

M. Lisa Manning

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| CONTACT INFORMATION | Physics Building 229G Department of Physics Syracuse University Syracuse, NY 13244 USA | <i>Voice:</i> 805.403.0808, 315.443.3920 <i>Fax:</i> 315.443.9103 <i>E-mail:</i> mmanning@syr.edu <i>Web:</i> https://mmanning.expressions.syr.edu |
| RESEARCH INTERESTS | Biophysics and Soft Matter. Modeling and analysis of collective and emergent behavior in biological tissues, as well as structure, deformation, and flow in glassy materials using theory and simulations. | |
| EDUCATION | University of California, Santa Barbara, California, USA Ph.D. Physics, September 2008 Dissertation title: <i>Effective temperature and strain localization in amorphous solids</i> Committee: Jean Carlson (advisor), James Langer, Ralph Archuleta M.A. Physics, May 2005 University of Virginia, Charlottesville, Virginia USA B.S. Physics, <i>with highest distinction</i> , 2002 B.A. Mathematics, 2002 | |
| ACADEMIC POSITIONS | 2015-present Associate Professor, Syracuse University. 2011-2015 Assistant Professor, Syracuse University. 2008-2011 Postdoctoral Fellow, Princeton University. | |
| AWARDS AND FELLOWSHIPS | 2018 Maria Goeppert Mayer Award, American Physical Society. 2016 Simons Investigator MMLS, Simons Foundation. 2016 IUPAP Young Investigator Prize, C3 (Statistical Physics) commission. 2015 Cottrell Scholar, Research Corporation. 2014 Scialog Fellow, Moore Foundation & Research Corporation. 2014 Physics Department Teaching Award, Phys 211, Syracuse University. 2014 Research Fellow, Alfred P. Sloan Foundation. 2013 Physics Department Teaching Award, Phys 576, Syracuse University. 2008-2011 Postdoctoral fellowship, Princeton Center for Theoretical Science. 2008-2011 Postdoctoral fellowship, Princeton Council on Science and Technology. 2004-2008 National Science Foundation Graduate Research Fellowship, NSF. 2007 Department Chair's Service Award, UCSB Department of Physics. 2003-2004 National Science Foundation Graduate K-12 Education Fellowship, NSF. 2004-2006 Physics Circus Outreach award, Department of Physics, UCSB. 2002 Barry M. Goldwater Scholarship, University of Virginia. 2001 Energy Research Lab. Undergrad. Fellow, Stanford Linear Accelerator. | |

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| EXTERNAL SUPPORT | 7/2017-6/2019 | \$25,000 | Cottrell Collaborative Award Workshop on developing authentic partnerships between Minority Serving Institutions and Primarily White Institutions. <i>PI, with 13 additional co-PIs.</i> |
| | 7/2016-6/2021 | \$500,000 | Simons Foundation 454947 Simons Investigator: Mathematical Modeling of Living Systems. |
| | 7/2016-6/2019 | \$686,000 | NSF-PHY-1607416 Predicting How Fluid-Solid Transitions in Cancer Tumors Help Govern Invasion and Metastasis. <i>With co-PIs Cristina Marchetti and Jennifer Schwarz.</i> |
| | 7/2016-6/2021 | \$546,000 | Simons Foundation 454947 Cracking the Glass Problem Collaboration. |
| | 7/2015-6/2018 | \$396,068 co-PI | NSF ACI-1541396 CC*DNI Engineer: Leading the Way for Research Computing at Syracuse University and Beyond. <i>With Samuel Scozzafava, PI and 3 other co-PIs.</i> |
| | 7/2015-6/2019 | \$ 1,020,000 | NIH-1R01GM117598 Quantitative Modeling of Cell Shape Changes During Organogenesis. <i>With collaborator Jeff Amack, Upstate Medical University.</i> |
| | 7/2015-6/2017 | \$ 56,250 | Scialog Gordon and Betty Morre Foundation. |
| | 6/2015-5/2018 | \$ 75,000 | Cottrell Scholar Research Corporation. |
| | 6/2014-5/2016 | \$ 50,000 | Sloan Fellowship Alfred P. Sloan Foundation. |
| | 6/2014-5/2019 | \$ 450,000 | NSF-DMR-CMMT 1352184 CAREER: Flow, Failure, and Migration in Glassy Materials. |
| | 7/2013-7/2017 | \$ 290,978 co-PI | NSF-BMMB-CMMI 1334611 Utilization of Smart Materials and Predictive Modeling to Integrate Intracellular Dynamics with Cell Biomechanics and Collective Tissue Behavior. <i>with Jay Henderson(PI) and Chris Turner.</i> |
| PH.D. STUDENTS SUPERVISED | Spring 2017 | Sven Wijtmans | |
| | expected 2018 | Giuseppe Passucci | |
| | expected 2018 | Michael Czajkowski | |
| | expected 2019 | Ethan Stanifer | |
| | expected 2020 | Preeti Sahu | |
| POSTDOCTORAL ASSOCIATES | 2012-15 | Dapeng (Max) Bi | Ph.D. Brandeis University 2012 |
| | 2015-16 | Jonathan Dawson | Ph.D. MPI-PKS 2012 |
| | 2015- | Matthias Merkel | Ph.D. MPI-PKS 2015 |
| | 2016- | Peter Morse | Ph.D. U. Oregon 2016 |
| | 2016- | Daniel Sussman | Ph.D. Illinois 2014 |
| 2017- | Gonca Erdemci-Tandogan | Ph.D. UC Riverside 2017 | |
| PREPRINTS AND SUBMITTED MANUSCRIPTS | A. M. Czajkowski, Dapeng Bi, M. L. Manning, M. C. Marchetti, "A Hydrodynamic Model for the Density-Independent Flocking Transition in Confluent Tissues," <i>submitted</i>, arXiv:1710.00708 (2018). | | |

B. Franziska Wetzel, Anatol Fritsch, Dapeng Bi, Roland Stange, Steve Pawlizak, Tobias Kiessling, Lars-Christian Horn, Klaus Bendrat, Maja Oktay, Axel Niendorf, John Condeelis, Michael Hckel, Cristina Marchetti, Lisa Manning, Josef A. Kaes, “Why do rigid tumours contain soft cancer cells?,” *submitted*, (2018).

C. G. Passucci, M.E. Brasch, J. H. Henderson, M. L. Manning, “Identifying the mechanisms that generate super-diffusivity in mouse fibroblast trajectories on 2D substrates,” *submitted*, arXiv:1712.05049 (2018).

D. Tristan Sharp, Matthias Merkel, M. Lisa Manning, Andrea J. Liu, “Statistical properties of 3D cell geometry from 2D slices,” *submitted*, arXiv:1802.09131 (2018).

E. Gonca Erdemci-Tandogan, Madeline Clark, Jeff Amack, M. L. Manning, “Tissue flow induces shape change during morphogenesis,” *submitted*, arXiv:1804.02252 (2018).

PEER-REVIEWED
PUBLICATIONS

31. Fabio Giavazzi, Matteo Paoluzzi, Marta Macchi, Dapeng Bi, Giorgio Scita, M. Lisa Manning, Roberto Cerbino, M. Cristina Marchetti, “Flocking Transition in Confluent Tissues,” *to appear in Soft Matter*, arXiv:1706.01113 , , (2018).

30. Daniel M. Sussman, M. Paoluzzi, M. Cristina Marchetti, M. Lisa Manning, “Anomalous glassy dynamics in simple models of dense biological tissue,” *Euro. Phys. Lett.* **121**, 36001, (2018). doi: 10.1209/0295-5075/121/36001

29. Agnik Dasgupta, Matthias Merkel, Andrew E. Jacob, Jonathan Dawson, M. Lisa Manning and Jeffrey D. Amack, “Asymmetric cell volume changes regulate epithelial remodeling of the left-right organizer,” *eLife* **7**, e30963, (2018). doi: 10.7554/eLife.30963

28. Daniel Sussman, Jennifer Schwarz, M. Cristina Marchetti, M. Lisa Manning, “Soft yet sharp interfaces in vertex-based models for confluent tissues,” *Editor’s suggestion in Phys. Rev. Letters* **120**, 058001, (2018). <https://doi.org/10.1103/PhysRevLett.120.058001>, Corresponding Synopsis

27. Matthias Merkel and Lisa Manning, “A geometrically controlled rigidity transition in a model for confluent 3D tissues,” *Fast Track communication, New Journal of Physics* **20**, 022002, (2018). <https://doi.org/10.1088/1367-2630/aaaa13>

26. X. Yang, Dapeng Bi, M. Czajkowski, M. Merkel, M. L. Manning, M. C. Marchetti, “Correlating Cell Shape and Cellular Stress in Motile Confluent Tissues,” *Proc. Nat. Acad. Sci.* **114**, 12663-12668, (2017). DOI: 10.1073/pnas.1705921114

25. Sven Wijtmans and M. L. Manning, “Disentangling defects and sound modes in disordered solids,” *Soft Matter (cover article)* **12**, 5649-5655, (2017). DOI: 10.1039/C7SM00792B

24. Matthias Merkel and M. Lisa Manning, “Using cell deformation and motion to predict forces and collective behavior in morphogenesis,” *Seminars in Developmental Biology* **67**, 161-169, (2017). DOI: 10.1016/j.semcd.2016.07.029

23. Dapeng Bi, X. Yang, M. C. Marchetti, M. L. Manning, “Motility-driven glass transitions in biological tissues,” *Phys. Rev X* **6**, 021011, (2016). <http://dx.doi.org/10.1103/PhysRevX.6.021011>

22. Dapeng Bi, J. Lopez, J. Schwarz, M. L. Manning, “A density-independent rigidity transition in biological tissues,” *Nature Physics* **11**, 1074-1079, (2015). DOI: 10.1038/nphys3471

21. S Pawlizak, A Fritsch, S Grosser, D Ahrens, T Thalheim, S Riedel, T Kiessling, M Zink, ML Manning, and JA Kaes, “Testing the differential adhesion hypothesis across the epithelial-mesenchymal transition,” *New Journal of Physics* **17**, 24 August, (2015). DOI: 10.1088/1367-2630/17/8/083049, Corresponding New Journal of Physics Perspective Article
20. J-A Park, JH Kim, D Bi, JA Mitchel, NT Qazvini, K Tantisira, CY Park, M McGill, S-H Kim, R Steward, Jr., S Burger, W Qiu, SH Randell, A Kho, D Tambe, C Hardin, SA Shore, E Israel, DA Weitz, DJ Tschumperlin, ST. Weiss, EP Henske, ML Manning, JP Butler, J M Drazen, JJ Fredberg, “Unjamming transition to cellular hypermobility in the asthmatic airway epithelium,” *Nature Materials* **14**, 1040-1048, (2015). DOI: 10.1038/nmat4357, Corresponding Nature Material News and Views Article
19. Danielle S. Bassett, Eli T. Owens, Mason A. Porter, M. Lisa Manning, Karen E. Daniels, “Extraction of Force-Chain Network Architecture in Granular Materials Using Community Detection,” *Soft Matter (cover article)* **11**, 2731-2744, (2015). DOI: 10.1039/C4SM01821D
18. M. L. Manning and A. J. Liu, “A random matrix definition of the boson peak,” *Europhys. Lett.* **109**, 36002, (2015). DOI: 10.1209/0295-5075/109/36002
17. Craig Fox, Lisa Manning, and Jeff Amack, “Automated tracking of beads in the ciliated zebrafish organ of asymmetry to quantify the role of fluid flow in left-right patterning,” *accepted as an invited chapter in Methods in Cell Biology; Methods in Cilia & Flagella*, Elsevier, (2015).
16. Xingbo Yang, M. Lisa Manning and M. Cristina Marchetti, “Aggregation and Segregation of confined active particles,” *Soft Matter* **10**, 6477-6484, (2014). DOI: 10.1039/C4SM00927D, Commentary in Journal Club for Condensed Matter Physics
15. R. M. Baker, M. E. Brasch, M. L. Manning, J. H. Henderson, “Automated, contour-based tracking and analysis of cell behavior over long timescales in environments of varying complexity and cell density,” *J. Roy. Soc. Interface* **11(97)**, 20140386, (2014). DOI: 10.1098/rsif.2014.0386
14. Dapeng Bi, J. Lopez, J. Schwarz, M. L. Manning, “Energy barriers and cell migration in densely packed tissues,” *Soft Matter* **10**, 1885-1890, (2014). DOI: 10.1039/C3SM52893F, Commentary in Journal Club for Condensed Matter Physics
13. T. Idema, J. O. Dubuis, L. Kang, M. L. Manning, P. C. Nelson, T. C. Lubensky, and A. J. Liu, “The syncytial *Drosophila* embryo as a mechanically excitable medium,” *PLOS ONE* **8(10)**, e77216, (2013). DOI: 10.1371/journal.pone.0077216
12. E.-M. Schoetz, M. Lanio, J. Talbot, and M. L. Manning, “Glassy dynamics in three dimensional embryonic tissues,” *J. Roy. Soc. Interface* **10(89)**, 20130726, (2013). DOI: 10.1098/rsif.2013.0726
11. J. D. Amack, M. L. Manning, “Knowing the Boundaries: Extending the Differential Adhesion Hypothesis in Embryonic Cell Sorting,” *Science* **338 (6104)**, 212-215, (2012). DOI: 10.1126/science.1223953
10. G. Wang, M. L. Manning, and J. D. Amack, “Regional Cell Shape Changes Control Form and Function of Kupffer’s Vesicle in the Zebrafish Embryo,” *Dev. Bio.* **370 (1)**, 52-62, (2012). DOI: 10.1016/j.ydbio.2012.07.019

9. M. L. Manning and A. J. Liu, "Vibrational modes identify soft spots in a sheared disordered packing," *Phys. Rev. Lett.* **107**, 108302, (2011). DOI: 10.1103/PhysRevLett.107.108302
8. K. Chen, M. L. Manning, P. J. Yunker, W. G. Ellenbroek, Z. Zhang, A. J. Liu, and A. G. Yodh, "Measurement of Correlations between Low-Frequency Vibrational Modes and Particle Rearrangements in Quasi-Two-Dimensional Colloidal Glasses," *Phys. Rev. Lett.* **107**, 108301, (2011). DOI: 10.1103/PhysRevLett.107.108301
7. M. L. Manning, R. A. Foty, M. S. Steinberg, and E.-M. Schoetz, "Coaction of intercellular adhesion and cortical tension specifies tissue surface tension," *Proc. Nat. Acad. Sci.* **107**, 28 12517-12522, (2010). DOI: 10.1073/pnas.1003743107
6. E. G. Daub, M. L. Manning and J. M. Carlson, "Pulse-like, crack-like and supershear earthquake ruptures with shear strain localization," *J. Geophys. Res.* **115**, B05311, (2010). DOI: 10.1029/2009JB006388
5. M. L. Manning, E. G. Daub, J. S. Langer and J. M. Carlson, "Rate dependent shear bands in a shear transformation zone model for amorphous solids," *Phys. Rev. E* **79**, 016110, (2009). DOI: 10.1103/PhysRevE.79.016110
4. E. G. Daub, M. L. Manning and J. M. Carlson, "Shear strain localization in elastodynamic rupture simulations," *Geo. Res. Lett.* **35**, L12310, (2008). DOI: 10.1029/2008GL033835
3. J. S. Langer and M. L. Manning, "Steady-state, effective-temperature dynamics in a glassy material," *Phys. Rev. E* **76**, 056107, (2007). DOI: 10.1103/PhysRevE.76.056107
2. M. L. Manning, J. S. Langer and J. M. Carlson, "Strain localization in a shear transformation zone model for amorphous solids," *Phys. Rev. E* **76**, 056106, (2007). DOI: 10.1103/PhysRevE.76.056106
1. M. Manning, J. M. Carlson and J. Doyle, "Highly Optimized Tolerance in dense and sparse resource regimes," *Phys. Rev. E* **72**, 016108, (2005). DOI: 10.1103/PhysRevE.72.016108

SELECTED INVITED **100+** invited talks total

TALKS

- 2018 Invited talk, Theory and Biology meeting, Simons Foundation (April).
- 2018 Computational biophysics seminar, Flatiron Institute (April).
- 2018 Cell and Molecular Biology seminar, Harvard University (March).
- 2018 Invited Award Talk, APS meeting Los Angeles (March).
- 2017 Invited talk, Mechanobiology subgroup, Am. Soc. Cell Bio. (Dec).
- 2017 Physics Colloquium, Washington University St. Louis (Oct).
- 2017 Physics Colloquium, North Carolina A&T (Sept).
- 2017 LASSP seminar, Cornell University (Aug).
- 2017 Seminar, ERC Cancer kickoff meeting Freyburg (Aug).
- 2017 Physics Colloquium, University of Chicago (May).
- 2017 Systems Biology seminar, Harvard University (April).

- 2017 Collective Motion Symposium. APS March meeting.
 2017 Simons Cracking the glass Collaboration, NYC (March).
 2017 Biophysical Society Mechanobiology subgroup (February).
 2017 Physical Oncology Gordon Conference, Galveston, TX (February).
 2017 Maryland Stat. Phys. seminar and Physics Colloquium (January).
 2016 Simons Foundation Mathematical and Physical Sciences Meeting (Oct).
 2016 Physics Colloquium, New York University (Oct).
 2016 Biophysics seminar, Rice University (Oct).
 2016 Invited talk and award, StatPhys 26, Lyon France (July).
 2015 Frontiers in Pattern formation, Nat. Acad. of Sci. (Oct).
 2015 Quantitative Cell Biology conference, Chicago, IL (Oct).
 2015 Seminar, Max Planck Inst. Physics of Complex Systems, Dresden, Germany (Sept).
 2015 Physics of Cancer conference in Leipzig, Germany (Sept).
 2015 Gordon Conference on Soft Matter, Colby Sawyer College (Aug).
 2015 American Physical Society Meeting, Frontiers of Soft Matter Symposium (Mar).
 + **81 talks prior**

TEACHING

Syracuse University, Syracuse, NY USA

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| Spring 2017, Spring 2018 | <i>Physics 215</i> Honors Introductory Physics |
| Fall 2015 | <i>Physics 399/600</i> Practicum in Science Teaching |
| Spring 2015, Spring 2013, Fall 2011 | <i>Physics 576</i> Introduction to Solid State Physics |
| Fall 2012, Spring 2014(2) | <i>Physics 211</i> General Physics I: Mechanics |

DEPARTMENTAL
AND UNIVERSITY
SERVICE

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| 2018- | Faculty Liaison to Women in Science and Engineering Postdoc Group |
| 2017- | Co-chair, Physics Department Strategic Planning Research Committee |
| 2017- | Member, Physics Department Faculty Planning Committee |
| 2016-17 | Chair, Faculty Search committee in soft matter/biophysics |
| 2016 | Co-chair, Conference for Undergraduate Women in Physics |
| 2015 | Co-chair, Working Group of Syracuse Biomaterials Institute |
| 2015 | Member, Faculty Advisory Committee for College of Medicine |
| 2014-15 | Member, Soft Matter Experimental Physics Faculty Search Committee. |
| 2014-15 | Member, College of Arts and Sciences Dean Search Committee. |
| 2013-14 | Chair, Graduate Recruiting Committee, Physics Department. |

PROFESSIONAL
ACTIVITIES AND
OUTREACH

- 2013 - Panelist for Women in Science and Engineering (WiSE) workshops: Dual Career, Writing a Dissertation, Peer Mentoring.
- 2012-15 Coordinator, Soft Interfaces IGERT orientation and student seminar.
- 2012- Oral exam committee member, Xingbo Yang, Jorge Lopez, Sean Sweeney, Jikai Wang (Physics), Kevin Davis, Megan Brasch, Fred Donelson (Bio. Eng.).
- 2011- Thesis committee: Shiliyang Xu, Zhenwei Yao, Jorge Lopez (Physics), Kosmas Diveris (Math-Chair), Sean Delaney (Chemistry-Chair), Thomas Juliano, (Chemistry - Chair), Megan Brasch (BMCE - Chair).
- 2011- Graduate Academic Advisor: Sven Wijtmans, Craig Fox, Jie Yang, Fu-Hao Chen (Physics).
- 2011-13 Chair('13) and co-Chair, Undergraduate Research Day, Physics Department.
- 2011-13 Coordinator: condensed matter theory group meeting.
- NSF Reviewer and Review Panelist.
- 2018 Public Lecture, Simons Foundation NYC, March 7
- 2018 PI and Co-organizer, Workshop for partnerships between MSIs (Minority-Serving Institutions) and PWIs (Primarily White Institutions), UC Irvine
- 2017- APS GSNP, Elected Member at Large.
- 2008- Referee: Science, Proc. Nat. Acad. Science, Roc. Soc. Interface, Phys. Rev. Letters, Phys. Rev. E, Phys. Rev. B, Phys. Bio., Biophys. J., Sci. Reports, New Jour. Phys., PLOS Comp. Bio, and Rev. Mod. Phys.
- 2017 APS GSOF T Program committee member.
- 2017,15 Lecturer, Boulder Condensed Matter Summer School.
- 2017 Public Lecture, Boulder CO, July
- 2015-17 APS GSOF T Membership committee chair.
- 2017 Public Lecture, Aspen CO, March
- 2016 Co-organizer, Workshop on the Physics of Development and Disease, Aspen Center for Physics (March).
- 2015 Co-organizer, Random walks and nonlinearity in the life of cells workshop MPI-PKS Dresden (May).
- 2014 Guest lecturer, Multiscale integration of biological systems, Institute Curie.
- 2014 Syracuse Soft Matter Program public lecture, "The sound of disorder".
- 2013- Guest Editor, New J. Phys. issue on Multicellularity and Active Matter.
- 2012 Jr. Science Cafe Seminar, Museum of Science and Technology (MoST), Syracuse NY
- 2006 Invited Speaker and Chaperone: Conference for Undergraduate Women in Physics, USC.
- 2003-08 WiSE graduate mentor, Chair and Webmaster: Women in Physics Group UCSB.
- 99-2001 Associate Editor and Staff Writer: Cavalier Daily Health and Science Section, University of Virginia.