Madhav Mani

Engineering Sciences and Applied Mathematics, Northwestern University, 2145 Sheridan Road, Evanston, IL 60208
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Current Positions

Assistant Professor, Engineering Sciences and Applied Mathematics (ESAM), Northwestern University

Adjunct Faculty Member, Molecular Biosciences, Northwestern University

Founding Member of the Institute of Theoretical and Computational Soft Matter, Northwestern University

Quantitative Biology Group Leader, Northwestern Institute of Complex System (NICO), Northwestern University

Leadership Council, NSF-Simons Center for Quantitative Biology (CQuB), Northwestern University

Education & Research Experience

2010-2014: Simons Postdoctoral Fellow, Kavli Institute of Theoretical Physics (KITP) & University of California Santa Barbara (UCSB) Physics,
Mentor: B.I. Shraiman

2007-2010: PhD, School of Eng. and App. Sci., Harvard University
Title: Dynamics at Soft Interfaces, *Mentors*: M.P. Brenner and L. Mahadevan

2006-2007: S.M., School of Eng. and App. Sci.,Harvard University

2005-2006: Masters of Advanced Studies in Mathematics and Theoretical Physics (Part 3), Cambridge University

2004-2005: M.A. in Mathematics and Theoretical Physics
Trinity Hall, Cambridge University - First-class honors

2002-2005: B.A. in Mathematics and Theoretical Physics
Trinity Hall, Cambridge University - First-class honors

Awards & Fellowships

2016-present: Simons Investigator in the mathematical modeling of living systems

2015-2016: June and Donald Brewer Chair, ESAM, Northwestern University.

2010-2013: Simons Postdoctoral Fellowship. *1 of 30 national fellowships awarded nationwide to exceptional young scientists in Theoretical Physics, Mathematics, and Computer Science.*

2009: Derek Bok undergraduate teaching award, Harvard University. *Selection based on student ratings across multiple courses.*

2007-2008: Robert L. Wallace Prize Fellowship, Harvard University. *Awarded by the Office of Student Affairs, in open competition and without regard to need, to a Ph.D. candidate conducting research on subjects related to the study of engineering sciences.*

Articles in submission/review

1. Stochastic gene expression is optimized to drive developmental self organization R Giri, DK Papadopoulos, DM Posadas, H Potluri, P Tomancak, M Mani, R Carthew (bioRxiv, 546911 – Accepted at ELife)
2. The Wg and Dpp morphogens regulate gene expression by modulating the frequency of transcriptional bursts R Bakker, M Mani, RW Carthew (BioRxiv, doi: http://dx.doi.org/10.1101/2020.01.24.918623 – In Submission at ELife)
3. Evolution of generalists by phenotypic plasticity DT Fraebel, K Gowda, M Mani, S Kuehn (bioRxiv, 761288 – In Submission at ELife)

Peer-Reviewed Articles

1. The Role of Cytoplasmic Interactions in the Collective Polarization of Tissues and its Interplay with Cellular Geometry: S Shadkhoo, M Mani (Plos Comp. Bio. 15(11)– 2019)
2. A jump distance based parameter inference scheme for particulate trajectories in biological settings: R Menssen, M Mani (Biophysical journal 117 (1), 143-156 – 2019)
3. QuBiT: a quantitative tool for analyzing epithelial tubes reveals unexpected patterns of organization in the Drosophila trachea: R Yang, E Li, YJ Kwon, M Mani, GJ Beitel (Development, dev. 172759 – 2019)
4. Distinct contributions of tensile and shear stress on E-cadherin levels during morphogenesis: GR. Kale, X Yang, JM Philippe, M Mani, PF Lenne, T Lecuit (Nature Communications volume 9, Article number: 5021 – 2018)
5. A scheme for 3-dimensional morphological reconstruction and force inference in the early C. elegans embryo: M Xu, Y Wu, H Shroff, M Wu , M Mani (PLoS ONE 13(7): e0199151 – 2018)
6. Matrix Production and Sporulation in Bacillus subtilis Biofilms Localize to Propagating Wave Fronts: S Srinivasan S, D Vladescu, SA Koehler, X Wang, M Mani, SM Rubinstein. (Biophys J. 2018 Mar 27;114(6):1490-1498.)
7. Active Tension Network model of epithelial mechanics: N Noll, M Mani, I Heemskerk, S Streichan, B.I. Shraiman (Nature Physics 13, 1221-1226 – 2017)
8. Collective Polarization and gradient sensing in the Fat pathway: M. Mani, S. Goyal, K. Irvine, B.I. Shraiman (Proceedings of the National Academy of Sciences 110.51 - 2013)
9. Principles of E-cadherin supramolecular organization *in vivo*: B.A.T. Quang, M. Mani, O. Markova, T. Lecuit, P-F. Lenne (Current Biology 23.22 - 2013)
10. Propagation of Dachsous-Fat Planar Cell Polarity, A. A. Ambegaonkar, G. Pan, M. Mani, Y. Feng, K. D. Irvine (Current Biology, Volume 22 June 2012)
11. Physical ageing of the contact line on colloidal particles at liquid interfaces David M. Kaz, Ryan McGorty, M. Mani, Michael P. Brenner, and Vinothan N. Manoharan (Nature Materials, 11, 138-142 - 2012)
12. How Things Get Stuck: Kinetics, Elastohydrodynamics, and Soft Adhesion M. Mani, Arvind Gopinath, and L. Mahadevan (Phys. Rev. Lett. 108, 226104 - 2012)
13. Self assembly of magnetically interacting cubes by a turbulent fluid flow: Filip Ilievski, M. Mani, G. Whitesides, M.P. Brenner (Phys. Rev. E, 83, 017301 - 2011)
14. Events before droplet splashing on a solid surface: M. Mani, S. Mandre, M. Brenner (J. Fluid Mech., 647, 163 - 2010)

15. Precursors to splashing of liquid droplets on a solid surface: S. Mandre, M. Mani, M. Brenner (Phys. Rev. Lett. 102, 134502, 2009)
16. Botanical ratchets: I. Kulic, M. Mani, H. Mohrbach, R. Thaokar, L. Mahadevan (Proceedings of the Royal Society of London (B), Biological Sciences, 276, 2243-47, 2009)

Invited Talks

1. Feb-2020: Stanford University (USA)
2. Dec-2019: Chan-Zuckerberg Biohub (USA)
3. Nov-2019: UChicago (USA)
4. Sept-2019: Les Treilles Meeting on Developmental Patterning (France)
5. Aug-2019: KITP (USA)
6. Mar-2019: Duke University (USA)
7. Mar-2018: Rockefeller University (USA)
8. Dec-2017: The Crick Inst. (UK)
9. Nov-2017: UIUC (USA)
10. Aug-2017: Marine Biological Labs Summer School (USA)
11. July-2017: EPFL (Switzerland)
12. July-2017: University of Geneva (Switzerland)
13. Mar-2017: Rutgers University (USA)
14. Apr-2017: APS March Meeting Invited Speaker (USA)
15. Apr-2017: Yale University (USA)
16. Oct-2016: Morphogenesis, Metabolism, and signaling, Max Planck Institute for complex systems, Dresden (Germany)
17. July-2016: Mechanics and Mechanisms of Morphogenesis Summer Workshop, KITP (USA)
18. May-2016: Midwest QBio Retreat, UIUC (USA)
19. May-2015: Physical Biology Retreat, Utah (USA)
20. Nov-2014: Biophysics Theory Seminar, Institute Curie (France)
21. Nov-2014: Statistical Mechanics Seminar, ecole normale suprieure (France)
22. Sep-2014: Quantitative Biology Seminar, Medical Research Council (UK)
23. Apr-2014: Emerging Leaders in Systems-level Biology Symposium at Cincinnati Children's Hospital Medical Center and University of Cincinnati College of Medicine
24. Feb-2014: Center for Biological Physics, UCLA (USA)
25. Feb-2014: Biophysics Seminar, Princeton University (USA)
26. Jan-2014: Engineering Sciences and Applied Math Seminar Series, Northwestern University (USA)
27. Dec-2013: Lewis-Sigler Seminar, Princeton University (USA)
28. Nov-2013: Widely Applied Mathematics, Harvard University (USA)
29. Mar-2013: Invited talk at Special Session at APS March Meeting
30. Aug-2013: Morphogenesis Workshop, Kavli Inst. of Theoretical Physics (USA)
31. Aug-2012: Physics and Mathematics of Cancer Workshop, Kavli Inst. of Theoretical Physics (USA)

32. Apr-2012: Simons Postdoctoral Fellows Symposium, Stonybrook (USA)
33. Feb-2013: Mechano-Biology Institute, National University of Singapore (Singapore)

Organizational Responsibilities

1. 2019: Course organizer at KITP Summer School on Morphogenesis
2. 2018: Leadership Council for the Center for Quantitative Biology at Northwestern
3. 2018: Led the submission of the grant for NSF-Simons center for Quantitative Biology (Awarded)
4. 2017: Group leader at the summer school on Physical Biology of the Cell at the Marine Biological Labs at WoodsHole
5. 2017: Instructor at Cold Spring Harbor Labs bootcamp on Physical Biology
6. 2016: Member of Organizing Committee of Morphogenesis Program at the Kavli Inst. of Theoretical Physics.
7. 2016: Member of Organizing Committee of Live Imaging and Morphogenesis School at Santa Barbara.
8. 2015: Chicago Biophysics and Quantitative Biology Group Meeting hosted at the Northwestern Institute on Complex Systems.
9. July-August 2013: Live Imaging in Morphogenesis workshop and conference at the Kavli Inst. of Theoretical Physics.