

Columbia University
Fu Foundation School of Engineering and Applied Science
Curriculum Vitae

Karen E. Kasza

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Education

Harvard University	Ph.D., Applied Physics	2010
Thesis: “Mechanics of the Actin Cytoskeleton”, Advisor: David Weitz		
Harvard University	M.A., Applied Physics	2005
University of Chicago	B.A., Physics	2003

Principal Fields of Interest

mechanics of morphogenesis, living matter, mechanobiology, developmental biology, biomechanics, soft matter

Academic Positions

Columbia University Mechanical Engineering	Associate Professor	07/2022 — present
Columbia University Mechanical Engineering	Assistant Professor	01/2016 — 06/2022
Memorial Sloan Kettering Cancer Center	Postdoctoral Fellow Mentor: Jennifer Zallen	01/2010 — 12/2015

Awards and Honors

Sloan Research Fellowship in Physics	2022-2024
Packard Fellowship for Science and Engineering	2018-2023
NSF CAREER Award	2018-2023
Columbia Provost’s Grant for Junior Faculty	2017-2018
Clare Boothe Luce Assistant Professorship	2016-2021
Burroughs Wellcome Fund Career Award at the Scientific Interface	2014-2022
Helen Hay Whitney Foundation Postdoctoral Fellowship	2011-2014
National Science Foundation Graduate Fellowship	2007-2009
National Defense Science and Engineering Fellowship	2004-2007

Awards and Honors to Trainees

1. NIH F31 Fellowship, Erika Kusaka 2026-2028
2. Selected to attend the summer AI@MBL course at the Woods Hole Marine Biological Laboratory, Erika Kusaka 2025
3. Best Poster Award, International Symposium for Stimuli Responsive Materials, Tammy Qiu 2025
4. NIH F31 Fellowship, Andrew Countryman 2025-2027
5. Selected to attend the summer Boulder School for Condensed Matter and Materials Physics, Tammy Qiu 2024
6. Selected to attend the summer Physiology Course at the Woods Hole Marine Biological Laboratory, Andrew Countryman 2023
7. NSF GRFP, Tammy Qiu 2022-2025
8. Burroughs Wellcome Fund Career Award at the Scientific Interface, Marisol Herrera-Perez 2021-2026
9. NIH F31 Fellowship, Christian Cupo 2021-2025
10. Poster Award, NSF IMECE Virtual Conference, Xun Wang 2020
11. 1st Place, ASME-BED SB3C Ph.D. Student Paper Competition, Xun Wang 2020
12. Blavatnik Doctoral Fellowship, Christian Cupo 2019-2020
13. NSF GRFP, Alicia Dagle 2019-2022
14. Finalist, ASME-BED SB3C Ph.D. Student Paper Competition, Xun Wang 2019

Publications

Authorship convention in field: senior author listed last

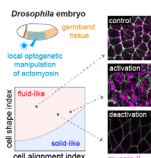
Underlined authors indicate students or postdocs supervised

Metrics

Google Scholar (retrieved: April 2026)

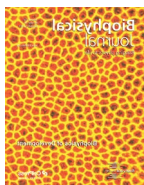
Citations: 3894; h-index: 21; i10-index: 25

Research publication highlights



PRX Life paper featured in *Physics Magazine* (2023)

<https://physics.aps.org/articles/v16/s111>



Biophysical Journal paper featured on cover (2021)

Peer Reviewed Journal Publications

Published and In press (*, corresponding author):

- J28. Kusaka EM[#], Ostvar S[#], Liu X, Wang X, Liu T, **Kasza KE***. Cell rearrangement progression along the apical-basal axis is linked with 3D epithelial tissue structure. *PRX Life* 4 (1), 013005, 2026.

- J27. Countryman AD, Doherty CA, Herrera-Perez RM, **Kasza KE***. Endogenous OptoRhoGEFs reveal biophysical principles of tissue furrowing. *Nature Communications*, 16 (1), 7665, 2025.
** featured story: <https://www.engineering.columbia.edu/about/news/tissue-origami-using-light-study-and-control-tissue-folding>
- J26. Cupo C, Allan C, Ailiani V, **Kasza KE***. Signatures of structural disorder in the developing *Drosophila* germband epithelium. *PRX Life*. 2 (4), 043004, 2024.
- J25. Wang X, Cupo C, Ostvar S, Countryman AD, **Kasza KE***. E-cadherin tunes tissue mechanical behavior before and during morphogenetic tissue flows. *Current Biology*, 34 (15), p3367-3379.e5, 2024.
- J24. Connors CQ, Mauro MS, Wiles JT, Countryman AD, Martin SL, LaCroix B, Shirasu-Hiza M, Dumont J, **Kasza KE**, Davies TR, Canman JC*. Germ fate determinants protect germ precursor cell division by reducing septin and anillin levels at the division plane. *Molecular Biology of the Cell*, 35 (7), 2024.
- J23. Matsuda M, Rozman J, Ostvar S, **Kasza KE**, Sokol S*. Mechanical control of neural plate folding by apical domain alteration. *Nature Communications*, 14 (1), 8475, 2023.
- J22. Herrera-Perez RM, Cupo C, Allan C, Dagle A, **Kasza KE***. Tissue flows are tuned by actomyosin-dependent mechanics in developing embryos. *PRX Life*, 1 (1), 013004, 2023.
**featured in *Physics Magazine*
- J21. Herrera-Perez RM, Cupo C, Allan C, Lin A, **Kasza KE***. Using optogenetics to link myosin patterns to contractile cell behaviors during convergent extension. *Biophysical Journal*, 120(19), 4214-4229, 2021.
**featured as cover image of special issue on Biophysics of Development
- J20. Arriaga M, Arteaga DN, Fafalis D, Yu M, Wang X, **Kasza KE**, Lalwani AK, Kysar JW*. Membrane curvature and connective fiber alignment in guinea pig round window membrane. *Acta Biomaterialia*, 136, 343-362, 2021.
- J19. Wang X[#], Merkel M[#], Sutter LB[#], Erdemci-Tandogan G, Manning ML, **Kasza KE***. Anisotropy links cell shapes to tissue flow during convergent extension. *Proceedings of the National Academy of Sciences USA*, 117 (24) 13541-13551, 2020. ([#], these authors contributed equally)
- J18. Herrera-Perez RM and **Kasza KE***. Manipulating the patterns of mechanical forces that shape multicellular tissues. (Review) *Physiology*, 34(6), 381-391, 2019.
- J17. **Kasza KE***, Supriatno S, Zallen JA*. Cellular defects resulting from disease-related myosin II mutations in *Drosophila*. *Proceedings of the National Academy of Sciences USA*, 116(44), 22205-22211, 2019.
- J16. Herrera-Perez RM and **Kasza KE***. Biophysical control of the cell rearrangements and cell shape changes that build epithelial tissues. (Review) *Current Opinion in Genetics & Development*, 51, 88-95, 2018.
- J15. Aksit A, Arteaga DN, Arriaga M, Wang X, Watanabe H, **Kasza KE**, Lalwani AK, Kysar JW*. In-vitro perforation of the round window membrane via direct 3-D printed microneedles. *Biomedical microdevices*. 20(2):47, 2018.
- J14. Guo M, Pegoraro AF, Mao A, Zhou EH, Arany PR, Han Y, Burnette DT, Jensen MH, **Kasza KE**, Moore JR, Mackintosh FC, Fredberg JJ, Mooney DJ, Lippincott-Schwartz J, Weitz DA*. Cell volume change through water efflux impacts cell stiffness and stem cell fate. *Proceedings of the National Academy of Sciences USA*. 114(41):E8618, 2017.

- J13. **Kasza KE**, Farrell DL, Zallen JA*. Spatiotemporal control of epithelial remodeling by regulated myosin phosphorylation. *Proceedings of the National Academy of Sciences USA*. 111(32):11732, 2014.
- J12. **Kasza KE**, Zallen JA*. Dynamics and regulation of contractile actin-myosin networks in morphogenesis. (Review) *Current Opinion in Cell Biology*. 23(1):30-8, 2011.
- J11. **Kasza KE**, Broedersz CP, Koenderink GH, Lin YC, Messner W, Millman EA, Nakamura F, Stossel TP, Mackintosh FC, Weitz DA*. Actin filament length tunes elasticity of flexibly cross-linked actin networks. *Biophysical Journal*. 99(4):1091-1100, 2010.
- J10. Yao NY, Broedersz CP, Lin YC, **Kasza KE**, Mackintosh FC, Weitz DA*. Elasticity in ionically cross-linked neurofilament networks. *Biophysical Journal*. 98(10):2147-53, 2010.
- J9. Broedersz CP, **Kasza KE**, Jawerth LM, Münster S, Weitz DA, MacKintosh FC*. Measurement of nonlinear rheology of cross-linked biopolymer gels. *Soft Matter*. 6(17):4120-4127, 2010.
- J8. **Kasza KE**, Koenderink GH, Lin YC, Broedersz CP, Messner W, Nakamura F, Stossel TP, MacKintosh FC, Weitz DA*. Nonlinear elasticity of stiff biopolymers connected by flexible linkers. *Physical Review E*. 79(4 Pt 1):041928, 2009.
- J7. **Kasza KE**, Nakamura F, Hu S, Kollmannsberger P, Bonakdar N, Fabry B, Stossel TP, Wang N, Weitz DA*. Filamin A is essential for active cell stiffening but not passive stiffening under external force. *Biophysical Journal*. 96(10):4326-35, 2009.
- J6. Huang F, Rotstein R, Fraden S, **Kasza KE**, Flynn NT. Phase behavior and rheology of attractive rod-like particles. *Soft Matter*. 5(14), 2766 – 2771, 2009.
- J5. Nakamura F, Heikkinen O, Pentikäinen OT, Osborn TM, **Kasza KE**, Weitz DA, Kupiainen O, Permi P, Kilpeläinen I, Ylännä J, Hartwig JH, Stossel TP*. Molecular Basis of Filamin A-FilGAP Interaction and Its Impairment in Congenital Disorders Associated with Filamin A Mutations. *PLoS ONE*. 4(3):e4928, 2009.
- J4. **Kasza KE**, Rowat AC, Liu J, Angelini TE, Brangwynne CP, Koenderink GH, Weitz DA*. The cell as a material. (Review) *Current Opinion in Cell Biology*. 19(1):101-107, 2008.
- J3. Liu J, Koenderink GH, **Kasza KE**, Mackintosh FC, Weitz DA*. Visualizing the strain field in semiflexible polymer networks: strain fluctuations and nonlinear rheology of F-actin gels. *Physical Review Letters*. 98(19):198304, 2007.
- J2. Kaufman LJ, Brangwynne CP, **Kasza KE**, Filippidi E, Gordon VD, Deisboeck TS, Weitz DA*. Glioma expansion in collagen I matrices: analyzing collagen concentration-dependent growth and motility patterns. *Biophysical Journal*. 89(1):635-50, 2005.
- J1. Ladavac K, **Kasza K**, Grier DG*. Sorting mesoscopic objects with periodic potential landscapes: optical fractionation. *Physical Review E*. 70(1 Pt 1):010901, 2004.

Chapters in Books

- B3. **Kasza KE** and Weitz DA. Mechanical Properties of Actin Networks, in *Comprehensive Biophysics, 1st Edition, Volume Four*, E. Egelman ed., Academic Press, 2012.
- B2. **Kasza KE**, Vader D, Köster S, Wang N, Weitz DA. Imaging techniques for measuring the materials properties of cells, in *Live Cell Imaging, 2nd Edition*, D. Spector, J. Swedlow, and R. Goldman eds., Cold Spring Harbor Laboratory Press, 2009.
- B1. Gardel ML, **Kasza KE**, Brangwynne CP, Liu J, Weitz DA. Mechanical response of cytoskeletal networks, in *Methods in Cell Biology, Biophysical Tools for Biologists, Volume Two: In Vivo Techniques*, D. J. J. Correia and H. William Detrich III eds., Academic Press, 89:487 – 519, 2008.

Ph.D. Thesis

Kasza KE, *Mechanics of the Actin Cytoskeleton*, Harvard University, 2010.

Patents

Aberration correction of optical traps. Curtis JE, Koss BA, Grier DG, Ladavac K, Kasza K. US Patent Application 0080316575, Dec. 2008

Invited Talks

University, Research Institute, and Virtual Seminar Series

- January 27, 2026. *Stress management: dissecting how epithelial tissues flow and fold inside developing embryos*. Department of Molecular Biology and Biochemistry Seminar, Rutgers University, Piscataway, NJ.
- October 2, 2025. *Stress management: dissecting how epithelial tissues flow and fold inside developing embryos*. Department of Stem Cell Biology & Regenerative Medicine Seminar, Mount Sinai, New York, NY.
- June 25, 2025. *Stress management: dissecting how epithelial tissues flow and fold inside developing embryos*. Theory of Living Matter Seminar Series. Virtual.
- November 11, 2024. *Stress management: dissecting how epithelial tissues flow and fold inside developing embryos*. Physics Colloquium and Krumhansl Lecture, Cornell University, Ithaca, NY.
- October 22, 2024. *Stress management: dissecting how epithelial tissues flow and fold inside developing embryos*. Center for Studies in Physics and Biology Seminar Series, Rockefeller University, New York, NY.
- September 26, 2024. *Stress management: dissecting how epithelial tissues flow and fold inside developing embryos*. Quantitative and Computational Developmental Biology Cluster Annual Retreat, Keynote talk, North Carolina State University, Raleigh, NC.
- June 21, 2024. *Stress management: dissecting how epithelial tissues flow and fold inside developing embryos*. Biological Physics & Physical Biology Seminar Series. Virtual.
- April 11, 2024. *Stress management: dissecting how epithelial tissues flow and fold inside developing embryos*. Physics Colloquium. New York University, New York, NY.
- November 2, 2023. *Stress management: cell packings and tissue flows in developing embryos*. Physics Colloquium. Vanderbilt University, Nashville, TN.
- May 18, 2023. *Stress management: cell packings and tissue flows in developing embryos*. Biomechanical Engineering Seminar Series. Stanford University, Stanford, CA.
- April 13, 2023. *Stress management: cell packings and tissue flows in developing embryos*. Thursday Series, Duke University, Durham, NC.
- February 28, 2023. *Stress management: cell packings and tissue flows in developing embryos*. Levich Seminar Series, City College of New York, New York, NY.
- November 17, 2022. *Cell packings and tissue flows in developing embryos*. Dynamic Cellular Interfaces Seminar Series. WWU Munster, Munster, Germany.
- November 15, 2022. *Stress management: cell packings and tissue flows in developing embryos*. Mechanical Engineering and Applied Mechanics Colloquium. University of Pennsylvania, Philadelphia, PA.

- October 14, 2022. *Stress management: cell packings and tissue flows in developing embryos*. QBio Institute Seminar, Yale University, New Haven, CT.
- April 20, 2022. *Biophysical mechanisms controlling tissue flows during development*. Department of Biology Seminar Series. Wesleyan University, Middletown, CT.
- October 27, 2021. *Biophysical mechanisms controlling tissue flows during development*. Department of Chemical and Biological Engineering Seminar Series. Princeton University, Princeton, NJ.
- September 29, 2021. *Biophysical mechanisms controlling tissue flows during development*. Department of Mechanical Engineering Seminar Series. Texas A&M University, College Station, TX.
- May 24, 2021. *Biophysical mechanisms controlling tissue flows during development*. Department of Mechanical Engineering Seminar Series. Northwestern University, Evanston, IL.
- May 13, 2021. *Biophysical mechanisms controlling tissue flows during development*. Developmental Mechanics Virtual Seminar Series.
- May 3, 2021. *Biophysical mechanisms controlling tissue flows during development*. Biological Sciences Seminar. Columbia University, New York, NY.
- April 2, 2021. *Biophysical mechanisms controlling tissue flows during development*. Mechanical and Aerospace Engineering Seminar Series. Syracuse University, Syracuse, NY.
- January 14, 2021. *Biophysical mechanisms controlling tissue flows during development*. Virtual Gastrulation Zoom Talks.
- October 27, 2020. *Biophysical mechanisms controlling tissue flows during development*. Cell Migration Seminar Series.
- October 16, 2020. *Biophysical mechanisms controlling tissue flows during development*. Department of Cell and Systems Biology Seminar Series. University of Toronto, Toronto, Canada.
- February 20, 2020. *Building an embryo: mechanics of morphogenesis*. BioMed Club Seminar Series. Baruch College, New York, NY.
- November 21, 2019. *Morphogenesis across length scales: forces organizing cell behaviors in tissues*. Department of Biological Sciences Seminar Series. University of Arkansas, Fayetteville, AR.
- November 14, 2019. *Understanding and controlling the mechanical behavior of living tissues inside developing embryos*. Physics Colloquium, Lehigh University, Bethlehem, PA.
- November 12, 2019. *Building the embryo: mechanisms controlling tissue flows during development*. Center for Studies in Physics and Biology, The Rockefeller University, New York, NY.
- March 28, 2019. *Controlling where and when mechanical forces are generated during tissue morphogenesis*. Department of Mechanical Engineering Colloquium Series, City College of New York, New York, NY.
- February 22, 2019. *Mechanics of morphogenesis: spatiotemporal control of the forces that shape epithelial tissues*. Mechanics Seminar Series, UW-Madison, Madison, WI.
- September 19, 2018. *Controlling where and when forces are generated during tissue morphogenesis*. Mechanics: Modeling, Experimentation, Computation (MMEC) Seminar, MIT, Cambridge, MA.

- September 12, 2016, *The forces that shape living tissues: building a fruit fly embryo*, Center for Neural Engineering and Computation Seminar Series, Columbia University. New York, NY.
- July 27, 2015, *Spatiotemporal control of the mechanical forces that shape tissues and embryos*, National Heart, Lung, and Blood Institute. National Institutes of Health. Bethesda, MD.
- April 9, 2015, *Spatiotemporal control of the forces that shape tissues*, Department of Biomedical Engineering Seminar, Cornell University. Ithaca, NY.
- March 20, 2015, *Spatiotemporal control of the forces that shape tissues*, Department of Biomedical Engineering Seminar, Northwestern University. Evanston, IL.
- March 17, 2015, *Spatiotemporal control of the forces that shape tissues*, Department of Biology Seminar, McGill University. Montreal, Canada.
- March 9, 2015, *Spatiotemporal control of the forces that shape tissues*, Department of Physics Seminar, University of Colorado. Boulder, CO.
- March 5, 2015, *Spatiotemporal control of the forces that drive cell rearrangements within multicellular tissues*, American Physical Society, Annual March Meeting. San Antonio, TX.
- March 2, 2015, *Spatiotemporal control of the forces that shape tissues*, Department of Mechanical Engineering Seminar, University of California. San Diego, CA.
- February 26, 2015, *Spatiotemporal control of the forces that shape tissues*, Department of Biomedical Engineering Seminar, University of Michigan. Ann Arbor, MI.
- February 19, 2015, *Spatiotemporal control of the forces that shape tissues*, Department of Mechanical Engineering Seminar, Columbia University. New York, NY.
- February 17, 2015, *Spatiotemporal control of the forces that shape tissues*, Department of Biomedical Engineering Seminar, Yale University. New Haven, CT.
- February 10, 2015, *Spatiotemporal control of the forces that shape tissues*, Department of Physics Colloquium, Syracuse University. Syracuse, NY.
- February 5, 2015, *Spatiotemporal control of the forces that shape tissues*, Department of Physics Colloquium, Brandeis University. Waltham, MA.
- February 2, 2015, *Spatiotemporal control of the forces that shape tissues*, Department of Biomedical Engineering Seminar, Boston University. Boston, MA.
- January 19, 2015, *Spatiotemporal control of the forces that shape tissues*, Department of Biology Seminar, Dartmouth College. Hanover, NH.
- January 12, 2015, *Spatiotemporal control of the forces that shape tissues*, Department of Developmental Biology Seminar, Washington University in St. Louis. St. Louis, MO.
- November 7, 2014, *Spatiotemporal control of the forces that shape tissues*, Condensed Matter & Biological Physics Seminar. Syracuse University. Syracuse, NY.
- April 7, 2014, *Spatiotemporal control of the forces that shape tissues*, Biophysics Seminar Series. Princeton University. Princeton, NJ.
- March 20, 2013, *Myosin II Dynamics during Embryo Morphogenesis*, American Physical Society, Annual March Meeting. Baltimore, MD.
- April 20, 2009, *Polymer physics of a reconstituted cell cytoskeleton*, Physics Department Seminar. Mount Holyoke College. Mt. Holyoke, MA.
- November 3, 2006, *Mechanics of Crosslinked Actin Networks and the Cell*, Mechanical Science and Engineering Department, University of Illinois at Urbana-Champaign, Bio-Interest Group Seminar.

Conferences, Workshops, Symposia

- March 15-20, 2026. *3D cell rearrangement progression and tissue structure during epithelial morphogenesis*. American Physical Society Annual March Meeting, Invited PRX Life Symposium. Denver, CO.
- March 4-8, 2024. *Stress management: dissecting how epithelial tissues flow and fold inside developing embryos*. American Physical Society Annual March Meeting, Invited session on Exploring New Frontiers: Measuring and Manipulating Mechanical Forces in Development and Disease. Minneapolis, MN.
- September 5-8, 2023. *Stress management: cell packings and tissue flows in developing embryos*. Packard Fellows 35th Anniversary Reunion Meeting, Colorado Springs, CO.
- August 13-18, 2023. *Stress management: cell packings and tissue flows in developing embryos*. Soft Condensed Matter Physics Gordon Research Conference, “The Soft and Sustainable Building Blocks of Living and Active Systems”, Colby-Sawyer College, New London, NH.
- February 23, 2023. *Stress management: cell packings and tissue flows in developing embryos*. Engineering in Medicine Symposium, Columbia University, New York, NY.
- December 2, 2022. *Stress management: cell packings and tissue flows in developing embryos*. New England Complex Fluids Workshop. Harvard University, Cambridge, MA.
- July 17-22, 2022. *Cell packings and tissue flows in developing embryos*. Signaling by Adhesion Receptors Gordon Research Conference, “Adhesion Across Scales: From Molecules to Morphogenesis”, Southern New Hampshire University, Manchester, NH.
- July 10-14, 2022. *Cell packings and tissue flows in developing embryos*. World Congress of Biomechanics. Taipei/Virtual.
- May 9-12, 2022. *Cell packings and tissue flows in developing embryos*. Workshop on Geometry, Topology, and Symmetry in Soft and Living Matter. Simons Center for Geometry and Physics, Stony Brook University, NY.
- October 13-15, 2019. *Epithelial tissue mechanics and morphogenesis during Drosophila development*. Society of Engineering Science Annual Technical Meeting, St. Louis, MO.
- September 4-7, 2019. *Understanding and controlling the forces that build multicellular tissue structures*. Annual Packard Fellows Meeting, Monterey, CA.
- August 14-16, 2019. *Spatiotemporal control of the mechanical forces that build and shape tissues during morphogenesis*. 2019 CMBBE, 16th International Symposium on Computer Methods on Biomechanics and Biomedical Engineering and 4th Conference on Imaging and Visualization, New York, NY.
- June 23-28, 2019. *Mechanical cues coordinating cell behaviors during morphogenesis*. 13th International Conference on Pathways, Networks, and Systems Medicine, Aegean Conferences, Chania, Crete, Greece.
- October 23, 2018, *Mechanics of morphogenesis: spatiotemporal control of the forces that shape epithelial tissues*. 2nd International Symposium on Mechanomedicine: In Memory of Christopher R. Jacobs, Columbia University, New York, NY.
- August 2-4, 2018, *Understanding and controlling where and when forces are generated during tissue morphogenesis*, Multi-Cellular Engineered Living Systems (M-CELS) Workshop, Q Center, St. Charles, IL.

- February 21-23, 2018, *Physical forces coordinating epithelial cell behavior during morphogenesis*, Mechanics in Morphogenesis Workshop, Princeton Center for Theoretical Science, Princeton University, Princeton, NJ.
- October 17-19, 2017, *Physical forces coordinating epithelial cell behaviors during morphogenesis*, Soft Matter Symposium on Biomedicine & Mechanics in Tissues, Cells, and their Microenvironments, University of Florida, Gainesville, FL.
- March 16, 2017, *Force generation within tissues during development*, American Physical Society, Annual March Meeting. New Orleans, LA.
- December 5, 2016, *Multicellular tissue dynamics during morphogenesis*, Workshop on Adaptive Network Dynamics. UC Santa Barbara. Santa Barbara, CA.
- July 16, 2016, *Translating molecular-level force generation into tissue-level morphogenesis*, Developmental Mechanics Workshop, The Allied Genetics Conference. Orlando, FL.
- March 28, 2016, *The forces that shape living tissues: building a fruit fly embryo*, Physics of Development and Disease Workshop, Aspen Center for Physics. Aspen, CO.
- January 15, 2016, *Active forces that shape living tissues: building a fruit fly embryo*, Northeast Complex Fluids and Soft Matter Workshop, NYU Tandon School of Engineering. New York, NY.
- December 16, 2014, *Spatiotemporal control of the forces that shape tissues*, Biomedical Engineering/Biophysics/ Physics Stadtman Symposium. National Institutes of Health. Bethesda, MD.
- December 14, 2013, *Control of the myosin-generated forces that shape tissues by genetically altered myosin activity*, American Society for Cell Biology, Annual Meeting. New Orleans, LA.

Contributed Talks

Papers and Presentations at Conferences

- C62. Qiu T, Countryman AD, Gunz S, Wang B, Dumitrascu B, **Kasza KE**. *Bilateral symmetry and robustness during axis elongation in Drosophila*. Conference presentation at the American Physical Society Annual March Meeting. Denver, CO, March 2026.
- C61. Li X, Kusaka E, **Kasza KE**, Banerjee S. *Tension-driven topological transitions in a 3D Epithelial Vertex Model*. Conference presentation at the American Physical Society Annual March Meeting. Denver, CO, March 2026.
- C60. Kusaka E, Ostvar S, Liu X, Wang X, Liu T, Countryman A, Qiu T, **Kasza KE**. *Lateral myosin II coordinates cell rearrangement progression in 3D during epithelial morphogenesis*. Poster presentation at ASCB Cell Bio 2025, Philadelphia, PA, December 2025.
- C59. Qiu T, Scharrer L, Vitelli V, **Kasza KE**. *Active bacterial nematogels: towards programmable shape-actuating living materials*. Poster presentation at the International Symposium for Stimuli Responsive Materials, October 2025. **Best Poster Award
- C58. **Kasza KE**. *Stress Management: Dissecting how Epithelial Tissues Flow and Fold Inside Developing Embryos*. Conference presentation at the SEM Annual Conference on Experimental and Applied Mechanics, Milwaukee, WI, June 2025.
- C57. Countryman AD, Doherty CA, Herrera-Perez RM, Shvartsman SY, **Kasza KE**. *Endogenous OptoRhoGEFs reveal biophysical principles of tissue furrowing*. Platform presentation in

- the Patterning, Morphogenesis, and Organogenesis session at the GSA Annual Drosophila Research Conference, San Diego, CA, April 2025.
- C57. Countryman AD, Doherty CA, Herrera-Perez RM, Shvartsman SY, **Kasza KE**. *Quantitatively Directing Epithelial Morphogenesis with Endogenous Opto-Rhogefs*. Poster presentation at the 4th Optogenetic Technologies and Applications Conference, Boston, MA, September 2024.
- C56. Ostvar S, Liu X, Lesko A, Sutherland A, **Kasza KE**. *Multiscale geometry and dynamics of epithelial cell packings in the mouse neuroectoderm*. Poster presentation at Santa Cruz Developmental Biology Meeting, Santa Cruz, CA, August 2024.
- C55. **Kasza KE**. *Tissue Structure and Mechanics Vary Across the Surface of the Developing Fly Embryo*. Conference presentation at the SEM Annual Conference on Experimental and Applied Mechanics, Vancouver, WA, June 2024.
- C54. Ostvar S, Liu X, Lesko A, Dumitrascu B, Sutherland A, **Kasza KE**. *Lateral cell-cell contact remodeling in the mouse neural plate epithelium*. Conference presentation at American Physical Society March Meeting, Minneapolis, MN, March 2024.
- C53. Cupo C, Allan C, Ailiani V, Cupo A, Ostvar S, **Kasza KE**. *Mechanical signatures of structural disorder in the Drosophila germband epithelium*. Conference presentation at American Physical Society March Meeting, Minneapolis, MN, March 2024.
- C52. Countryman AD, Herrera-Perez RM, Doherty CA, Shvartsman SY, **Kasza KE**. *Optogenetic control of endogenous Rho signaling reveals biophysical principles of tissue morphogenesis*. Minisymposium presentation, Cell Bio 2023, Boston, MA, December 2023.
- C51. Kusaka E, Ostvar S, Wang X, **Kasza KE**. *Tissue structure and mechanics vary along the apical-basal axis in the Drosophila germband epithelium*. Subgroup presentation at Cell Bio 2023, Boston, MA, December 2023.
- C50. Ostvar S, Liu X, Lesko A, Sutherland A, **Kasza KE**. *Shaping the developing mouse neuroepithelium from the cell to the tissue scales*. Poster presentation at Cell Bio 2023, Boston, MA, December 2023.
- C49. Cupo C, Allan C, Ailiani V, Cupo A, Ostvar S, **Kasza KE**. *Shaping the mechanics of developing epithelia from the cellular to tissue scales in the Drosophila embryo*. Poster presentation at Cell Bio 2023, Boston, MA, December 2023.
- C48. Qiu T, Countryman AD, **Kasza KE**. *Using optogenetics to disentangle how mechanical cues coordinate cell behaviors during axis elongation in Drosophila*. Poster presentation at Cell Bio 2022, Boston, MA, December 2023.
- C47. **Kasza KE**. *Signatures of Cell Packings and Myosin Network Architecture Reveal Transitions in Embryonic Tissue Mechanics*. Conference presentation at the SEM Annual Conference on Experimental and Applied Mechanics, Orlando, FL, June 6, 2023.
- C46. Ostvar S, Kusaka E, Wang X, Lesko A, Sutherland A, **Kasza KE**. *3D cell packing dynamics in converging and extending epithelial sheets*. Conference presentation at American Physical Society March Meeting, Las Vegas, NV, March 2023.
- C45. Cupo C, Allan C, Ailiani V, Ostvar S, **Kasza KE**. *Cell packings and myosin network architectures underlie local tissue mechanical behaviors in the fly embryo*. Conference presentation at American Physical Society March Meeting, Las Vegas, NV, March 2023.
- C44. Countryman AD, Puri MS, Herrera-Perez M, Doherty CA, Shvartsman SY, **Kasza KE**, *Optogenetic reconstitution of apicobasal shortening in early embryonic epithelia*. Poster presentation at 64th Annual Drosophila Research Conference, Chicago, IL, March, 2023.

- C43. Countryman A, Doherty C, Shvartsman S, **Kasza KE**, *Optogenetic control of endogenous Rho/Rho-kinase signaling in the Drosophila germband*. Poster presentation at Cell Bio 2022, Washington DC, December 2022.
- C42. Cupo C, Allan C, **Kasza KE**, *Spatiotemporal Dynamics of Epithelial Cell Packings and Tissue Mechanics During Morphogenesis*. Conference presentation at NCS17: Northeast Complex Fluids and Soft Matter Workshop, Stevens Institute of Technology, Hoboken, NJ, June 24, 2022.
- C41. Cupo C, Allan C, Pomposelli A, **Kasza KE**, *Spatiotemporal Dynamics of Epithelial Cell Packings and Tissue Mechanics During Morphogenesis*. Conference paper and presentation at the SB3C Summer Biomechanics, Bioengineering, and Biotransport Conference, Eastern Shore, MD, June 21, 2022.
- C40. Herrera-Perez RM, Cupo C, **Kasza KE**. *Optogenetic control of tissue flows in developing embryos*. Conference presentation at the SEM Annual Conference on Experimental and Applied Mechanics, Pittsburgh, PA, June 14, 2022.
- C39. Ostvar S, Lesko, A, Cupo C, Sutherland A, **Kasza KE**. *Cell packing structure in converging and extending epithelial tissues near rigidity transitions*. Poster presentation at the Simons Workshop on Geometry, Topology, and Symmetry in Soft and Living Matter. Simons Center for Geometry and Physics, Stony Brook University, NY, May 20, 2022.
- C38. Herrera-Perez RM, Cupo C, **Kasza KE**. *Exploring cell mechanisms of tissue fluidity by optogenetic manipulation of Rho activity*. Conference presentation at the ASCB/EMBO Cell Bio Annual Meeting, Virtual Meeting, December 8, 2021.
- C37. **Kasza KE**, *Linking cell shapes to tissue flows during morphogenesis*. Conference presentation at the SEM Annual Conference on Experimental and Applied Mechanics, Virtual Meeting, June 17, 2021.
- C36. Cupo C, Allan C, Lin A, Herrera-Perez RM, **Kasza KE**, *Myosin network architecture during convergent extension*. Conference paper and presentation at the Virtual SB3C Summer Biomechanics, Bioengineering, and Biotransport Conference, June 16, 2021.
- C35. Wang X, Cupo C, Ostvar S, **Kasza KE**, *Cell-cell adhesion modulates tissue fluidity during epithelial morphogenesis*. Conference paper and presentation at the Virtual SB3C Summer Biomechanics, Bioengineering, and Biotransport Conference, June 16, 2021.
- C34. Cupo C, Allan C, Lin C, Herrera-Perez RM, **Kasza KE**, *Myosin network architecture and tissue fluidity during convergent extension*. Conference presentation at the 2021 Workshop on Multicellular Engineered Living Systems, June 1-3, 2021.
- C33. Herrera-Perez RM, Cupo C, **Kasza KE**, *Dissecting cell mechanisms of tissue fluidity using optogenetic manipulation of Rho activity*. Conference presentation at the Genetics Society of America Annual *Drosophila* Research Conference, Virtual, March 23 – April 1, 2021.
- C32. Wang X*, Christian Cupo, and **Kasza KE**, *The Role of Cell-Cell Adhesion in Epithelial Tissue Mechanics and Morphogenesis*, Poster presentation at the NSF IMECE Virtual Conference, November 16-19, 2020. (*, Poster Award)
- C31. **Kasza KE**, *Linking cell shapes to tissue flows during morphogenesis*, Conference presentation at “From Molecules to Organs: The Mechanobiology of Morphogenesis”, Mechanobiology Institute, National University of Singapore, October 28-30, 2020.
- C30. Wang X and **Kasza KE**, *Linking cell shapes to tissue mechanics during epithelial morphogenesis*, Conference presentation at the SEM Virtual Annual Conference on Experimental and Applied Mechanics, September 14-17, 2020.

- C29. **Kasza KE**, *Understanding and controlling the forces that build multicellular tissue structures*. Annual Packard Fellows Meeting, Virtual Meeting, September 9-12, 2020.
- C28. **Wang X***, **Cupo C**, and **Kasza KE**, *Cell-Cell Adhesion Links Cell Rearrangement and Cell Shape During Epithelial Morphogenesis*, Conference paper and presentation in the Ph.D. Student Paper Competition at the Virtual SB3C Summer Biomechanics, Bioengineering, and Biotransport Conference, June 17-20, 2020. (*, awarded 1st Place)
- C27. **Herrera-Perez RM** and **Kasza KE**, *Spatiotemporal Control of Body Axis Elongation by Optogenetic Manipulation of Actomyosin Contractility*, Conference paper and presentation at the Virtual SB3C Summer Biomechanics, Bioengineering, and Biotransport Conference, June 17-20, 2020.
- C26. **Wang X** and **Kasza KE**, *Cell-Cell Adhesion Links Cell Shape and Rearrangement Speed During Drosophila Axis Elongation*, Poster presentation at the American Society for Cell Biology Annual Meeting, Washington, DC, December 7-11, 2019.
- C25. **Herrera-Perez RM** and **Kasza KE**, *Optogenetic Control of RhoGTPase Activity Reveals Dynamics of Contractile and Adhesive Machinery During Epithelial Morphogenesis*, Poster presentation at the American Society for Cell Biology Annual Meeting, Washington, DC, December 7-11, 2019.
- C24. **Wang X** and **Kasza KE**, *Systematic modulation of cell-cell adhesion in vivo modulates epithelial tissue mechanics and remodeling*, Conference paper and presentation in the Ph.D. Student Paper Competition at the SB3C Summer Biomechanics, Bioengineering, and Biotransport Conference, Seven Spring, PA, USA, June 25-28, 2019.
- C23. **Wang X** and **Kasza KE**, *Cell-cell adhesion in tissue mechanics and morphogenesis*, Conference presentation at the SEM Annual Conference on Experimental and Applied Mechanics, Reno, Nevada USA, June 3-6, 2019.
- C22. **Wang X** and **Kasza KE**, *Cell-cell adhesion in tissue mechanics and morphogenesis*, Conference presentation at the American Physical Society March Meeting, Boston, MA, March 4-8, 2019.
- C21. **Herrera-Perez RM** and **Kasza KE**, *Optogenetic control of contractile forces during Drosophila morphogenesis*, Conference presentation at the American Physical Society March Meeting, Boston, MA, March 4-8, 2019.
- C20. **Zhang R** and **Kasza KE**, *Coordination of cell-cell adhesion and contractility during tissue remodeling*. Conference presentation at the 10th Northeast Complex Fluids and Soft Matter Workshop, Rutgers University, New Brunswick, NJ, January 23, 2019.
- C19. **Wang X** and **Kasza KE**, *The role of cell-cell adhesion in tissue mechanics and morphogenesis*. Conference presentation at the 10th Northeast Complex Fluids and Soft Matter Workshop, Rutgers University, New Brunswick, NJ, January 23, 2019.
- C18. **Wang X** and **Kasza KE**, *The role of cell-cell adhesion in tissue mechanics and morphogenesis*. Conference presentation at the 77th New England Complex Fluids Meeting, Harvard University, Cambridge, MA, November 30, 2018.
- C17. **Wang X** and **Kasza KE**, *Systematically modulating cell-cell adhesion in vivo reveals mechanics of epithelial tissue morphogenesis*. Conference presentation at the 8th World Congress of Biomechanics, Dublin, Ireland, July 8-12, 2018.
- C16. **Kasza KE** and **Herrera-Perez RM**, *Controlling where and when forces are generated during tissue morphogenesis*. Conference presentation at the 8th World Congress of Biomechanics, Dublin, Ireland, July 8-12, 2018.

- C15. **Kasza KE** and Herrera-Perez RM, *Controlling where and when forces are generated during tissue morphogenesis*. Conference presentation at the SEM Annual Conference on Experimental and Applied Mechanics, Greenville, South Carolina USA, June 4-7, 2018.
- C14. Wang X and **Kasza KE**, *Cell-cell adhesion in tissue mechanics*. Conference presentation at the 9th Northeast Complex Fluids and Soft Matter Meeting, University of Pennsylvania, Philadelphia, PA, May 25, 2018.
- C13. Herrera-Perez RM and **Kasza KE**, *Optogenetic control of cell contractility during epithelial morphogenesis in Drosophila*. Conference presentation at the Genetics Society of America Annual *Drosophila* Research Conference, Philadelphia, PA, April 11-15, 2018.
- C12. Wang X and **Kasza KE**, *The role of cell-cell adhesion in epithelial tissue remodeling*. Conference presentation at the 8th Northeast Complex Fluids and Soft Matter Meeting, Columbia University, New York, NY, January 12, 2018.
- C11. Wang X and **Kasza KE**, *Systematically modulating cell-cell adhesion reveals cellular mechanisms of epithelial remodeling in Drosophila*, Conference poster presentation at the American Society for Cell Biology Annual Meeting, Philadelphia, PA, December 1-5, 2017.
- C10. Herrera-Perez RM and **Kasza KE**, *Spatiotemporal control of contractile forces in Drosophila using optogenetic tools*, Conference poster presentation at the Gordon Research Conference on Motile and Contractile Systems, New London, NH, July 30 - August 4, 2017.
- C9. **Kasza KE**, *Force Generation within Tissues During Embryo Development*, Conference presentation at the SEM Annual Conference on Experimental and Applied Mechanics, Indianapolis, IN, June 12-15, 2017.
- C8. Wang X and **Kasza KE**, *Mechanics and Morphogenesis of Epithelial Tissues*, Conference poster presentation at the Northeast Complex Fluids and Soft Matter Workshop (NCS7), Princeton, NJ, May 26, 2017.
- C7. **Kasza KE**, Farrel DL, and Zallen JA, *Myosin II regulation and activity provide spatial and temporal control of the forces that shape tissues*, Conference poster presentation at the American Society for Cell Biology, Annual Meeting. Philadelphia, PA, December 6-8, 2014.
- C6. **Kasza KE** and Zallen JA, *Mechanical regulation of myosin II in morphogenesis*, Conference poster presentation at the Evolution of Colloidal Matter Conference, Center for Soft Matter Research, New York University, June 27-29, 2013.
- C5. **Kasza KE** and Zallen JA, *Mechanical regulation of myosin II in morphogenesis*, Conference poster presentation at the Morphogenesis and Dynamics of Multicellular Systems Workshop, EMBL Heidelberg, Germany, September 7-9, 2012.
- C4. **Kasza KE** and Zallen JA, *Mechanical regulation of motor proteins in animal morphogenesis*, Conference poster presentation at the 6th Gotham-Metro Condensed Matter Meeting, The New York Academy of Sciences, November 11, 2011.
- C3. **Kasza KE** and Zallen JA, *Mechanical regulation of myosin II in morphogenesis*, Conference poster presentation at Mathematical Biology of the Cell: Cytoskeleton and Motility Workshop at the Banff International Research Station, Banff, Canada, July 31-Aug 5, 2011.
- C2. **Kasza KE** and Weitz DA, *Actin-Filamin Networks and Cell Mechanics*, Conference presentation at the American Physical Society March Meeting, Denver, CO, March 5-9, 2007.
- C1. **Kasza KE** and Weitz DA, *The actin cross-linker filamin plays a key role in the nonlinear mechanical response of living cells*, Conference presentation at the 5th World Congress of Biomechanics, Munich, Germany, July 29-Aug 4, 2006.

Current Research Group – Kasza Living Materials Lab

1. Andrew Countryman, Ph.D. Candidate September 2020 - present
Project: *Endogenous OptoRhoGEFs to study epithelial furrowing*
**NIH F31 Fellow
2. Erika Kusaka, Ph.D. Student September 2021 – present
Project: *Tissue structure and dynamics along the apical-basal axis*
**NIH F31 Fellow
3. Tammy Qiu, Ph.D. Student September 2022 – present
Project: *Morphogenesis in natural and engineered living materials*
**NSF GRFP Fellow
4. Nickia Muraskin, Ph.D. Student September 2023 – present
Project: *Mechanical properties of developing epithelia*
5. Siroun Johnson, undergraduate researcher September 2025 – present
Project: *Leveraging bacterial self-organization for building cellulose-based materials*
6. Hyunwoo Lee, undergraduate researcher September 2025 – present
Project: *Cell rearrangement dynamics in epithelia*

Recent Alumni – Kasza Living Materials Lab

1. Sassan Ostvar, Postdoctoral Researcher January 2021 – February 2025
Project: *Cellular geometries and tissue morphogenesis in three dimensions*
2. Christian Cupo, Ph.D. Candidate January 2020 – December 2024
Project: *Measuring and manipulating the mechanics of epithelial cells and tissues*
**Blavatnik Fellow, NIH F31 Fellow
Defended: December 13, 2024
3. R. Marisol Herrera-Perez, Postdoctoral Fellow August 2016 – June 2022
Project: *Optogenetic control of tissue mechanics in vivo*
**Burroughs Wellcome Fund Career Award at the Scientific Interface Fellow
**Began tenure-track faculty position at University of Rochester, July 2022
4. Xun Wang, Ph.D. May 2016 – October 2021
Project: *Mechanics and morphogenesis of epithelial tissues*
Defended: August 10, 2021

Theses Supervised

Doctoral Theses, Supervisor

1. Xun Wang (ME), Thesis title: *Mechanics and morphogenesis of epithelial tissues*, completed, Thesis Defense Date: August 10, 2021
2. Christian Cupo (ME), Thesis title: *Measuring and manipulating the mechanics of epithelial cells and tissues*, Co-advisor: Jim Hone, Thesis Defense Date: December 13, 2024
3. Andrew Countryman (BME), Proposed thesis title: *Endogenous OptoRhoGEFs to study tissue furrowing*, DBME co-advisor: Lance Kam
4. Erika Kusaka (BME), Proposed thesis title: *Tissue structure and dynamics along the apical-basal axis*, DBME co-advisor: Nandan Nerurkar
5. Tammy Qiu (BME), Proposed thesis title: *Morphogenesis in natural and engineered living materials*, DBME co-advisor: Henry Hess
6. Nickia Muraskin (ME), Proposed thesis title: *Mechanical properties of developing epithelia*

Doctoral Theses, As Reader (On Committee):

1. Panagiotis Oikonomou, Biomedical Engineering, advisor: Nandan Nerurkar, in progress
2. Tianyi Zhu, Chemical Engineering, advisor: Ben O'Shaughnessy, in progress
3. Karen Yu, Physics, advisor: Laura Kaufman, *Nuclei-Driven Jamming Transitions in Confluent Cellular Systems*, January 2026
4. Olivia Powell, Biomedical Engineering, advisor: Nandan Nerurkar, *Biomechanical regulation of nascent avian foregut growth and elongation*, May 2025
5. Kimberly Kroupa, Mechanical Engineering, advisor: Gerard Ateshian, *Basic Science of Cartilage Collagen Damage and Fatigue Wear Resistance*, April 2025
6. Hongkang Zhu, Chemical Engineering, advisor: Ben O'Shaughnessy, *Mathematical Modeling and Data-Driven Analysis of Embryo Development*, December 2024
7. Erin Louwagie, Mechanical Engineering, advisor: Kristin Myers, *Development and Implementation of a Parametric Patient-Specific Computational Approach to Study Pregnancy Biomechanics*, May 2024
8. Emma Xu, Mechanical Engineering, advisor: James Schuck, *Thulium-doped Avalanching Nanoparticles*, April 2024
9. Caroline Connors, Pathology and Molecular Medicine, advisor: Julie Canman, *Germ fate determinants protect germ precursor cell division by restricting septin and anillin levels at the division plane*, March 2024
10. Philippe Wyder, Mechanical Engineering, advisor: Hod Lipson, *Metabolic Machines*, August 2023
11. Courtney Petersen, Mechanical Engineering, advisor: Gerard Ateshian, proposal committee, completed
12. Kechun Wen, Mechanical Engineering, advisor: Qiao Lin, *Microfluidic isolation and characterization of aptamers for biomolecular and cellular targets*, February 2023
13. Nicole Lee, Mechanical Engineering, advisor: Kristin Myers, *Identification of the mechanical role of extracellular matrix components in cervical remodeling*, August 2022
14. Aykut Aksit, Mechanical Engineering, advisor: Jeff Kysar, *Microneedles for the Inner Ear*, August 2022
15. Smiti Bhattacharya, Mechanical Engineering, advisor: James Hone, *A versatile biomimetic microfabricated platform for multicellular drug studies*, July 2022
16. Changhwan Lee, Mechanical Engineering, advisor: James Schuck, *Photon avalanching in $Tm^{3+}:NaYF_4$ nanocrystals and its applications*, January 2022
17. Alex Devanny, Chemistry, advisor: Laura Kaufman, *Spatial Organization and Segregation of Cells in Breast Cancer*, August 2021
18. Jay Shim, Mechanical Engineering, advisor: Gerard Ateshian, *A Multiphasic Fluid-Structure Interaction Formulation Based on Mixture Theory and Its Finite Element Implementation in FEBio*, April 2021
19. Sophia Hirsh, CUIMC, Genetics and Development, advisor: Julie Canman, *Spatial requirements in the molecular regulation of cytokinesis*, November 2020
20. Christopher DiMarco, Mechanical Engineering, advisor: Jeffrey Kysar and James Hone, *Mechanical behavior of polycrystalline graphene*, December 2019
21. Andrea Westervelt, Mechanical Engineering, advisor: Kristin Myers, *Biomechanical Simulations of Human Pregnancy: Patient-Specific Finite Element Modeling*, June 2019
22. Junyi Shang, Mechanical Engineering, advisor: Qiao Lin, *Experimentation and Multiphysical Modeling of Bioanalytical Microdevices*, February 2019

23. Braden Czapla, Mechanical Engineering, advisor: Arvind Narayanaswamy, *Near-Field Radiative Heat Transfer in Linear Chains of Multilayered Spheres*, December 2018
24. Tim Olsen, Mechanical Engineering, advisor: Qiao Lin, *Microfluidic Selection of Aptamers towards Applications in Precision Medicine*, September 2018
25. Weiyang (Susie) Jin, Biomedical Engineering, advisor: Lance Kam, *Multidimensional T Cell Mechanosensing*, May 2018
26. Chieh (Jay) Hou, Mechanical Engineering, advisor: Gerard Ateshian, *Implementation and Validation of Finite Element Framework for Passive and Active Membrane Transport in Deformable Multiphasic Models of Biological Tissues and Cells*, April 2018
27. Frank Yao, Mechanical Engineering, advisor: Kristin Myers, *Mechanical properties and collagen fiber orientation and dispersion in the cervix of pregnant and non-pregnant women*, April 2017
28. Haogang Cai, Mechanical Engineering, advisor: Shalom Wind, *Biomimetic nano-architectures for the study of T cell activation with single-molecule control*, September 2016
29. Junqiang Hu, Mechanical Engineering, advisor: James Hone, *Nanostructured Platforms for Biological Study*, September 2016
30. Mufeng Hu, Mechanical Engineering, advisor: James Hone, *Biomaterial-based cell culture platform for podocyte phenotype study with shape and substrate rigidity control*, July 2016
31. Michael Fernandez, Mechanical Engineering, advisor: Kristin Myers, *The biomechanics of pregnancy: Simulating pregnancy mechanics, evaluating preterm delivery interventions, and measuring in vivo mechanical properties*, April 2016
32. Alex Cigan, Biomedical Engineering, advisor: Gerard Ateshian, *Nutrient channels to aid the growth of articular surface-sized engineered cartilage constructs*, April 2016
33. Shuaimin Liu, Mechanical Engineering, advisor: James Hone, *High Resolution Quantification of Cellular Forces for Rigidity Sensing*, January 201

Teaching Experience

MECE E3100, “Introduction to Mechanics of Fluids”, undergraduate course

Fall 2024, 88 students

Fall 2023, 71 students

Fall 2021, 78 students

Fall 2020, 61 students

Fall 2018, 61 students

MECE E4100, “Mechanics of Fluids”, undergraduate/graduate course

Spring 2023, 12 students

Spring 2021, 8 students

Spring 2019, 12 students

Spring 2018, 12 students

Spring 2017, 8 students

Spring 2016, 8 students

ENME E3105, “Mechanics”, undergraduate course

Spring 2025, 57 students

MEBM E4710, “Morphogenesis: Shape and Structure in Biological Materials”,
undergraduate/graduate course

Fall 2025, 10 students

Spring 2024, 17 students
Spring 2022, 11 students
Spring 2020, 23 students
Fall 2017, 12 students

Teaching Innovations

Designed and received COI approval for a new course in research area: MEBM E4710 “Morphogenesis: shape and structure in biological materials”. The course provides an introduction to how shape and structure are generated in biological materials, using an engineering approach that emphasizes the application of fundamental physical concepts to a diverse set of problems.

Outreach

- Faculty research mentor for 1 undergraduate student as part of summer research opportunities through Summer@SEAS and Columbia Engineering, Columbia University, 06/2024-08/2024.
- Faculty research mentor for 1 undergraduate and 1 masters student as part of summer research opportunities through Summer@SEAS and Columbia Engineering, Columbia University, 06/2023-08/2023.
- Faculty research mentor for 2 high school students as part of a summer research opportunity through the E.N.G Program at Columbia University, 07/2022-08/2022.
- Faculty research mentor for 2 undergraduates as part of summer research opportunities through Summer@SEAS and Columbia Engineering, Columbia University, 06/2022-08/2022.
- Faculty research mentor for 1 high school students as part of a summer research opportunity through the E.N.G Program at Columbia University, 07/2021-08/2021.
- Faculty research mentor for 3 undergraduates as part of summer research opportunities through Summer@SEAS and Columbia Engineering, Columbia University, 06/2021-08/2021.
- Faculty research mentor for 3 high school students as part of a summer research opportunity through the E.N.G Program at Columbia, 07/2020-08/2020.
- Faculty research mentor for 5 undergraduates as part of summer research opportunities through Columbia Engineering, 06/2020-08/2020.
- Kasza Lab tour for Inside Engineering visit by ELLIS Prep High School, 02/2020.
- Faculty research mentor for 2 high school students as part of a summer research opportunity through the E.N.G Program at Columbia, 06/2019- 09/2019.
- Faculty research mentor for 2 high school students as part of a summer research opportunity through the E.N.G Program at Columbia, 06/2018- 09/2018.
- Faculty research mentor for an undergraduate in engineering as part of a summer research opportunity through the J&J Scholars Program at Columbia, 06/2018- 09/2018.
- Faculty research mentor for 2 undergraduates in engineering as part of a summer research opportunity through the J&J Scholars Program at Columbia, 06/2017- 09/2017.

Service

Department of Mechanical Engineering, Columbia University

1. Member, Graduate Committee, 01/2016-present
2. Member, Faculty Search Committee, 09/2022-04/2023
3. Coordinator, Department Seminar Series, 09/2016-08/2017

4. Speaker, Mechanical Engineering External Advisory Board Meeting, 04/2016
5. Speaker, Mechanical Engineering Grad Students Association (MEGA), 03/2016

School of Engineering and Applied Science

1. Panelist, WiSE Conference, 10/2025
2. Panelist, SEAS New Faculty Orientation, 08/2025
3. Speaker, Society of Women Engineers, Women in Engineering Day, 04/2021
4. Speaker, Eggleston Student Seminar, 02/2021
5. Faculty representative, SEAS Internal Academic Review, 04/2019
6. Faculty representative, SEAS External Academic Review, 02/2019
7. Faculty speaker, Summer@SEAS Seminar, 07/2018
8. Faculty participant, Alumni Reunion Departmental Lunch, 06/2018
9. Panelist, SEAS New Faculty Orientation, 08/2017
10. Faculty speaker, NSF GRFP Workshop, 09/2017
11. Outreach to students admitted to Columbia Engineering, 04/2017
12. Faculty Participant, Women of Columbia Engineering Lunch, 04/2016, 04/2017
13. Faculty Panelist, Women in Science and Engineering (WISE) Conference, 11/2016
14. Faculty Panelist, Society of Women Engineers (SWE) Student Faculty Dinner, 10/2016

University

1. Reviewer, Internal review of fellowship and grant programs, 2023, 2024, 2025, 2026

Professional Service and Activities

Conference Organizer

1. Simons Center Workshop on Geometry, Topology, and Symmetry in Soft and Living Matter, Simons Center for Geometry and Physics, Stony Brook University, Stony Brook, NY, May 9-13, 2022 (co-organizer)
2. Annual Drosophila Research Conference, Virtual, March 2021 (Techniques and Technology Plenary Session co-chair)
3. Mechanobiology and Embryogenesis session at the 8th World Congress of Biomechanics, Dublin, Ireland, July 8-12, 2018 (session co-chair)
4. 8th Northeast Complex Fluids and Soft Matter Workshop (NCS8), Columbia University, New York, NY. January 12, 2018 (co-organizer)

Professional Association Activity

1. Chair, Technical Division on the Mechanics of Biological Systems and Materials, Society of Experimental Mechanics, June 2023 — June 2025
2. Co-chair, Technical Division on the Mechanics of Biological Systems and Materials, Society of Experimental Mechanics, June 2021 — June 2023
3. Secretary, Technical Division on the Mechanics of Biological Systems and Materials, Society of Experimental Mechanics, June 2019 — June 2021

Journal Paper Review

Proceedings of the National Academy of Sciences USA, Biophysical Journal, Cell Reports, eLife, Soft Matter, Nature Materials, Nature Communications, Nature Physics, Physical Review X, Journal of Cell Biology, Review Commons, Nature Reviews Molecular Cell Biology, Current Biology, PRX Life, Physical Review Letters, Physical Review E

Proposal Review

1. National Science Foundation (NSF), Panel Reviews, Dir. for Engineering, CMMI, BMMB
2. National Science Foundation (NSF), Ad hoc, Dir. for Biological Sciences, IOS, DSC
3. National Institutes of Health (NIH), Special Emphasis Panel Reviews, National Institute of General Medical Sciences (NIGMS)

Professional Organization Membership

1. American Physical Society (APS)
2. American Society for Cell Biology (ASCB)
3. Genetics Society of America (GSA)
4. Society for Experimental Mechanics (SEM)
5. Society for Developmental Biology (SDB)
6. Biophysical Society (BPS)

Grants

Current and Completed

1. NIH, National Institute for Childhood Health and Development, “Molecular and mechanical mechanisms coordinating cell rearrangements in 3D during epithelial morphogenesis” (to graduate student Erika Kusaka), Role: Sponsor, 5/1/2026 - 4/30/2028
2. NIH, National Institute of General Medical Sciences, “MIRA: Mechanisms coordinating cell behaviors within tissues during development”, Role: Sole PI, 8/19/2025-6/30/2030
3. NIH, National Institute for Childhood Health and Development, “Using genetics and optogenetics to dissect how Rho signaling is coordinated at distinct subcellular domains to drive epithelial tissue morphogenesis” (to graduate student Andrew Dylan Countryman), Role: Sponsor, 4/1/2025 - 3/31/2027
4. NIH, National Institute of General Medical Sciences, “MIRA: Mechanisms coordinating cell behaviors within tissues during development”, Role: Sole PI, 7/1/2020-4/30/2026
5. David & Lucile Packard Foundation, “Understanding and controlling the forces that build multicellular tissue structures”, Role: Sole PI, 10/15/2018-11/30/2026 (NCE)
6. Alfred P. Sloan Foundation; Sloan Research Fellowship in Physics, Role: Sole PI, 9/15/2022-9/14/2024 (completed)
7. National Science Foundation, “CAREER: Biophysical Mechanisms Underlying the Generation of Tissue Structure and Mechanics”, Role: Sole PI, 07/01/2018-05/31/2024 (completed)
8. Columbia University, Provost’s Grants Program for Junior Faculty, Role: Sole PI, 02/01/2017-01/31/2018 (completed)
9. Henry Luce Foundation, Clare Boothe Luce Assistant Professorship, Role: Sole PI, 09/01/2016-08/31/2021 (completed)
10. Burroughs Wellcome Fund, Career Award at the Scientific Interface (faculty portion) Role: Sole PI, 01/01/2016-06/30/2022 (completed)
11. Burroughs Wellcome Fund, Career Award at the Scientific Interface (postdoctoral portion) Role: Sole PI, 04/01/2014-12/31/2015 (completed)
12. Hay Whitney Foundation, Postdoctoral Fellowship, Role: Sole PI, 04/01/2011-03/31/2014 (completed)