface–Ligand Redox Chemistry with Photocatalytic Activity. *Nano Letters* **22**, 4694–4701 (2022). 10.1021/acs.nanolett.2c00674

31. T. Wu, J. Lu, **M. D. Lew**, Dipole-Spread-Function Engineering for Simultaneously Measuring the 3D Orientations and 3D Positions of Fluorescent Molecules. *Optica* **9**, 505 (2022). 10.1364/OPTICA.451899 PMC9122034

30. O. Zhang, W. Zhou, J. Lu, T. Wu, **M. D. Lew**, Resolving the Three-Dimensional Rotational and Translational Dynamics of Single Molecules Using Radially and Azimuthally Polarized Fluorescence. *Nano Letters* **22**, 1024–1031 (2022). 10.1021/acs.nanolett.1c03948 PMC8893020

29. T. Ding, **M. D. Lew**, Single-Molecule Localization Microscopy of 3D Orientation and Anisotropic Wobble Using a Polarized Vortex Point Spread Function. *The Journal of Physical Chemistry B* **125**, 12718–12729 (2021). 10.1021/acs.jpcb.1c08073 PMC8662813 Cover

28. M. Shen, T. Ding, W. H. Rackers, C. Tan, K. Mahmood, **M. D. Lew**, B. Sadtler, Single-Molecule Colocalization of Redox Reactions on Semiconductor Photocatalysts Connects Surface Heterogeneity and Charge-Carrier Separation in Bismuth Oxybromide. *Journal of the American Chemical Society* **143**, 11393–11403 (2021). 10.1021/jacs.1c02377

27. O. Zhang, **M. D. Lew**, Single-Molecule Orientation Localization Microscopy II: A Performance Comparison. *Journal of the Optical Society of America A* **38**, 288 (2021). 10.1364/JOSAA.411983

26. O. Zhang, **M. D. Lew**, Single-Molecule Orientation Localization Microscopy I: Fundamental Limits. *Journal of the Optical Society of America A* **38**, 277 (2021). 10.1364/JOSAA.411981 ★ Correction

25. H. Mazidi, T. Ding, A. Nehorai, **M. D. Lew**, Quantifying Accuracy and Heterogeneity in Single-Molecule Super-Resolution Microscopy. *Nature Communications* **11**, 6353 (2020). 10.1038/s41467-020-20056-9 PMC7732856

24. J. Lu, H. Mazidi, T. Ding, O. Zhang, **M. D. Lew**, Single-Molecule 3D Orientation Imaging Reveals Nanoscale Compositional Heterogeneity in Lipid Membranes. *Angewandte Chemie International Edition* **59**, 17572–17579 (2020). 10.1002/anie.202006207 PMC7794097 Cover ★

23. O. Zhang, **M. D. Lew**, Quantum Limits for Precisely Estimating the Orientation and Wobble of Dipole Emitters. *Physical Review Research* **2**, 033114 (2020). 10.1103/PhysRevResearch.2.033114 PMC7440618

22. M. Shen, T. Ding, J. Luo, C. Tan, K. Mahmood, Z. Wang, D. Zhang, R. Mishra, **M. D. Lew**, B. Sadtler, Competing Activation and Deactivation Mechanisms in Photodoped Bismuth Oxybromide Nanoplates Probed by Single-Molecule Fluorescence Imaging. *The Journal of Physical Chemistry Letters* **11**, 5219–5227 (2020). 10.1021/acs.jpclett.0c01237

21. T. Ding*, T. Wu*, H. Mazidi, O. Zhang, **M. D. Lew**, Single-Molecule Orientation Localization Microscopy for Resolving Structural Heterogeneities between Amyloid Fibrils. *Optica* **7**, 602 (2020). 10.1364/OPTICA.388157 PMC7440617

20. M. Shen*, T. Ding*, S. T. Hartman, F. Wang, C. Krucylak, Z. Wang, C. Tan, B. Yin, R. Mishra, **M. D. Lew**+, B. Sadtler+, Nanoscale Colocalization of Fluorogenic Probes Reveals the Role of Oxygen Vacancies in the Photocatalytic Activity of Tungsten Oxide Nanowires. *ACS Catalysis* **10**, 2088–2099 (2020). 10.1021/acscatal.9b04481

19. H. Mazidi, E. S. King, O. Zhang, A. Nehorai, **M. D. Lew**, Dense Super-Resolution Imaging of Molecular Orientation Via Joint Sparse Basis Deconvolution and Spatial Pooling, *2019 IEEE 16th International Symposium on Biomedical Imaging (ISBI 2019)*, 325–329 (2019). 10.1109/ISBI.2019.8759444

18. O. Zhang, **M. D. Lew**, Fundamental Limits on Measuring the Rotational Constraint of Single Molecules Using Fluorescence Microscopy. *Physical Review Letters* **122**, 198301 (2019). 10.1103/PhysRevLett.122.198301 PMC6649682

17. H. Mazidi, J. Lu, A. Nehorai, **M. D. Lew**, Minimizing Structural Bias in Single-Molecule Super-Resolution Microscopy. *Scientific Reports* **8**, 13133 (2018). 10.1038/s41598-018-31366-w PMC6120949

16. D. Maji, J. Lu, P. Sarder, A. H. Schmieder, G. Cui, X. Yang, D. Pan, **M. D. Lew**, S. Achilefu, G. M. Lanza, Cellular Trafficking of Sn-2 Phosphatidylcholine Prodrugs Studied with Fluorescence Lifetime Imaging and Super-resolution Microscopy. *Precision Nanomedicine* **1**, 128–145 (2018). 10.33218/prnano1(2).180724.1 PMC6597004 Cover

15. K. Spehar*, T. Ding*, Y. Sun, N. Kedia, J. Lu, G. R. Nahass, **M. D. Lew**$^{+}$, J. Bieschke^{+}, Super-resolution Imaging of Amyloid Structures over Extended Times by Using Transient Binding of Single Thioflavin T Molecules. *ChemBioChem* **19**, 1944–1948 (2018). 10.1002/cbic.201800352 PMC6428420 Cover

14. O. Zhang, J. Lu, T. Ding, **M. D. Lew**, Imaging the Three-Dimensional Orientation and Rotational Mobility of Fluorescent Emitters Using the Tri-spot Point Spread Function. *Applied Physics Letters* **113**, 031103 (2018). 10.1063/1.5031759 PMC6050162 Correction

13. O. Liba, **M. D. Lew**, E. D. SoRelle, R. Dutta, D. Sen, D. M. Moshfeghi, S. Chu, A. de la Zerda, Speckle-Modulating Optical Coherence Tomography in Living Mice and Humans. *Nature Communications* **8**, 15845 (2017). 10.1038/ncomms15845 PMC5481831 ★ Correction

12. L. von Diezmann, M. Y. Lee, **M. D. Lew**, W. E. Moerner, Correcting Field-Dependent Aberrations with Nanoscale Accuracy in Three-Dimensional Single-Molecule Localization Microscopy. *Optica* **2**, 985 (2015). 10.1364/OPTICA.2.000985 PMC4782984 Cover

11. **M. D. Lew**, W. E. Moerner, Azimuthal Polarization Filtering for Accurate, Precise, and Robust Single-Molecule Localization Microscopy. *Nano Letters* **14**, 6407–6413 (2014). 10.1021/nl502914k PMC4245985

10. A. S. Backer, M. P. Backlund, **M. D. Lew**, W. E. Moerner, Single-Molecule Orientation Measurements with a Quadrated Pupil. *Optics Letters* **38**, 1521 (2013). 10.1364/OL.38.001521 PMC3991307

9. **M. D. Lew***, M. P. Backlund*, W. E. Moerner, Rotational Mobility of Single Molecules Affects Localization Accuracy in Super-Resolution Fluorescence Microscopy. *Nano Letters* **13**, 3967–3972 (2013). 10.1021/nl304359p PMC3696529 Cover

8. M. P. Backlund*, **M. D. Lew***, A. S. Backer, S. J. Sahl, G. Grover, A. Agrawal, R. Piestun, W. E. Moerner, Simultaneous, Accurate Measurement of the 3D Position and Orientation of Single Molecules. *Proceedings of the National Academy of Sciences* **109**, 19087–19092 (2012). 10.1073/pnas.1216687109 PMC3511094 ★

7. H.-l. D. Lee*, S. J. Sahl*, **M. D. Lew**, W. E. Moerner, The Double-Helix Microscope Super-Resolves Extended Biological Structures by Localizing Single Blinking Molecules in Three Dimensions with Nanoscale Precision. *Applied Physics Letters* **100**, 153701 (2012). 10.1063/1.3700446 PMC3338582 Cover

6. **M. D. Lew***, S. F. Lee*, J. L. Ptacin, M. K. Lee, R. J. Twieg, L. Shapiro, W. E. Moerner, Three-Dimensional Superresolution Colocalization of Intracellular Protein Superstructures and the Cell Surface in Live *Caulobacter Crescentus*. *Proceedings of the National Academy of Sciences* **108**, E1102–E1110 (2011). 10.1073/pnas.1114444108 PMC3219151

5. **M. D. Lew**, S. F. Lee, M. Badieirostami, W. E. Moerner, Corkscrew Point Spread Function for Far-Field Three-Dimensional Nanoscale Localization of Pointlike Objects. *Optics Letters* **36**, 202 (2011). 10.1364/OL.36.000202 PMC3196662

4. M. Badieirostami, **M. D. Lew**, M. A. Thompson, W. E. Moerner, Three-Dimensional Localization Precision of the Double-Helix Point Spread Function versus Astigmatism and Biplane. *Applied Physics Letters* **97**, 161103 (2010). 10.1063/1.3499652 PMC2980550

3. M. A. Thompson*, **M. D. Lew***, M. Badieirostami, W. E. Moerner, Localizing and Tracking Single Nanoscale Emitters in Three Dimensions with High Spatiotemporal Resolution Using a Double-Helix Point Spread Function. *Nano Letters* **10**, 211–218 (2009). 10.1021/nl903295p PMC2806512

2. X. Cui, **M. Lew**, C. Yang, Quantitative Differential Interference Contrast Microscopy Based on Structured-Aperture Interference. *Applied Physics Letters* **93**, 091113 (2008). 10.1063/1.2977870

1. **M. Lew**, X. Cui, X. Heng, C. Yang, Interference of a Four-Hole Aperture for on-Chip Quantitative Two-Dimensional Differential Phase Imaging. *Optics Letters* **32**, 2963 (2007). 10.1364/OL.32.002963

Review Articles, Book Chapters, and Commentaries

13. S. Brasselet^{+}, **M. D. Lew**$^{+}$, Single-Molecule Orientation and Localization Microscopy. *Nature Photonics* **19**, 925–937 (2025). 10.1038/s41566-025-01724-y PMC12440149

12. **M. D. Lew**, Painting Rich Six-Dimensional Pictures Using Polarized Fluorescence Microscopy. *Proceedings of the National Academy of Sciences* **122**, e2501914122 (2025). 10.1073/pnas.2501914122 PMC12002169

11. O. Zhang, **M. D. Lew**, Single-Molecule Orientation-Localization Microscopy: Applications and Approaches. *Quarterly Reviews of Biophysics* **57**, e17 (2024). 10.1017/S0033583524000167 PMC11771422
10. T. Wu, **M. D. Lew**, Dipole-Spread Function Engineering for Six-Dimensional Super-Resolution Microscopy, in *Coded Optical Imaging*, ed. by J. Liang (Springer International Publishing, Cham, 2024), pp. 207–223. 10.1007/978-3-031-39062-3_12
9. O. Zhang, **M. D. Lew**, Single-Molecule Orientation-Localization Microscopy. *Imaging & Microscopy* **26**, 20–22 (2024).
8. **M. D. Lew**, Can a Computer Help Make a Better Camera? *New Science*, 6–9 (Summer 2022).
7. J. S. Biteen[+], **M. D. Lew**[+], K. A. Willets[+], Tribute to W. E. Moerner. *The Journal of Physical Chemistry B* **126**, 1157–1158 (2022). 10.1021/acs.jpcb.2c00136
6. **M. D. Lew**, Computational Modelling Enables Robust Multidimensional Nanoscopy, in *Computational Modeling: From Chemistry to Materials to Biology* (WORLD SCIENTIFIC, 2021), pp. 189–195. 10.1142/9789811228216_0022
5. M. P. Backlund, **M. D. Lew**, A. S. Backer, S. J. Sahl, W. E. Moerner, The Role of Molecular Dipole Orientation in Single-Molecule Fluorescence Microscopy and Implications for Super-Resolution Imaging. *ChemPhysChem* **15**, 587–599 (2013). 10.1002/cphc.201300880 PMC3992256
4. **M. D. Lew***, A. R. S. von Diezmann*, W. E. Moerner, Easy-DHPSF Open-Source Software for Three-Dimensional Localization of Single Molecules with Precision beyond the Optical Diffraction Limit. *Protocol Exchange*, 1–18 (2013). 10.1038/protex.2013.026
3. **M. D. Lew**, S. F. Lee, M. A. Thompson, H.-l. D. Lee, W. E. Moerner, Single-Molecule Photocontrol and Nanoscopy, in *Far-Field Optical Nanoscopy*, ed. by P. Tinnefeld, C. Eggeling, S. W. Hell (Springer Berlin Heidelberg, Berlin, Heidelberg, 2012), vol. 14, pp. 87–110. 10.1007/4243_2011_37
2. M. A. Thompson, **M. D. Lew**, W. Moerner, Extending Microscopic Resolution with Single-Molecule Imaging and Active Control. *Annual Review of Biophysics* **41**, 321–342 (2012). 10.1146/annurev-biophys-050511-102250
1. **M. D. Lew**, Measuring the Phase of Light, in *Caltech Undergraduate Research Journal (CURJ)*, ed. by H. Lee, M. Chan, C. Felsen, D. Forbes, T. Lee (California Institute of Technology, Pasadena, CA, 2007), vol. 6, pp. 18–25.

Conference Publications

33. Y. Chen, Y. Qiu, **M. D. Lew**, Combining Excitation and Emission Modulation Resolves the Angular Separation between a Pair of Dipole Emitters, *Optica Biophotonics Congress 2025*, NM1C.4 (2025). 10.1364/NTM.2025.NM1C.4
32. E. Eshelman, M. Willis, C. Foreman, J. Michels, A. Cerrud, L. Schattner, G. Singh, D. Van Hoesen, W. Medina, T. Carlson, **M. Lew**, PERISCOPE: Detecting and Mapping Organic Compounds in the Near Subsurface, *2024 IEEE Aerospace Conference*, 1–10 (2024). 10.1109/AERO58975.2024.10521317
31. T. Wu, W. Zhou, J. S. Rudra, R. V. Pappu, **M. D. Lew**, 6D Single-Fluorogen Orientation-Localization Microscopy for Elucidating the Architecture of Beta-Sheet Assemblies and Biomolecular Condensates, *Proc. SPIE* **12853**, High-Speed Biomedical Imaging and Spectroscopy IX, 1285302 (2024). 10.1117/12.3005992
30. T. Ding, **M. Lew**, Elucidating the Nanoscale Architecture of Amyloid Aggregates Using a Polarized Donut Point Spread Function. *Microscopy and Microanalysis* **27**, 1428–1430 (2021). 10.1017/S1431927621005298
29. T. Wu, J. Lu, **M. Lew**, pixOL: Pixel-Wise Point Spread Function Engineering for Measuring the 3D Orientation and 3D Location of Dipole-like Emitters. *Microscopy and Microanalysis* **27**, 858–862 (2021). 10.1017/S1431927621003366
28. H. Mazidi, T. Ding, A. Nehorai, **M. D. Lew**, Robustly Detecting Imaging Model Mismatches and Reconstruction Artifacts in Single-Molecule Localization Microscopy, *OSA Imaging and Applied Optics Congress 2021 (3D, COSI, DH, ISA, pcAOP)*, CTu4B.5 (2021). 10.1364/COSI.2021.CTu4B.5
27. T. Ding, J. Lu, T. Wu, **M. D. Lew**, Imaging Chemical Environments and Amyloid Architectures Using Single-Molecule Orientation-Localization Microscopy, *OSA Imaging and Applied Optics Congress 2021 (3D, COSI, DH, ISA, pcAOP)*, ITu7A.6 (2021). 10.1364/ISA.2021.ITu7A.6

26. T. Wu, T. Ding, H. Mazidi, O. Zhang, **M. D. Lew**, A Computationally-Efficient Bound for the Variance of Measuring the Orientation of Single Molecules, *Proc. SPIE* **11246**, Single Molecule Spectroscopy and Superresolution Imaging XIII, 1124616 (2020). 10.1117/12.2543813

25. H. Mazidi, T. Ding, A. Nehorai, **M. D. Lew**, Measuring Localization Confidence for Quantifying Accuracy and Heterogeneity in Single-Molecule Super-Resolution Microscopy, *Proc. SPIE* **11246**, Single Molecule Spectroscopy and Superresolution Imaging XIII, 1124611 (2020). 10.1117/12.2545033

24. O. Zhang, **M. D. Lew**, Fundamental Limits on Imaging the Orientational Dynamics of Dipole-Like Emitters, *Imaging and Applied Optics 2019 (COSI, IS, MATH, pcAOP)*, MM3D.2 (2019). 10.1364/MATH.2019.MM3D.2

23. H. Mazidi, E. S. King, O. Zhang, A. Nehorai, **M. D. Lew**, Single-Molecule Super-Resolution Imaging of Molecular Orientation Using a Tri-Spot Point Spread Function, *Imaging and Applied Optics 2019 (COSI, IS, MATH, pcAOP)*, CTh4A.4 (2019). 10.1364/COSI.2019.CTh4A.4

22. O. Zhang, **M. D. Lew**, Measuring Rotational Dynamics with High Accuracy and Precision Using a Tri-spot Point Spread Function, *Biophotonics Congress: Optics in the Life Sciences Congress 2019 (BODA,BRAIN,NTM,OMA,OMP)*, NS2B.2 (2019). 10.1364/NTM.2019.NS2B.2

21. K. Spehar*, T. Ding*, Y. Sun, N. Kedia, J. Lu, G. R. Nahass, **M. D. Lew**, J. Bieschke, Long-Term Super-Resolution Imaging of Amyloid Structures Using Transient Binding of Thioflavin T, *Biophotonics Congress: Optics in the Life Sciences Congress 2019 (BODA,BRAIN,NTM,OMA,OMP)*, OW4D.4 (2019). 10.1364/OMP.2019.OW4D.4

20. O. Zhang, **M. D. Lew**, Fundamental Limits of Measuring Single-Molecule Rotational Mobility, *Proc. SPIE* **10884**, Single Molecule Spectroscopy and Superresolution Imaging XII, 1088412 (2019). 10.1117/12.2506712

19. T. Ding, K. Spehar, J. Bieschke, **M. D. Lew**, Long-Term, Super-Resolution Imaging of Amyloid Structures Using Transient Amyloid Binding Microscopy, *Proc. SPIE* **10884**, Single Molecule Spectroscopy and Superresolution Imaging XII, 108840J (2019). 10.1117/12.2507656

18. O. Liba, **M. D. Lew**, E. D. SoRelle, R. Dutta, D. Sen, D. M. Moshfeghi, S. Chu, A. de la Zerda, Speckle-Free Non-Invasive Imaging with Speckle-Modulating Optical Coherence Tomography, *Conference on Lasers and Electro-Optics*, AM2J.3 (2018). 10.1364/CLEO_AT.2018.AM2J.3

17. O. Zhang, T. Ding, J. Lu, H. Mazidi, **M. D. Lew**, Measuring 3D Molecular Orientation and Rotational Mobility Using a Tri-spot Point Spread Function, *Proc. SPIE* **10500**, Single Molecule Spectroscopy and Superresolution Imaging XI, 105000B (2018). 10.1117/12.2287004

16. H. Mazidi, **M. D. Lew**, A. Nehorai, A Robust Statistical Estimation (RoSE) Algorithm Jointly Recovers the 3D Location and Intensity of Single Molecules Accurately and Precisely, *Proc. SPIE* **10500**, Single Molecule Spectroscopy and Superresolution Imaging XI, 105000E (2018). 10.1117/12.2289994

15. O. Liba, **M. D. Lew**, E. D. SoRelle, R. Dutta, D. Sen, D. M. Moshfeghi, S. Chu, A. De La Zerda, Speckle-Modulation for Speckle Reduction in Optical Coherence Tomography, *Proc. SPIE* **10483**, Optical Coherence Tomography and Coherence Domain Optical Methods in Biomedicine XXII, 104832D (2018). 10.1117/12.2289405

14. **M. D. Lew**, Accurate 3D Nanoscale Imaging of Dipole-like Emitters, *Frontiers in Optics 2015*, LW3I.2 (2015). 10.1364/LS.2015.LW3I.2

13. **M. D. Lew**, W. E. Moerner, An Azimuthal Polarizer Assures Localization Accuracy in Single-Molecule Super-Resolution Fluorescence Microscopy, *CLEO: 2015*, STh4K.2 (2015). 10.1364/CLEO_SI.2015.STh4K.2

12. A. S. Backer, M. P. Backlund, **M. D. Lew**, A. R. Diezmann, S. J. Sahl, W. E. Moerner, Single-Molecule Orientation Measurements with a Quadrated Pupil, *Proc. SPIE* **8950**, Single Molecule Spectroscopy and Superresolution Imaging VII, 89500L (2014). 10.1117/12.2042097

11. **M. D. Lew**, M. P. Backlund, A. S. Backer, W. E. Moerner, Optical Methods for Measuring Single-Molecule Orientation and Position: Implications for Super-Resolution Microscopy, *Frontiers in Optics 2013 Postdeadline*, FW6A.6 (2013). 10.1364/FIO.2013.FW6A.6

10. **M. D. Lew**, M. P. Backlund, A. S. Backer, S. J. Sahl, G. Grover, A. Agrawal, R. Piestun, W. E. Moerner, Measuring the 3D Position and Orientation of Single Molecules Simultaneously and Accurately with the Double Helix Microscope, *CLEO: 2013*, CTu3N.3 (2013). 10.1364/CLEO_SI.2013.CTu3N.3

9. M. P. Backlund*, **M. D. Lew***, A. S. Backer, S. J. Sahl, G. Grover, A. Agrawal, R. Piestun, W. E. Moerner, The Double-Helix Point Spread Function Enables Precise and Accurate Measurement of 3D Single-Molecule Localization and Orientation, *Proc. SPIE* **8590**, Single Molecule Spectroscopy and Superresolution Imaging VI, 85900L (2013). 10.1117/12.2001671
8. **M. D. Lew**, S. F. Lee, J. L. Ptacin, M. K. Lee, L. Shapiro, W. E. Moerner, Super-Resolution 3D Co-Localization of Protein Superstructures and the Cellular Surface in Live Caulobacter Crescentus, *Frontiers in Optics 2011/Laser Science XXVII*, FTuH2 (2011). 10.1364/FIO.2011.FTuH2
7. **M. D. Lew**, S. F. Lee, W. E. Moerner, Three-Dimensional Super-Resolution Imaging with a Corkscrew Point Spread Function, *Optics in the Life Sciences*, Novel Techniques in Microscopy, NMB2 (2011). 10.1364/NTM.2011.NMB2
6. M. A. Thompson, **M. D. Lew**, M. Badieirostami, W. E. Moerner, Localizing and Tracking Single Emitters in Three Dimensions Using a Double Helix Point Spread Function, *Conference on Lasers and Electro-Optics 2010*, CThCC3 (2010). 10.1364/CLEO.2010.CThCC3
5. **M. D. Lew**, M. A. Thompson, M. Badieirostami, W. E. Moerner, In Vivo Three-Dimensional Superresolution Fluorescence Tracking Using a Double-Helix Point Spread Function, *Proc. SPIE* **7571**, Single Molecule Spectroscopy and Imaging III, 75710Z (2010). 10.1117/12.842608
4. **M. Lew**, M. A. Thompson, M. Badieirostami, W. E. Moerner, Localization Precision of Three-Dimensional Superresolution Fluorescence Imaging Using a Double-Helix Point Spread Function, *Frontiers in Optics 2009/Laser Science XXV/Fall 2009 OSA Optics & Photonics Technical Digest*, Computational Optical Sensing and Imaging, CThA4 (2009). 10.1364/COSI.2009.CThA4
3. W. E. Moerner, M. Thompson, **M. Lew**, M. Badieirostami, S. J. Lord, N. R. Conley, H.-l. D. Lee, S. R. P. Pavani, R. Piestun, Three-Dimensional Superresolution Using Single-Molecule Photoswitches and a Double-Helix PSF, *Frontiers in Optics 2009/Laser Science XXV/Fall 2009 OSA Optics & Photonics Technical Digest*, Computational Optical Sensing and Imaging, CTuD1 (2009). 10.1364/COSI.2009.CTuD1
2. **M. Lew**, X. Cui, X. Heng, C. Yang, Two-Dimensional Differential Interference Contrast Microscopy Based on Four-Hole Variation of Young's Interference, *Proc. SPIE* **6859**, Imaging, Manipulation, and Analysis of Biomolecules, Cells, and Tissues VI, 685916 (2008). 10.1117/12.760118
1. X. Cui, **M. Lew**, X. Heng, C. Yang, On-Chip Differential Interference Contrast (DIC) Phase Imager and Beam Profiler Based on Young's Interference, *Proc. SPIE* **6441**, Imaging, Manipulation, and Analysis of Biomolecules, Cells, and Tissues V, 64411F (2007). 10.1117/12.699920

PATENTS LENS.ORG PATENT SEARCH

7. **M. Lew**, T. Wu, Pixel-Wise Point Spread Function Engineering Systems And Methods, US 11994470 B2 (2022).
6. **M. Lew**, O. Zhang, Multi-View Reflector Microscope, US 2024/0210671 A1 (2021).
5. **M. Lew**, T. Wu, T. Ding, Systems And Methods For Performing Optical Imaging Using Duo-spot Point Spread Functions, US 2023/0073324 A1 (2021).
4. **M. Lew**, A. Nehorai, H. Mazidisharfabadi, Methods For Quantifying And Enhancing Accuracy In Microscopy Using Measures Of Localization Confidence, US 11300515 B2 (2020).
3. O. Zhang, **M. D. Lew**, Systems And Methods For Performing Optical Imaging Using A Tri-spot Point Spread Function (Psf), US 10761419 B2 (2018).
2. O. Liba, **M. D. Lew**, E. D. Sorelle, A. de la Zerda, Methods And Apparatus For Speckle-free Optical Coherence Imaging, US 2018/0299251 A1 (2016).
1. **M. D. Lew**, W. E. Moerner, Apparatus And Method For Localizing Objects For Distance And/or In Three Dimensions Using A Spiral Point Spread Function, US 9693034 B2 (2012).

Professional Talks

Invited Talks

39. Single-molecule Orientation-Localization Microscopy: New Approaches and Applications, *2025 Optica Biophotonics Congress: Optics in the Life Sciences*, Coronado, CA (Apr. 2025).
38. Visualizing the Architectures of Beta-Sheet Assemblies and Biomolecular Condensates Using Single-Fluorogen Orientation-Localization Microscopy, *Special Materials Seminar, Boise State University*, Boise, ID (Apr. 2025).
37. Single-Molecule Orientation-Localization Microscopy: New Challenges and Biophysical Insights, *Biophysical Evening, WashU Biochemistry and Biophysics*, St. Louis, MO (Mar. 2025).
36. Microscopy in the 21st Century – Blinking Molecules, Bending Light, and Rapid Computation, *2024 Lawrence Jasper Lecture, Osher Lifelong Learning Institute*, St. Louis, MO (Apr. 2024).
35. 6D Single-Fluorogen Microscopy for Visualizing Biomolecular Condensates, *Mini Symposium of the Center for Biomolecular Condensates, Washington University*, St. Louis, MO (Mar. 2024).
34. 6D Single-Molecule Orientation-Localization Microscopy: Fundamental Limits for Visualizing the Dynamic Organization of Biomolecule, *Quantum Sensing and Information Processing for Biomedical Applications, APS March Meeting 2024*, Minneapolis, MN (Mar. 2024).
33. 6D Single-Fluorogen Orientation-Localization Microscopy for Elucidating the Architecture of Beta-Sheet Assemblies and Biomolecular Condensates, *High-Speed Biomedical Imaging and Spectroscopy IX, SPIE Photonics West*, San Francisco, CA (Jan. 2024).
32. Single-Fluorogen Imaging Reveals the Nanoscale Structure of Beta-Sheet Assemblies and Biomolecular Condensates, *SERMACS 2023*, Durham, NC (Oct. 2023).
31. Single-Molecule Imaging of Fluorogenic Probes Reveals Inhomogeneous Molecular Organization in Biomolecular Condensates, *Inaugural Symposium of the Center for Biomolecular Condensates, Washington University*, St. Louis, MO (Oct. 2022).
30. Single-Molecule Orientation Localization Microscopy: Visualizing Molecular Organization at the Nanoscale, *San Francisco State University Physics & Astronomy Colloquium*, online (Apr. 2022).
29. Single-Molecule Orientation Localization Microscopy: Visualizing Molecular Organization at the Nanoscale, *MIT Modern Optics and Spectroscopy Seminar*, online (Apr. 2022).
28. Single-Molecule Orientation Localization Microscopy: Visualizing Molecular Rotational Dynamics at the Nanoscale, *SERMACS 2021*, Birmingham, AL (Nov. 2021).
27. Single-Molecule Orientation Localization Microscopy: Engineering Imaging Systems to Visualize Molecular Dynamics at the Nanoscale, *Hong Kong University of Science and Technology Physics Seminar*, online (July 2021).
26. Visualizing Enzyme Activity in Lipid Membranes, One Molecule at a Time, *Probing Chemical Reactions by Single-Molecule Spectroscopy*, online (June 2021).
25. Toward Visualizing the Dynamic Organization of Amyloid Aggregates Using Single-Molecule Orientation Localization Microscopy, *Knight Alzheimer Disease Research Center Seminar*, online (Jan. 2021).
24. Single-Molecule Orientation Localization Microscopy for Visualizing Lipid Nanodomains and the Organization of Amyloid Aggregates, *University of Minnesota Biophysics Seminar*, online (Oct. 2020).
23. Quantifying and Maximizing Imaging Accuracy in Single-Molecule Super-Resolution Microscopy, *2020 IEEE 17th International Symposium on Biomedical Imaging (ISBI 2020)*, online (Apr. 2020).
22. Computational Modeling Enables Robust Multidimensional Nanoscopy, *25th Solvay Conference on Chemistry*, Brussels, Belgium (Oct. 2019).
21. Single Molecules and Point Spread Function Engineering for Visualizing Amyloid Protein Dynamics at the Nanoscale, *Imaging Sciences Pathway Retreat 2019*, St. Louis, MO (June 2019).
20. Visualizing Amyloid Protein Dynamics at the Nanoscale, *5th Annual Meeting of the Biophysical Society of Canada*, Mississauga, ON (May 2019).
19. Single-Molecule Orientation Spectroscopy, *Rice University Spectroscopic Imaging Workshop*, Houston, TX (Dec. 2018).

18. Towards Optimal Imaging of Single-Molecule Rotational Dynamics at the Nanoscale, *Gordon Research Conference: Single-Molecule Approaches to Biology*, West Dover, VT (July 2018).
17. Computational Optics for Multidimensional Nanoscale Imaging of Single Fluorescent Molecules, *Stanford Optical Society Seminar*, Stanford, CA (June 2018).
16. Elucidating the Functions of Molecular Machines in Living Cells, *Washington University School of Engineering & Applied Science National Council Meeting*, St. Louis, MO (Apr. 2018).
15. Single-Molecule Probes and Computational Optics for Imaging Activity at the Nanoscale, *Siteman Cancer Center Oncologic Imaging Research Forum*, St. Louis, MO (Feb. 2018).
14. Computational Optics for Imaging Nanoscale Single-Molecule Dynamics, *Washington University in St. Louis Chemistry Seminar*, St. Louis, MO (Mar. 2017).
13. Single Molecules and Computational Optics for Nanoscale Biological Imaging, *Washington University in St. Louis Optical Radiology Seminar*, St. Louis, MO (Oct. 2016).
12. Single Molecules and Computational Optics for Nanoscale Biological Imaging, *Washington University in St. Louis Biochemistry and Molecular Biophysics Seminar*, St. Louis, MO (Mar. 2016).
11. Single Molecules and Computational Optics for Nanoscale Imaging of Living Cells, *The Sixteenth Conference of Peace through Mind Brain Science*, Hamamatsu City, Japan (Feb. 2016).
10. Single Molecules and Computational Optics for Nanoscale Imaging of Living Cells, *Washington University in St. Louis Biomedical Engineering Seminar*, St. Louis, MO (Feb. 2016).
9. Accurate 3D Nanoscale Imaging of Dipole-Like Emitters, *Laser Science 2015*, San Jose, CA (Oct. 2015).
8. Accurate Nanoscale Imaging of Dipole-Like Emitters, *Stefan W. Hell group retreat*, Ringberg Castle, Kreuth, Germany (Jan. 2015).
7. Engineering New Capabilities Into Optical Microscopes: Towards Measuring the 3D Position and Orientation of Biomolecules Within Living Cells, *Washington University in St. Louis Electrical and Systems Engineering Seminar*, St. Louis, MO (Apr. 2014).
6. Beyond the Clear Pupil: Engineering New Capabilities Into Optical Microscopes, *Washington University in St. Louis Electrical and Systems Engineering Seminar*, St. Louis, MO (Mar. 2014).
5. Beyond the Clear Pupil: Engineering New Capabilities Into Optical Microscopes, *Duke University Electrical and Computer Engineering Seminar*, Durham, NC (Mar. 2014).
4. Beyond the Clear Pupil: Engineering New Capabilities Into Optical Microscopes, *IBM Research Almaden ARC Angels Student Seminar Series*, San Jose, CA (Feb. 2014).
3. Superresolution Far-Field Optical Microscopy: Turning Mountains Into Points, *Spectra-Physics company seminar*, Santa Clara, CA (Nov. 2011).
2. Three-Dimensional Superresolution Fluorescence Microscopy Using a Double-Helix Point Spread Function, *Arizona State University Center for Biological Physics Graduate Seminar*, Tempe, AZ (Nov. 2011).
1. In Vivo Three-Dimensional Superresolution Fluorescence Tracking Using a Double-Helix Point Spread Function, *SPIE Photonics West BiOS (Biomedical Optics)*, San Francisco, CA (Jan. 2010).

Contributed Talks

25. Simultaneous Single-molecule Orientation Imaging of Absorption and Emission Dipoles (poster), *Gordon Research Conferences: Single Molecule Approaches to Biology*, Newry, ME (July 2024).
24. A Multi-view Reflector Microscope Visualizes Six-dimensional Single-molecule Translational and Rotational Dynamics with Isotropic Nanoscale Resolution (poster), *67th Biophysical Society Annual Meeting*, San Diego, CA (Feb. 2023).
23. Visualizing the Nanoscale Architecture of Amyloid Aggregates Using Amyloidophilic Probes and a Polarized Vortex Microscope (poster), *66th Biophysical Society Annual Meeting*, San Francisco, CA (Feb. 2022).
22. Single-molecule Imaging of the Electron Transfer Pathways Within Single Electroactive Bacteria, *2021 NA-ISMET*, Los Angeles, CA (Nov. 2021).

21. Imaging Chemical Environments and Amyloid Architectures Using Single-molecule Orientation-localization Microscopy, *OSA Imaging and Applied Optics Congress*, virtual conference (July 2021).
20. Robustly Detecting Imaging Model Mismatches and Reconstruction Artifacts in Single-molecule Localization Microscopy, *OSA Imaging and Applied Optics Congress*, virtual conference (July 2021).
19. Visualizing Membrane Composition and Amyloid Aggregate Organization Using Single-molecule 3d Orientation Imaging, *Focus on Microscopy 2021 (FOM 2021)*, virtual conference (Mar. 2021).
18. Quantifying Localization Accuracy in Single-molecule Super-resolution Microscopy, *Quantitative Bioimaging Conference (QBI 2020)*, Oxford, UK (Jan. 2020).
17. Single-molecule Super-resolution Imaging of Molecular Orientation Using a Tri-spot Point Spread Function, *OSA Imaging and Applied Optics*, Munich, Germany (June 2019).
16. Fundamental Limits on Imaging the Orientational Dynamics of Dipole-like Emitters, *OSA Imaging and Applied Optics*, Munich, Germany (June 2019).
15. Computational Optics for Multidimensional Nanoscale Imaging of Single Fluorescent Molecules (poster), *Gordon Research Conferences: Image Science*, Easton, MA (June 2018).
14. Computational Nanoscopy for Multidimensional Imaging of Single Fluorescent Molecules (poster), *Gordon Research Conferences: Image Science*, Easton, MA (June 2016).
13. An Azimuthal Polarizer Assures Localization Accuracy in Single-molecule Super-resolution Fluorescence Microscopy, *OSA CLEO: 2015*, San Jose, CA (May 2015).
12. Optical Methods for Measuring Single-molecule Orientation and Position: Implications for Super-resolution Microscopy (postdeadline), *OSA Frontiers in Optics (FiO)*, Orlando, FL (Oct. 2013).
11. Measuring the 3d Position and Orientation of Single Molecules Simultaneously and Accurately with the Double Helix Microscope, *OSA CLEO: 2013*, San Jose, CA (June 2013).
10. The Double-helix Microscope Simultaneously Measures Single-molecule Orientation and 3d Position, Reducing Dipole-induced Localization Errors, *Understanding Cell Behavior through Single Cell and Single Molecule Biology: Conference on Quantitative Bioimaging*, Albuquerque, NM (Jan. 2013).
9. The Double-helix Microscope Simultaneously Measures Single-molecule Orientation and 3d Position, Reducing Dipole-induced Localization Errors (2nd place poster award), *Gordon Research Conferences: Single-Molecule Approaches to Biology*, West Dover, VT (July 2012).
8. Superresolution Double-helix Microscopy Resolves Extended Biological Superstructures in 3d Within Bacterial and Mammalian Cells, *Stanford Molecular Biophysics Seminar*, Stanford, CA (Apr. 2012).
7. Super-resolution 3d Co-localization of Protein Superstructures and the Cellular Surface in Live Caulobacter Crescentus, *OSA FiO*, San Jose, CA (Oct. 2011).
6. Super-resolution 3d Co-localization of Protein Superstructures and the Cellular Surface in Live Caulobacter Crescentus, *International OSA Network of Students-North America 3 (IONS-NA3)*, Stanford, CA (Oct. 2011).
5. Three-dimensional Super-resolution Imaging with a Corkscrew Point Spread Function, *OSA Novel Techniques in Microscopy*, Monterey, CA (Apr. 2011).
4. Three-dimensional Super-resolution Co-localization of Intracellular Protein Superstructures and the Cell Membrane in Live Caulobacter Crescentus, *3rd Annual Center for Biological Imaging at Stanford Symposium*, Stanford, CA (Mar. 2011).
3. Three-dimensional Superresolution Imaging of Single Emitters Using a Double-helix Point Spread Function, *Picoquant 16th Annual Workshop on Single Molecule Spectroscopy and Ultrasensitive Analysis in the Life Sciences*, Berlin, Germany (Sept. 2010).
2. Localization Precision of Three-dimensional Superresolution Fluorescence Imaging Using a Double-helix Point Spread Function, *OSA Computational Optical Sensing and Imaging*, San Jose, CA (Oct. 2009).
1. Two-dimensional Differential Interference Contrast Microscopy Based on Four-hole Variation of Young's Interference, *SPIE Photonics West BiOS*, San Jose, CA (Jan. 2008).

Student Mentoring with dissertation titles and current position, if known

Ph.D.

9. Zhihang Li, Imaging Science (current)
8. Brian Sun, MSTP/Electrical Engineering (current)
7. Suraj Deepak Khochare, Imaging Science (current)
6. Yiyang Chen, Imaging Science (current)
5. Yuanxin Qiu, Imaging Science (current)
4. Dr. Tingting Wu, Imaging Science 2023
   Information-Rich 6D Single-Molecule Imaging Design Using Optimization
   Currently: Senior Imaging Quality Engineer, metalenz
3. Prof. Oumeng Zhang, Electrical Engineering 2022
   Multi-Dimensional Single-Molecule Nanoscopy: Fundamental Limits and Novel Approaches
   Currently: Assistant Professor, Department of Physics & Astronomy, Texas A&M University
2. Prof. Tianben Ding, Electrical Engineering 2020
   Structural Organization and Chemical Activity Revealed by New Developments in Single-Molecule Fluorescence and Orientation Imaging
   Currently: Assistant Professor, Department of Chemistry, University of Tokyo
1. Dr. Hesam Mazidisharfabadi, Electrical Engineering (co-advised with Arye Nehorai) 2020
   Convex Relaxations for Particle-Gradient Flow with Applications in Super-Resolution Single-Molecule Localization Microscopy
   Currently: Vice President, MUFG Securities Americas

M.S.

5. Ziyi Hu, Biomedical Engineering 2023
   Single-Molecule Super-Resolution Imaging of *Geobacter sulfurreducens* under Anaerobic Conditions
   Placement: WashU BME Ph.D. Program
4. Tristan Carlson, Electrical Engineering 2022
   Design of an Offner-Chrisp Imaging Spectrometer for a Planetary Fluorescence Instrument
   Currently: Optical/Electronics Engineer, MIT Lincoln Laboratory
3. Jackson Hyde, Electrical Engineering 2020
   Data Processing Electronics for an Ultra-Fast Single-Photon Counting Camera
   Currently: Hardware Engineer, IMC Trading
2. Weiran Wang, Electrical Engineering 2019
   Three-dimensional Point Spread Function Engineering for High Axial Localization Precision
1. Prof. Oumeng Zhang, Electrical Engineering 2017
   Measuring Molecular Orientation and Rotational Mobility Using a Tri-spot Point Spread Function
   Placement: WashU EE Ph.D. Program

B.S.

14. Alex Nie, Electrical Engineering (current)
13. Erik Lindeman, Physics 2024
12. Sam Kang, Electrical Engineering 2024
11. Jasmine Cheng, Electrical Engineering 2024
    Robust 6D Fluorescence Microscopy
10. Brian Sun, Electrical Engineering 2023
9. Makaiya Smith, Computer Engineering 2021
8. Max Huang, Electrical Engineering 2021
7. Tristan Carlson, Electrical Engineering 2020
6. James Cevasco, Electrical Engineering 2020
5. Jackson Hyde, Electrical Engineering 2020
4. James Jusuf, Physics 2019
3. Tara Porter, Electrical Engineering 2019
2. Eshan King, Biomedical Engineering 2019
1. Kevin Spehar, Biomedical Engineering 2019

Teaching Experience (enrollment)

Washington University in St. Louis

ESE 4880 Signals and Imaging Laboratory (UG) — FL24 (12), SP25 (3), FL25 (13)
Co-Developer and Co-Instructor with Jason Trobaugh

ESE 5820 Fundamentals and Applications of Modern Optical Imaging (GR) — FL15 (18), SP17 (15), SP18 (28), SP19 (12), SP20 (18), SP21 (23), SP22 (15), SP24 (21), SP26 ()
Developer and Instructor

ESE 4301 Quantum Mechanics for Engineers (UG) — FL24 (8)
Instructor

ESE 105 Introduction to Electrical and Systems Engineering (UG) — FL18 (36), FL19 (67), FL20 (76), FL21 (83), FL22 (93), FL23 (66)
Co-Developer and Co-Instructor with Shinung Ching

ESE 330 Engineering Electromagnetics Principles (UG) — FL16 (37)
Instructor

Stanford University

EE 134 Introduction to Photonics (UG) — 2012
Co-Developer (taught by Audrey K. Bowden)

California Institute of Technology

EE 113 Feedback and Control Circuits (UG) — 2007 – 2008
Teaching Assistant (taught by Glen George)

EE 20 Electronics Laboratory (UG) — 2006 – 2007
Teaching Assistant (taught by Dimitrios Antsos)

Other Professional Activities

Service to Washington University in St. Louis (Department/unit service, followed by school/university service)

Undergraduate Curriculum Committee, *Preston M. Green Department of Electrical and Systems Engineering*	2021 – present
Admissions Committee, *Imaging Science PhD Program, McKelvey School of Engineering*	2018 – present
Curriculum Committee, *Imaging Science PhD Program, McKelvey School of Engineering*	2017 – present
Faculty Search Committee, *Preston M. Green Department of Electrical and Systems Engineering*	2016, 2017, 2020 – 2025
PhD Admissions Committee, *Preston M. Green Department of Electrical and Systems Engineering*	2017 – 2021
Chair Search Committee, *Preston M. Green Department of Electrical and Systems Engineering, School of Engineering & Applied Science*	2018
Advisory Committee on Teaching-Track Faculty Promotion, *McKelvey School of Engineering*	2024 – present
LinQ-STL Leadership Team, *NSF Research Traineeship (NRT) Award 2152221*	2022 – present
Doctoral Council, *Office of the Provost*	2022 – present
Laser Safety Advisory Committee, *Environmental Health and Safety*	2018 – present
Speaker, Faculty Assembly, *McKelvey School of Engineering*	2024 – 2025
Faculty Assembly Advisory Committee, *McKelvey School of Engineering*	2023 – 2025
Marshal, 163rd Commencement, *McKelvey School of Engineering*	2024
Research Advisory Committee, *McKelvey School of Engineering*	2021

Editorial Boards

Early Career Board, *Chemical & Biomedical Imaging*	2024 – present
Editorial Board, *Scientific Reports*	2019 – present
Associate Editor, *Biological Imaging*	2020 – 2024
Guest Editor, W. E. Moerner Festschrift, *Journal of Physical Chemistry B*	2022

Conference Leadership

Session Leader, "Single Molecules and Phase", *65th Welch Conference on Chemical Research, "Molecules and Sculpted Light," Houston, TX*	2022
Symposium Organizer, "Frontiers in Fluorescence Lifetime and Super-resolution Imaging of Biological Structures and Dynamics", *Microscopy & Microanalysis (M&M), virtual*	2021
Program Committee, *Stanford University Photonics Retreat (SUPR) 2015, Pacific Grove, CA*	2015
Program Committee, *SUPR 2014, Marshall, CA*	2014
Program Chair, *SUPR 5, Rohnert Park, CA*	2013
Program Committee, *SUPR 2012, Pacific Grove, CA*	2012
Program Committee, *International OSA Network of Students (IONS) North America-3, Stanford, CA*	2011

Service to Optica

Faculty Advisor, *WashU SPECTRA, a student chapter of Optica and SPIE*	2021 – present
Chair, *Molecular Probes and Nanobio-Optics Technical Group*	2017 – 2019
Co-President, *Stanford Optical Society, a student chapter of OSA and SPIE* – Recipient of The Optical Society's 2014 Student Chapter Excellence Award	2013 – 2014

Service to Tau Beta Pi

Faculty Advisor, *Missouri Gamma Chapter, Washington University*	2020 – 2024
President, *California Beta Chapter, California Institute of Technology*	2007 – 2008

Service to IEEE

Vice Chair, *Caltech Branch*	2007 – 2008

Professional Society Memberships (with rank, if applicable)

Sigma Xi	2020 – present
American Association for the Advancement of Science	2017 – present
American Chemical Society	2015 – present
Optica, *Fellow*	2008 – present
SPIE	2007 – present
Tau Beta Pi	2007 – present
American Physical Society	2024
Biophysical Society	2014 – 2023
Microanalysis Society	2021
IEEE	2007 – 2020

Peer Review (Funding Agencies)

Department of Energy, *Basic Energy Sciences*

National Institutes of Health, *Molecular and Cellular Sciences and Technologies Review Branch (MCST), Enabling Bioanalytical and Imaging Technologies (EBIT)*

National Science Foundation, *Division of Electrical, Communications and Cyber Systems*

Peer Review (Journals) (with number of verified reviews)

(14) Nature Communications

(11) Optics Express

(9) Journal of the Optical Society of America A

(8) Optics Letters

(7) Applied Physics Letters

(7) Biomedical Optics Express

(4) Biophysical Journal

(4) Chemical Science

(4) Journal of Physical Chemistry Letters

(4) Nature Methods

(3) Nano Letters

(3) Nature Structural & Molecular Biology

(3) Optica

(3) Proceedings of the National Academy of Sciences

(3) Science Advances

(3) Scientific Reports

(2) Angewandte Chemie International Edition

(2) Applied Optics

(2) Biological Imaging

(2) IEEE Transactions on Computational Imaging

(2) Laser & Photonics Reviews

(2) Optics Communications

(2) The Journal of Chemical Physics

(1) ACS Nano

(1) APL Photonics	(1) Nature Nanotechnology
(1) IEEE Access	(1) Neurobiology of Disease

Community Outreach

SciFest Demonstrations, *Saint Louis Science Center*	2016 – present
Quantum 100 Celebration Panelist, *Saint Louis Science Center*	2025
Portal to the Public, *Saint Louis Science Center*	2016 – 2023
LEGO Microscope Demonstration with WashU SPECTRA, *Gateway STEM High School*	2016

Updated December 2, 2025. Adapted with gratitude from Jitin's autoCV template.